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TARAGO RAIL CORRIDOR
REMEDIAL ACTION PLAN

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REMEDIAL ACTION PLAN

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CONTENTS

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
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
DP	Deposited Plan
DQI	Data Quality Indicator
EIL	Ecological Investigation Level
EPA	Environment Protection Authority
fpXRF	Filed portable X-Ray Fluorescence metals analyser
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
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
-	On tables is "not calculated", "no criteria" or "not applicable"

EXECUTIVE SUMMARY

Ramboll Australia Pty Ltd (Ramboll) was retained by John Holland Rail (JHR) on behalf of Transport for NSW (TfNSW) to prepare a Remedial Action Plan (RAP) for contamination identified along approximately one kilometre of the Goulburn – Bombala rail corridor at Tarago, NSW (the site).

In November 2019 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: 20201103; 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 in soil ("the Contaminant") to be lead.

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

Site contamination appears limited to ballast in rail formations and surrounding soils to a maximum depth of approximately 0.5 meters below ground level. Contaminated rail formations include the redundant Woodlawn Siding (historically used to load ore concentrate for rail transport), the Tarago Yard Loop and the Goulburn – Bombala main line. Contaminated soils are generally limited to those adjacent the rail formation though include a vertically defined band beneath approximately one meter of uncontaminated clayey fill around the footprint of the former Ore Concentrate Loadout Complex buildings.

Contaminant migration from the site occurred in airborne dust and surface water. The Tarago Lead Management Action Plan was developed by Ramboll in 2020 to address associated exposure risks. This included removal of dust from affected houses and rainwater tanks, application of a polymer sealant to contaminated surfaces onsite and monitoring of surface water and air quality which are ongoing. Surface water and air quality monitoring completed to date indicates risks of exposure to site contamination in the surrounding environment are low and within this context remediation offsite is not considered necessary.

The objective of remediation is to address the risk to human health and the environment from contamination at the site.

The preferred remedial strategy comprises offsite disposal of ballast fines from the Woodlawn Siding and adjacent surface soils. Offsite disposal will include excavation and transport of soils to a compound established at a licensed waste facility. Ballast will be mechanically screened for reuse onsite following successful validation. Ballast fines will be chemically immobilised for disposal as General Solid Waste in accordance with a NSW EPA Specific Immobilisation Approval.

Contaminated ballast will remain within operational rail formations and at depth around the footprint of the former Ore Concentrate Loadout Complex buildings. Remnant contamination will be managed under a long term environmental management plan (LTEMP).

The former Station Masters Cottage adjacent the rail formation has been acquired by TfNSW. Contaminant exposure risks will be managed under the LTEMP prepared for other remnant contamination.

The effectiveness of remediation at mitigating exposure risks associated with site contamination in the receiving environment will be assessed through post remediation surface water and air quality monitoring.

1. INTRODUCTION

Ramboll Australia Pty Ltd (Ramboll) was retained by John Holland Rail (JHR) on behalf of Transport for NSW (TfNSW) to prepare a Remedial Action Plan (RAP) for contamination identified along approximately one kilometre of the Goulburn – Bombala rail corridor at Tarago, NSW. This area is presented on **Figure 1**, **Appendix 1** and is here-in referred to as the site.

1.1 Background

Ramboll has assisted JHR to date in the assessment and management of site contamination including assessment of risks to human health and ecological receptors within and surrounding the site. This previous assessment included identification of data gaps that limited capacity to assess potential risks to users of Tarago Station and sensitive offsite receptors.

In November 2019 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: 20201103; 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 in soil ("the Contaminant") to be 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 and
- 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 include:

P1. Collate and review data from third parties in relation to lead in soil and water in the Tarago area

P2. Complete delineation of lead impacts within the corridor through investigation footprint of the former Woodlawn Ore Concentrate Load-Out Complex

P3. Install seven groundwater monitoring wells within he rail corridor and on public land to the east between the rail corridor and the Mulwaree River to assess impacts to groundwater

P4. Assess vertical distribution of lead concentrations through the soil profile at monitoring well locations described above

P5. Assess concentrations of lead in surface waters and sediments downstream of the site

P6. Preparation of a Detailed Site Investigation (Ramboll 2020a)

P7. Preparation and implementation of an Action Plan (Ramboll 2020b) including interim management measures and verification monitoring to be implemented until completion of remediation.

P8. Assess remedial options to address site contamination

P9. Select a preferred remedial option integrating consultation with the community and other stakeholders

P10. Prepare a RAP(s) to define how the selected remedial option will be implemented and validated

P11. Obtain a Section B Site Audit Statement from an Auditor accredited under the NSW EPA Site Auditor Scheme confirming:

- The assessment adequately characterises the degree and extent of site contamination
- The RAP(s) are suitable to address risks associated with site contamination

P12. Implement the RAP(s)

P13. Compile a validation report that describes and provides evidence of the activities taken to effect remediation and concludes on the success of remediation

P14. Obtain a Site Audit Statement from an Auditor accredited under the NSW EPA Site Auditor Scheme confirming remediation has occurred in accordance with the RAP and objectives of this VMP are met, i.e. a Section B4 Site Audit.

Principal features P1 – P6 have been addressed. The Action Plan described under P7 has been prepared and continues to be implemented.

1.2 Objective

The objective of this RAP is to define a remedial strategy to address the risk to human health and the environment from contamination at the site. This includes addressing VMP principal features P8 – P10 and will underpin progression through P11 – P14.

1.3 Scope of Work

The scope of this Remedial Action Plan is to define the requirements for implementation of the preferred remedial strategy and associated validation to be undertaken at the site to achieve the remediation objective.

2. REGULATORY REQUIREMENTS

This Remedial Action Plan has been prepared in general accordance with the following guidance documents:

- National Environment Protection Council (NEPC), National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013 (NEPM, 2013)
- NSW EPA, Contaminated Land – Consultants Reporting on Contaminated Land (NSW EPA, 2020)
- NSW EPA, Sampling Design Guidelines (EPA, 1995)
- NSW EPA, Guidelines for the Site Auditor Scheme (3rd Edition) (NSW EPA, 2017)
- NSW EPA, Waste Classification Guidelines, Part 1: Classifying Waste (NSW EPA, 2014)
- State Environmental Planning Policy 55 – Remediation of Land

2.1 Voluntary Management Proposal

In March 2020, the NSW EPA declared the site to be significantly contaminated under Section 11 of the CLM Act (Declaration Number: 20201103; 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 site is now regulated under VMP (Notice Number: 20201711, dated 25 May 2020) which defines the requirements for management and remediation of the Contaminant, as well as a performance schedule for the management works. The performance schedule defines the relative timeline for completion of the staged management. The requirements for the preparation of this RAP are defined in the VMP including:

P8. Assess remedial options to address site contamination

P9. Select a preferred remedial option integrating consultation with the community and other stakeholders

P10. Prepare a RAP(s) to define how the selected remedial option will be implemented and validated

3. SITE DESCRIPTION

3.1 Site Identification

The site particulars are presented in **Table 3-1**.

Table 3-1: Site Particulars

Information	Description
Street Address:	Accessed from Stewart Street and Goulburn Street Tarago NSW
Identifier:	Part Lot 22 DP1202608 and Lot 1 DP816626
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)

A site Locality Plan is presented as **Figure 1**, **Appendix 1.** Site features plans are presented as **Figures 2a – 2e**, **Appendix 1**.

3.2 Land Use

The site forms part of the Goulburn – Bombala rail corridor. Review of satellite imagery and site inspection identified land use within the surrounding environment including:

- Tarago Station (onsite).
- A former residence adjacent (east of) the site and adjacent (north of) Tarago Station, defined as 106 Goulburn Street Tarago (Lot 1 DP816626 - the Station Masters Cottage). The Station Masters Cottage is known to be impacted by the Contaminant and has been purchased by TfNSW to be reintegrated within the rail corridor and is no longer used as a residence. The future use of the Station Masters Cottage is not known however will not include residential land use until demonstrated suitable for this purpose.
- A farm with a dam that receives waters from the site (during surface water flow), located adjacent (east of) the northern end of site.
- Tarago Public School approximately 120 m east of the northern end of site.
- Residences approximately 70 m west of the south end of site and east of Goulburn Street.
- Tarago Recreation Area approximately 300 m east of site.

4. SITE HISTORY

Site history previously presented in the *Tarago Rail Corridor and Tarago Area Detailed Site Investigation* (Ramboll 2020a) is summarised in **Table 4-1**.

Table 4-1: Site History Summary

Site	Description
Zoning	The site is currently zoned RU2 Rural Landscape under the Goulburn Mulwaree Local Environmental Plan (LEP).
Council Records	Council held records identified as relevant to the former loadout complex were limited to the Woodlawn Project Environmental Impact Statement (Jododex Australia, 1976). The following excerpts from the EIS (Section 8.11 Transport of Concentrates) are considered relevant to the type and distribution of contamination associated with the former loadout complex: *The Woodlawn project will market four products. These are a zinc concentrate, a lead concentrate and two different copper concentrates, one from the 'complex ore' and one from the 'footwall copper ore'.* *The zinc concentrate consists mainly of sphalerite (zinc sulphide), the lead concentrate of galena (lead sulphide) and both copper concentrates of chalcopyrite (copper iron sulphide). Each of the concentrates contain various proportions of the other base metal sulphides and pyrite (iron sulphide) as the main contaminants…* *Separate storages for the various types of concentrates would be provided in the shed and a passageway between concentrate stockpiles and the railway spur line will allow trucks to enter and depart from opposite ends of the building. The tipped concentrates will be pushed up by front end loader to make best possible use of the available storage space. The amount of storage capacity provided at Tarago will not be large as it is anticipated that there will be frequent dispatches of concentrates by rail from Tarago. The average quantity of material involved will be about 775 wet tonnes per day, requiring about 35 truck movements.*
Mine Owner (Heron Resources Limited) Records	Review of records accessible from the website of Heron Resources Limited (the mine owner) (SRK, 2015) indicate the Woodlawn deposit was discovered in 1970 and mined by open-pit and underground methods between 1978 and 1998. Additionally, the SRK report references a rail siding in Tarago that was historically used to rail concentrates to smelters in Newcastle and Port Kembla and to a concentrate berth at Port Kembla.
Dangerous Goods	A search of the SafeWork NSW Dangerous Goods register has not been completed as previous inspection of the site indicates all infrastructure associated with the former loadout complex (except the rail formation) has been removed.
Licenses, Permits and Approvals	A search of the NSW Environment Protection Authority (EPA) Public Register (www.epa.nsw.gov.au/prpoeoapp) was undertaken on 13 January 2020 and identified JHR operate the CRN under EPL 13421. EPL 13421 includes environmental limits for pollution of waters, noise, blasting, odour and dust as well as requirements for notification of environmental harm.
EPA Records	The site was notified to the NSW EPA under section 60 of the Contaminated Land Management Act in November 2018.
Historical Aerial Photographs	Historical aerial photographs were obtained and reviewed for the years 1960, 1976, 1985, 1991, 1997 and 2005. Review indicates the loadout complex was located approximately 20 m north of Tarago Station adjacent/over the west side of the rail formation. Loadout complex infrastructure appears to have included a

Site	Description
Interview of loadout complex employee	loop road for truck access from the south, a truck dumping station, a conveyor from the dumping station to a larger square building and an undercover rail loading point extending over part of the rail formation (the former Woodlawn siding). The loadout complex appears to have been constructed between 1976 and 1985 with demolition between 1997 and 2005. Evidence of the loadout complex in satellite imagery after demolition appears limited to remnants of the haul road for truck access from the south. The loadout complex is identified as the main potential source of site contamination. Key points from interview of a former employee of the loadout complex (and long term resident of Tarago) are summarised below: • The load-out complex floor elevation was approximately the same elevation as the remnant Woodlawn Siding. The current elevation across the area of the load-complex footprint is approximately one meter higher. This is a result of soil that was imported to cap the area after demolition of the buildings. • During operation, ore was transported to the loadout complex by truck, tipped at a dump station, transported via conveyor into the main building and loaded onto rail cars using a front-end loader • The tail gates of trucks used to haul ore from the mine to the corridor used to bang all the way down Stewart Street as they drove off and the road was green from the ore. • Movement of sediment from the former ore concentrate load-out complex occurred during high rainfall weather events. A flood occurred in the early 1980s which washed through the load-out complex and knocked over the fences to the station masters cottage. Sediment was transported down Wallace Street and possibly across Boyd Street through the tennis courts to the River.
Historical Title Search	A historical title search was not completed based on the longstanding use of the site as a rail corridor.

5. GEOLOGY AND HYDROGEOLOGY

A summary of the site geology and hydrogeology is detailed in **Table 5-1**.

Table 5-1: Summary of Geology and Hydrogeology

Site	Details
Geology	Review of the Australian Geoscience Information Network (AUSGIN) portal (http://portal.geoscience.gov.au/ accessed 8/1/2020) identified regional geology including channel and flood plain alluvium (gravel, sand and clay) locally formed as calcrete overlying quaternary sedimentary rock (including some of low metamorphic grade).
Excavation Logs	Excavation logs reviewed to assess site geology included a registered onsite groundwater well, one test pit west of the rail formation opposite Tarago Station, and nine test pits through the rail formation. The bore log from the registered bore identified fill from surface to 0.6 mbgl overlying clay to 7 mbgl overlying sand to 12.2 mbgl (depth of bore). The test pit west of the rail formation identified silty gravel fill to 0.4 mbgl overlying clay to 0.8 mgl (depth of test pit) The nine test pits within the rail formation identified a profile consistent with expected layers of ballast, capping and base formation materials. These included silty gravel (ballast) from surface generally to 0.5 mbgl overlying black gravelly clay (capping) and grey / brown gravelly clay to depth of test pits (generally 0.7 mbgl).
Location and Extent of Fill	Fill was identified progressively through site assessments broadly across the site including in the area of the former loadout complex, the rail formation and adjacent the eastern side of the rail formation. At the loadout complex a maximum of approximately one meter of fill (battered to the road to the west, rail to the east and stormwater drain to the north) was observed during targeted test pitting (described within this report) consistent with anecdotal account of application of clay 'capping' following demolition of buildings. Localised stockpiles were identified east and west of the rail formation and north of Tarago Station. The identification of these stockpiles on an historic survey plan indicates presence before loop extension works. Stockpiles of contaminated spoil (approx. 750m^3 of fouled ballast and approx. 50m^3 of timber sleepers) were also created during construction west of the rail formation and opposite Tarago Station.
Onsite Wells	One groundwater well is present onsite. Review of the NSW Department of Planning Industry Environment MinView portal identified well ref: GW053976) was installed in 1984 to a depth of 12.2 mbgl with a water bearing zone in sands from 7 mbgl. No other wells were identified onsite. Records indicate the well was constructed using 0.15m diameter steel casing with 2 mm wide vertical screen slots.
Groundwater Bore Search	Review of the NSW Department of Planning Industry Environment MinView portal (https://minview.geoscience.nsw.gov.au/) identified 12 wells within a 500 m radius from the site.
Depth to Groundwater Flow	Review of drilling and construction details for registered wells indicates the shallowest regional aquifer is present in gravel layers from 5.5 – 18.6 mbgl with deeper aquifers present in fractures of underlying shale, siltstone and limestone from 50 – 74 mbgl.
Groundwater Usage	Assessment of groundwater usage has occurred including: • A search for registered groundwater bores (described above)

Site	Details
	• A groundwater usage survey delivered by JHR to 94 letter boxes in Tarago. A total of 17 responses were received. • Discussion with 43 private property owners during assessments of discrete properties Integrated findings of the groundwater usage survey and discussions with property owners included: • 20 properties were identified where groundwater bores had been installed. • At all properties, groundwater use included (or was assumed to include) watering gardens • At three properties groundwater was reported to include drinking and washing • At two properties groundwater use was reported for agriculture • At one property groundwater was reported to be used for filling a pool • At two properties groundwater use remained unclear
Direction and Rate of Groundwater Flow	It is considered likely that the shallower aquifer flows toward the Mulwaree River approximately 550 m east of site.
Direction of Surface Water Runoff	Regional surface water runoff is expected to flow toward the Mulwaree River approximately 500 m east of site.
Surface Water Usage	Surface water usage within the downstream receiving environment has been conservatively assessed as including recreational use and agriculture (irrigation and stock watering).
Background Groundwater Quality	Review of drilling and construction details indicates groundwater salinity is low.
Preferential Water Courses	Review of satellite imagery identified the Mulwaree river as the main water course close to site. Three culverts direct surface water beneath the rail formation onsite and then offsite to the east. Each culvert receives water from contaminated areas of site via cess drains on the west side of and running parallel to the rail line as described below: • The southernmost culvert is located at CH 262.660 and 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 is located at CH 262.354 and 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.

6. PREVIOUS INVESTIGATIONS

Assessment and management measures for site contamination at Tarago is described within the following documents:

- *Tarago – Rail Siding Extension, Preliminary Contaminated Site Assessment* (McMahon 2015).
- *August 2019 Surface Water Monitoring - Tarago Loop Extension* (Ramboll 2019a)
- *Tarago Loop Extension Further Intrusive Assessment and Lead Management Plan* (Ramboll 2019b)
- *Tarago Crossing Loop Extension Short-Term Lead Management Plan* (Ramboll 2019c)
- *Tarago Loop Extension Preliminary Human Health Risk Assessment* (Ramboll 2019d)
- *Tarago Rail Corridor Environmental Site Assessment* (Ramboll 2019e)
- *Tarago Loop Extension: Interim Lead Management Plan* (Ramboll 2019f)
- *Tarago Rail Corridor Environmental Data Gap Assessment* (Ramboll 2020a)
- *Rail Sleeper Waste Classification, Tarago Loop Extension* (Ramboll 2020b)
- *Tarago Rail Corridor and Tarago Area Detailed Site Investigation* (Ramboll 2020c)
- *Tarago Lead Management Action Plan* (Ramboll 2020d)
- *Tarago Rail Corridor and Tarago Area Detailed Site Investigation Addendum* (Ramboll 2020e)
- *Tarago Air Quality Monitoring Reports April 2020 – February 2021* (Ramboll 2020f – 2021b)
- *April 2021 Surface Water Monitoring Tarago NSW* (Ramboll 2021c)

Assessments were additionally completed at 44 discrete land parcels surrounding the site along with the following site specific risk assessments:

- *Advice on risks from metals in soil: Agricultural property at 2135 Braidwood Road, Tarago NSW* (EnRiskS 2020)
- *Advice on risks to human health and the environment: Boyd Street and publicly accessible areas, Tarago NSW* (EnRiskS 2021a)
- *Advice on risks from metals in soil: property P40, Tarago, NSW* (EnRiskS 2021b)

Cumulatively assessments included:

- Assessment of contaminant concentrations in soil onsite including:
    - Measurement of metals in surface soil / sediment at over 200 locations onsite
    - Measurement of TRH, BTEXN, PAH, asbestos in shallow soil at 30 locations onsite
    - Measurement of OCP, OPP and PCB in surface soil / sediment at 11 locations onsite
    - Measurement of metals at progressively increasing depth to vertically delineate metals concentrations at over 15 locations
- Assessment of lead in public road reserves surrounding the site and along the haul route from the mine to the site by field portable x-ray fluorescence (XRF) metals analyser at over 200 locations
- Assessment of offsite contaminant migration in surface water and sediment. This work included co-located sampling of surface water and sediment onsite and within the receiving environment at 11 locations. Analyses initially included TRH, BTEX, metals (dissolved and total) and inorganics though this was later refined to focus on metals (dissolved and total). Monitoring occurred during construction of the Loop Line and then on quarterly intervals since April 2020
- Assessment of offsite contaminant migration in groundwater through installation of seven groundwater monitoring wells targeting the site and surrounding environment. Groundwater from these wells was sampled and analysed for filtered metals
- Assessment of air quality monitoring surrounding the site over 11 months during implementation of the Action Plan (Ramboll 2020d). This has included installation and operation of a high-volume air sampler, real time air sampler and dust deposition gauge adjacent the site and dust deposition gauges at three other locations in the surrounding

community. Air quality monitoring was established in April 2020 and decommissioned in July 2021.

- Assessment of lead at 44 discrete private properties integrating assessment of shallow soils, tank water, tank sediment, internal dust and groundwater based on structures present at each site. These assessments were completed at community request though captured the downstream receiving environment
- Development of Site Specific Trigger Levels (SSTLs) for potential human health, ecological and agricultural receptors of site contamination within the surrounding environment

6.1 Results Summary

Analytical results are compared to criteria selected to assess risk to identified receptors in the investigative reports referred to above. Tabulated summaries and summary interpretations are descried in the sub-sections below. Sampling locations are presented on **Figure 2a 2e** and **Figure 3**, **Appendix 1**.

6.2 Onsite Soil

Data from previous investigations relied upon to assess the type and extent of onsite contamination is presented on figures as **Appendix 1**, in **Tables 1 – 9** in **Appendix 2** and in **Table 6-1** below.

Table 6-1: A summary of soil analyses for the type and extent of contaminants onsite

Contaminant of Potential Concern	Count	Min	Max	Average	No > Human Health Guideline
Asbestos					
Asbestos Detected	30	Nil	Nil	--	0
Metals					
Arsenic	30	<2	150	20	0
Cadmium	30	<0.4	14	3	0
Chromium	30	<5	57	13	0
Copper	30	<5	990	185	**11**
Lead	191	<5	184000	4200	**41**
Nickel	30	<5	17	5	0
Zinc	30	12	1600	410	**8**
Mercury					
Mercury	30	<0.1	0.6	0.1	0
PAH					
Naphthalene	30	<0.5	<0.5	<0.5	0
Benzo(a)pyrene	30	<0.5	0.7	0.3	0
Sum of polycyclic aromatic hydrocarbons	30	<0.5	6	0.7	0
Benzo(a)pyrene TEQ (LOR)	30	1.2	1.4	1.2	0
TRH					
C6 - C10 Fraction	30	<20	10	10	0
C6 - C10 Fraction minus BTEX (F1)	30	<20	10	10	0
>C10 - C16 Fraction	30	<50	92	28	0

Contaminant of Potential Concern	Count	Min	Max	Average	No > Human Health Guideline
>C16 - C34 Fraction (F3)	30	<50	310	110	0
>C34 - C40 Fraction (F4)	30	<100	140	60	0
>C10 - C40 Fraction (sum)	30	<100	506	130	---
>C10 - C16 Fraction minus Naphthalene (F2)	30	<50	92	28	0
BTEXN					
Benzene	30	<0.1	<0.1	<0.1	0
Toluene	30	<0.1	<0.1	<0.1	0
Ethylbenzene	30	<0.1	<0.1	<0.1	0
meta- & para-Xylene	30	<0.2	<0.2	<0.2	---
ortho-Xylene	30	<0.1	<0.1	<0.1	---
Total Xylenes	30	<0.3	<0.3	<0.3	0
Naphthalene	30	<0.5	<0.5	<0.5	---
Organochlorine Pesticides					
*Aldrin and Dieldrin (Total)**	11	<0.05	<0.05	<0.05	0
Chlordanes - Total	11	0.05	0.05	0.05	0
*DDT + DDE + DDD (Total)**	11	<0.05	<0.05	<0.05	0
Endosulfan sulphate	11	<0.05	<0.05	<0.05	0
Endrin	11	<0.05	<0.05	<0.05	0
Heptachlor	11	<0.05	<0.05	<0.05	0
Methoxychlor	11	<0.2	<0.2	<0.2	0
Organophosphorus Pesticides	11	<0.2	<0.2	<0.2	0
Polychlorinated Biphenyls					
Total PCB	11	<0.1	<1	0.2	0

All units are in mg/kg unless stated otherwise, --- - no guideline

Table 6-2: Lead in soil leachate

	TCLP	ASLP
Number of Samples (n)	3	3
Detections	3	2
Minimum (mg/L)	4.3	<0.01
Maximum (mg/L)	32	1.1

6.2.1.1 The Former Loadout Complex

Test pitting targeting contaminant delineation around the former Loadout Complex was completed in April on a systematic grid in April 2020 (Ramboll 2020c) and August 2020 (Ramboll 2020c and 2020e). A total of 20 test pits were advanced in August 2020 on a systematic grid pattern west of the Woodlawn Siding integrating the former loadout complex and surroundings. Lead concentrations are presented in **Table 6**, **Appendix 2**, and in summary as **Table 6-3** below.

Table 6-3: Summary of Loadout Complex Soil Lead Analytical Results from April 2020

Number of Samples (n)	64
Detections	63
Minimum (mg/kg)	<5
Maximum (mg/kg)	1,200
Mean (mg/kg)	130
n > Site specific human health guideline (2,200 mg/kg)	0
n > Site specific ecological guideline (1,800 mg/kg)	0

Further 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). Lead concentrations are presented in **Table 6**, **Appendix 2**, and in summary as **Table 6-4** below.

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

Table 6-4 Summary of Loadout Complex Soil Lead Analytical Results from August 2020

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	95	0	0
0.5 – 1.0		13	12	< 5	3,600	620	**1**	**1**
1.0 – 1.5		12	12	8	6,900	1,400	**2**	**2**
1.5 – 2.0		4	4	29	3,662	960	**1**	**1**
>2.0		3	3	42	200	130	0	0

Results indicated that lead contamination was 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.

6.2.1.2 Additional Assessment of Site Surface Soils

Evidence of ore concentrate was visually observed at the north of the former Loadout Complex adjacent a drainage channel upstream of the middle rail culvert. Results from field portable XRF are presented in **Table 6-5** below.

Table 6-5: XRF Results from Additional Assessment of Site Surface Soils

SAMPLE	As	Cu	Pb	Ni	Zn
WLB1_262.5	81.36	1172.52	5322.19	<LOD	3915.66
PIA-1	11.68	37.73	49.34	<LOD	133.27
PIA-2	842.35	2804.36	9404.2	236.66	3015.17
PIA-2_0.1	24.02	54.47	123.58	81.6	125.53
PIA-3	<LOD	56.72	215.66	<LOD	122.68
PIA-4	1576.36	5107.27	15510.1	224.52	3745.53
PIA-4_0.1	9.09	34.68	33.66	36.69	51.5
PIA-5	26.76	236.15	830.68	<LOD	1204.63
PIA-5_0.1	11.47	84.93	206.45	38.55	455.06
PIA-6	304.32	753.34	7040.33	146.81	1259.26
PIA-7	<LOD	140.34	396.68	69.73	296.26

<LOD – below the limit of detection.

6.2.2 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 6-6**.

Table 6-6 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	470	--	--
pH	20	20	4	8.3	5.4	--	--
Sulphur	20	20	79	16000	4900	--	--
Total Organic Carbon	20	19	< 0.1	6.5	1.5	--	--
Total Metals							
Antimony	20	14	< 10	55	25	--	--
Arsenic	20	20	14	190	84	0	**3**
Beryllium	20	0	< 2	0	--	0	--
Boron	20	0	< 20	0	--	0	--
Cadmium	20	20	1.8	170	15	0	--
Chromium	20	20	12	130	49	0	0
Cobalt	20	13	< 5	30	12	0	--
Copper	20	20	240	4,100	1,210	0	**20**
Lead[1]	20	20	230	19,000	5,050	**14**	**14**
Manganese	20	20	70	1,100	500	0	--
Mercury	20	19	< 0.1	2.9	0.7	0	--
Molybdenum	20	14	< 5	20	9.0	--	--
Nickel	20	19	< 5	85	30	0	0
Selenium	20	17	< 2	27	13	0	--
Tin	20	18	< 10	400	70	--	--
Vanadium	20	20	30	93	63	--	--
Zinc	20	20	550	12,000	1,780	0	**20**

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

6.2.3 Groundwater

6.2.3.1 Groundwater Gauging Data

Seven groundwater monitoring wells were gauged on 15 April 2020. Groundwater well locations are presented on **Figure 4** – **5**, **Appendix 1.** A summary of the groundwater gauging data is presented in **Table 6-7.**

Table 6-7: Groundwater level observations

Well ID	Coordinates MGA Zone 56S		Top of Casing Elevation	Standing Water Level		Depth of Well
	Easting	Northing	mAHD	mbtoc	mAHD	mbtoc
MW1	741504.21	6115627.04	690.59	6.15	684.44	10.79
MW2	741756.36	6116009.7	689.16	6.955	682.205	12.69
MW3	741875.76	6116215.04	688.33	6.1	682.23	9.48
MW4	741813.67	6116016.97	686.47	4.38	681.835	7.09
MW5	741938.29	6116212.86	688.27	6.435	682.09	12.25
MW6	741917.66	6116051.99	685.89	3.99	681.9	8.46
MW7	742268.21	6115965.68	682.35	1.21	681.14	8.51

mAHD – metres above Australian Height Datum

mbtoc – metres below top of casing

Groundwater level contours were developed using Surfer software and are presented in **Figure 5**, **Appendix 1**. The groundwater was inferred to flow to the east, towards the Mulwaree River.

6.2.3.2 Groundwater Quality Parameters

Groundwater quality parameters were measured in the field prior to sampling to ensure collection of water that is representative of the groundwater conditions. The groundwater quality parameters are presented in **Table 6-8**.

Table 6-8: Field physico-chemical groundwater quality parameters

Well ID	Date	Temp	Spec. Cond.	pH	Dissolved Oxygen	Redox Potential	Total Dissolved Solids	Comments
		°C	µS/cm	pH units	mg/L	mV	mg/L	
MW1	2/04/2020	17.26	682	7.55	6.12	114	446	Light brown, medium turbidity, no odour
MW2	2/04/2020	17.24	504	6.94	1.84	-72	322	Brown, low turbidity, no odour
MW3	2/04/2020	16.46	1,020	6.81	0.00	-154	655	Light brown, med-high turbidity, no odour
MW4	27/03/2020	16.60	615	7.04	2.97	125	393	Light brown, low turbidity, no odour
MW5	2/04/2020	18.1	601	6.86	1.07	112.9	390	
MW6	27/03/2020	17.0	643	7.06	1.14	114.5	416.0	Difficult to filter, cloudy
MW7	27/03/2020	16.0	475.5	6.77	0.75	-70.8	308.75	Difficult to filter
GW053976[1]	2/04/2020	16.63	260	7.57	2.19	126	169	Clear, no turbidity, no odour

[1] GW053976 is an old well located within the rail corridor located to the north of MW5. As the well depth and construction details are unknown, the well is excluded from the discussion below.

- pH was generally neutral, with measurements ranging from pH6.77 at MW7, closest to the Mulwaree River, to pH7.55 at MW1, located furthest from Mulwaree River.
- EC measurements ranged from 475.5 µS/cm at MW7 to 1,020 µS/cm at MW3, indicating fresh groundwater conditions.
- DO ranged from 0.0 mg/L (MW3) to 6.94 mg/L (MW1), with an average of 2.0 mg/L across the investigation area.
- Redox potential measurements varied between -154 mV at MW3 (reducing conditions) to 114.5 mV (oxidising conditions).
- TDS concentrations ranged from 308.75 ppm (MW7) to 655 ppm (MW3), indicating fresh groundwater.

6.2.3.3 Analytical Results

Soil lead analytical results from samples collected during the installation of the groundwater monitoring wells are summarised in **Table 6-9**.

Table 6-9: Summary of Groundwater Monitoring Well Soil Lead Analytical Results

Number of Samples (n)		46
Detections		466
Minimum (mg/kg)		13
Maximum (mg/kg)		3,600
Mean (mg/kg)		164
HILs	**n > Site specific human health guideline (2,200 mg/kg)**	1
	n > Public open space (HIL C)	0
EILs	**n > Site specific ecological guideline (1,800 mg/kg)**	1
	n > Urban residential and public open space	0

Notes: Site specific HIL and EIL adopted for monitoring wells MW-MW4 located within the rail corridor. HIL C and EIL for urban residential and public open space adopted for monitoring wells MW5-MW6 located outside of the rail corridor.

Groundwater analytical results are summarised in **Table 6-10** and tabulated in **Table 9**, **Appendix 2**.

Table 6-10: Summary of Groundwater Monitoring Well Results

Analyte / Grouping	Number of samples (n)	n = 'detects'	Maximum (mg/L)	Guidelines			
				n > 95% fresh water species protection	n > livestock use	n > irrigation use	n > drinking water
Filtered metal(loid)s							
Aluminium	5	0	<0.05	-	0	0	-
Arsenic	8	2	0.005	0	0	0	0
Barium	5	5	0.16	-	-	-	0
Beryllium	8	0	<0.001	0	-	0	0
Boron	3	0	<0.05	-	0	0	0
Cadmium	8	2	0.003	**1(MW5)**	0	0	0
Chromium	8	1	0.002	**1 (MW4)**	0	0	-
Cobalt	8	6	0.029	**5 (MW1, MW2, MW3, MW4 & MW7)**	0	0	0
Copper	8	2	0.003	**1 (GW053976)**	0	0	0
Lead	8	2	0.005	**1 (GW053976)**	-	0	0
Manganese	8	8	2	**1 (MW3)**	0	0	0
Mercury	8	0	<0.0001	0	0	0	0
Nickel	8	6	0.004	0	0	0	-
Selenium	3	0	<0.001	-	0	0	-
Zinc	8	7	0.27	**6 (MW1-MW5, GW053976**)	0	0	0

6.3 Surface Water

6.4 Monitoring Events

A total of eight monitoring events have been completed between August 2019 and April 2021. 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. Sampling locations are presented on **Figure 6**, **Appendix 1**. Results for all surface water monitoring at each location are presented in the April 2021 surface water monitoring report (Ramboll 2021 A summary of monitoring events is outlined in **Table 6-11**.

Table 6-11 includes information on rainfall conditions precedent to each monitoring event. The table includes comparison of the rainfall falling over the 48 hour period preceding the sampling event to the design rainfall events for the Mulwaree 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 6-11: Indicative Summary of Rainfall Preceding Sampling Events

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	28-Jan-21	14-Apr-21
>10% AEP	< 126	0	0	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	64	2.4
Average Monthly Rainfall (mm)		42.9	44	49	40.4*	42.9	44	63.9	25.9
Comment		Dry month, dry conditions precedent	Average rainfall month, dry conditions precedent	Dry month, dry conditions precedent	Wet month, dry conditions precedent	Wet month, high rainfall event precedent	Wet month. Dry conditions precedent	Average rainfall month, dry conditions precedent	Dry 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 as an indicator of general conditions around each monitoring event.

AEP – Annual Exceedance Probability

Rainfall measured in August 2019, September 2019 and January 2020 was lower than the monthly average though rainfall measured in 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 integrates 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 any given year. The monitoring data is considered representative of the effects of high and low 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.

The monitoring data presented in **Table 6-12** includes quarterly events 2019 to 2021 and is considered representative of the effects of recent seasonal variability.

6.4.1 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 6-12**.

Table 6-12: Summary of 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	5	Minimum	7.8	206.1	6.35	0.04	23.6	133.9	Dry during January 2020.
		Maximum	17.4	684	7.7	11	175.8	434	
		Average	12.9	552.2	7.3	5.9	121.8	332.9	
SW1-UP	5	Minimum	8	205.6	7.05	0.1	-41.4	133.25	Dry during January 2020. Parameters not recorded during September 2019.
		Maximum	19.94	704	7.43	10.86	186.9	431	
		Average	14.1	550.7	7.3	5.8	112.8	328.5	
SW2	6	Minimum	7.3	213.3	6.54	0.12	48.3	137.8	Dry during January 2020. Parameters not recorded during September 2019.
		Maximum	17.54	677	8.27	10.59	185.9	416	
		Average	12.6	519.6	7.7	5.6	140.9	314.3	
SW3	4	Minimum	8.9	142.5	6.23	4.84	64.8	92.3	Dry during January 2020 and January 2021. Parameters not recorded during September 2019.
		Maximum	21.75	245	7.96	9.43	178	159	
		Average	13.2	214.7	7.2	6.9	138.6	133.4	
SW4	7	Minimum	7.4	128.2	5.75	1.12	70	99.45	Dry during January 2020. Parameters not recorded during September 2019.
		Maximum	20.33	388.3	8.8	10.42	263.1	251.82	
		Average	13.0	247.5	7.5	6.5	171.4	177.9	
SW5	3	Minimum	11.2	117.9	6.85	4.06	-3	76.7	Dry during January and April 2020 and January 2021.
		Maximum	11.95	251.2	8.35	8.75	163.2	121	
		Average	11.6	185.4	7.5	6.9	78.4	98.9	
SW6	1	---	8.3	168.3	7.47	9.61	187	109.2	Dry during January, April and October 2020, and January and April 2021. Parameters for August 2020 presented.
Offsite									
SW7	6	Minimum	11.5	94.7	6.57	1.8	56	61.75	---
		Maximum	23.1	2342	8.92	8.76	168	396.6	
		Average	17.5	584.5	7.5	6.1	103.0	163.5	
SW8	6	Minimum	9.1	170.5	7.2	3.1	84.0	107.9	---
		Maximum	23.6	1007.0	8.5	9.3	124.0	656.5	
		Average	17.2	648.7	7.7	6.4	111.2	410.1	
SW9	6	Minimum	8.9	125.3	7.5	0.3	83.0	115.7	---
		Maximum	25.0	852.0	8.4	16.8	227.7	812.5	

Sample ID	No. of Recordings		Temperature	SPC	pH	DO	ORP	TDS	Comments
			°C	µS/cm	pH units	mg/L	mV	mg/L	
		Average	17.5	499.4	7.8	9.1	137.2	449.1	
SW10	3	Minimum	12.9	682.0	7.2	3.6	3.8	454.4	---
		Maximum	18.2	881.0	7.4	8.2	103.5	564.0	
		Average	15.7	757.7	7.3	5.3	62.1	509.2	

SPC – Specific Conductivity

DO – Dissolved Oxygen

ORP – Oxidation-Reduction Potential

TDS – Total Dissolved Solids

6.4.2 Analytical Results

A summary of the surface water analytical results for monitoring events from August 2019 to April 2021 is presented in Table 6-13 for on and near site and Table 6-14 for the Mulwaree River sampling locations.

Table 6-13: Summary of Onsite and Near Site Surface Water Analytical Results (SW1_UP, SW1, SW2, SW3, SW4, SW5, SW6, SW7)

Analyte	No. of Samples	No. of Detects	Min.	Max	Avg	No above site-specific criteria		No above Tier 1 criteria			
						Human Health	Ecology	ANZECC Fresh Water Guidelines - Irrigation	ANZECC Fresh Water Guidelines - Stock Water	Health-based Screening Criteria (Recreational Waters)	Eco Sceening Criteria (ANZG 95% Protection) Fresh Water
Aluminium	35	26	<0.05	11	1.0	-	-	-	-	**1**	-
Arsenic	36	21	<0.001	0.016	0.004	0	-	-	-	0	-
Barium	35	35	0.03	0.36	0.09	-	-	-	-	0	-
Beryllium	36	0	<0.0001	<0.0001	-	-	-	-	-	0	-
Cadmium	36	25	<0.0003	0.04	0.006	0	-	-	-	**2**	-
Chromium	35	20	<0.001	0.011	0.002	-	-	-	-	0	-
Cobalt	36	17	<0.001	0.014	0.004	-	-	-	-	-	-
Copper	36	31	<0.001	0.31	0.05	-	-	-	-	0	-
Iron	35	34	<0.05	8.9	1.6	-	-	-	-	**5**	-
Lead	41	34	<0.001	0.17	0.03	0	-	-	-	**2**	-
Manganese	36	36	0.012	1.1	0.2	0	-	-	-	0	-
Mercury	36	0	<0.0001	0	-	-	-	-	-	0	-
Nickel	36	26	<0.001	0.451	0.03	0	-	-	-	**1**	-
Zinc	36	35	<0.005	7	0.7	-	-	-	-	0	-
Dissolved Aluminium	33	21	<0.05	3.2	0.6	-	0	0	0	-	**20**
Dissolved Arsenic	34	21	<0.001	0.011	0.003	-	0	0	0	-	0
Dissolved Barium	33	33	0.04	0.12	0.07	-	-	-	-	-	-
Dissolved Beryllium	34	0	<0.0001	0	-	-	-	-	0	-	0
Dissolved Cadmium	34	21	<0.0003	0.018	0.003	-	**2**	**2**	0	-	**20**
Dissolved Chromium	33	11	<0.001	0.003	0.001	-	-	0	0	-	**3**
Dissolved Cobalt	34	9	<0.001	0.005	0.002	-	-	0	0	-	**5**
Dissolved Copper	34	28	<0.001	0.2	0.04	-	0	0	**3**	-	**28**

Analyte	No. of Samples	No. of Detects	Min.	Max	Avg	No above site-specific criteria		No above Tier 1 criteria			
						Human Health	Ecology	ANZECC Fresh Water Guidelines - Irrigation	ANZECC Fresh Water Guidelines - Stock Water	Health-based Screening Criteria (Recreational Waters)	Eco Sceening Criteria (ANZG 95% Protection) Fresh Water
Dissolved Iron	33	22	<0.05	2.4	0.8	-	-	-	0	-	**18**
Dissolved Lead	34	22	<0.001	0.033	0.011	-	0	0	0	-	**19**
Dissolved Manganese	34	33	<0.005	1	0.1	-	-	0	0	-	0
Dissolved Mercury	34	0	<0.0001	0	-	-	-	0	0	-	0
Dissolved Nickel	34	22	<0.001	0.421	0.027	-	0	0	0	-	**6**
Dissolved Zinc	34	30	<0.005	2.6	0.4	-	0	0	0	-	**27**

Table 6-14: Summary of Mulwaree River Surface Water Analytical Results (SW8, SW9, SW10)

Analyte	No. of Samples	No. of Detects	Min.	Max.	Average	Health-based Screening Criteria (Recreational Waters)	Ecological Screening Criteria (ANZG 95% Protection) Fresh Water	ANZECC Fresh Water Guidelines - Irrigation	ANZECC Fresh Water Guidelines - Stock Water
Aluminium	14	3	<0.05	0.72	0.4	0	NA	-	-
Arsenic	15	6	<0.001	0.002	0.001	0	NA	-	-
Barium	14	13	0.02	0.12	0.08	0	NA	-	-
Beryllium	15	0	<0.0001	0	-	0	NA	-	-
Cadmium	15	2	<0.0003	0.0004	0.0003	0	NA	-	-
Chromium	14	2	<0.001	0.002	0.002	0	NA	-	-
Cobalt	15	1	<0.001	0.003	0.002	-	NA	-	-
Copper	15	6	<0.001	0.01	0.00	0	NA	-	-
Iron	14	13	0.15	3.2	0.6	**1**	NA	-	-
Lead	15	5	<0.001	0.002	0.00	0	NA	-	-
Manganese	15	15	0.03	1.9	0.3	0	NA	-	-
Mercury	15	0	<0.0001	<0.0001		0	NA	-	-
Nickel	15	13	<0.001	0.002	0.001	0	NA	-	-
Zinc	15	12	<0.005	0.16	0.08	0	NA	-	-
Dissolved Aluminium	12	2	<0.05	0.41	0.4	-	**2**	0	0
Dissolved Arsenic	13	3	<0.001	0.003	0.003	-	0	0	0
Dissolved Barium	12	11	0.02	0.12	0.08	-	-	-	-
Dissolved Beryllium	13	0	<0.001	<0.001		-	0	-	0
Dissolved Cadmium	13	2	<0.0002	0.0004	0.0002	-	**1**	0	0
Dissolved Chromium	12	1	<0.001	0.001	0.001	-	0	0	0
Dissolved Cobalt	13	0	<0.001	<0.001		-	0	0	0
Dissolved Copper	13	5	<0.001	0.008	0.00	-	**5**	0	0

Analyte	No. of Samples	No. of Detects	Min.	Max.	Average	Health-based Screening Criteria (Recreational Waters)	Ecological Screening Criteria (ANZG 95% Protection) Fresh Water	ANZECC Fresh Water Guidelines - Irrigation	ANZECC Fresh Water Guidelines - Stock Water
Dissolved Iron	12	9	<0.05	0.8	0.2	-	**2**	-	0
Dissolved Lead	13	0	<0.05			-	0	0	0
Dissolved Manganese	13	13	0.012	0.33	0.1	-	0	0	0
Dissolved Mercury	13	0	<0.0001	<0.0001		-	0	0	0
Dissolved Nickel	13	8	<0.001	0.002	0.002	-	0	0	0
Dissolved Zinc	13	8	<0.005	0.14	0.0	-	**4**	0	0

6.5 Air Quality

The focus of the air quality monitoring program has been lead in particulate form, both for ambient airborne fractions and deposited dust. This program was commissioned during early April 2020.

Table 6-15: Measured lead content in deposited dust and deposited dust at four properties around Tarago, NSW

Month	DDG1, Stewart St		DDG2, Station Masters Cottage		DDG3, Boyd St		DDG4, Mulwaree St	
	Lead (µg)	Insoluble solids (g/m2 /month)	Lead (µg)	Insoluble solids (g/m2 /month)	Lead (µg)	Insoluble solids (g/m2 /month)	Lead (µg)	Insoluble solids (g/m2 /month)
April (1-4-2020 to 30-4-2020)	<0.01	1.0	<0.01	0.7	<0.01	0.6	<0.01	0.4
May (30-4-2020 to 1-6-2020)	<1	0.9	<1	0.4	<1	0.4	<1	0.3
June (1-6-2020 to 1-7-2020)	<1	0.9	<1	0.5	<1	1.3	<1	0.3
July (1-7-2020 to 13-08-2020)	<1	1.9	<1	0.8	<1	0.2	<1	0.7
August (13-08-2020 to 1-09-2020)	<1	0.5	<1	0.2	<1	0.2	<1	0.2
September (1-09-2020 to 30-09-2020)	<1	2.1	<1	1.2	<1	7.2[1]	<1	0.8
October (30-09-2020 to 30-10-2020)	<1	3.0	<1	3.9	<1	1.4	<1	1.2
November (30-10-2020 to 1-12-2020)	<1	0.9	<1	1.4	<1	1.2	<1	0.6
December (1-12-2020 to 29-12-2020)	<1	2.3	<1	1.0	<1	4.0	<1	1.0
January (29-12-2020 to 28-01-2021)	<1	1.8	<1	**4.3**	<1	4.2[2]	<1	1.5
February (28-01-2021 to 26-02-2021)	<1	1	<1	1.8	<1	**8.8**	<1	0.7
March (26-02-2021 to 29-03-2021)	<1	1.2	<1	1.2	<1	1.5	<1	0.2
Rolling annual average	**<1**	**1.5**	**<1**	**1.5**	**<1**	**2.0**	**<1**	**0.7**

Limit of reporting = 0.01 µg during April and 1 µg from May forward following change in laboratory facility completing analysis

[1] Sample invalidated – DDG3 September 2020 sample contaminated with animal faeces

[2] Sample invalidated – DDG3 January 2021 sample contaminated with spiders and insects

Lead has not been measured above the detection limit (1 μg) across the monitoring network at any point. All locations measured deposited dust (insoluble solids) below the annual average criteria of 4 g/m^2/month and the rolling annual average for each location remains under criteria.

6.6 Key Findings

Key findings were:

- 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 identified the Contaminant at depth though this is considered unlikely to present a risk to human health or the environment. The extent of lead concentrations exceeding the SSTL in soil onsite is presented on **Figures 2a** – **2e** and **Figure 3**, **Appendix 1**
- The Contaminant has not impacted groundwater offsite. 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 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. Further site specific risk assessments (EnRiskS 2020, 2021a – b) concluded that risks from site contamination within the surrounding environment were acceptable
- Surface water impacts from the site to the Mulwaree River are not evident
- Offsite migration of the Contaminant 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 has been low and acceptable throughout implementation of the Action Plan (2020d)
- 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 were identified in local public road reserves and (with the exception of Boyd Street) appear to be unrelated to the rail corridor

7. INTERIM ACTIONS

The *Tarago Lead Management Action Plan* (Ramboll 2020e) was prepared to minimise exposure pathways to human health and ecology to contamination at or originating from the site until such time as permanent remediation works are completed. Measures to minimise exposure included:

- Removal of rainwater tank sediment from tanks considered likely to have been affected by site contamination
- Removal of internal dust from properties considered likely to have been affected by site contamination
- Application of a polymer sealant to contaminated areas onsite to reduce potential for contaminant migration in airborne dust and/or via surface water
- Demarcation of contaminated areas with signage advising of the presence of contamination and requirement for induction to the Action Plan
- Controls for disturbance of contaminated materials onsite including notification to SafeWork NSW of Lead Risk Work
- Inspection and monitoring requirements to assess the adequacy of control measures including inspection of the polymer sealant, quarterly surface water monitoring and ongoing air quality monitoring.

Additionally, residents of 106 Goulburn Street, adjacent the site were relocated after potentially complete exposure pathways to site contamination were identified. TfNSW has since purchased this property and is incorporating this property in the CRN through amendment to the applicable Operation and Maintenance Deed and EPL. Measures to mitigate contaminant exposure risks associated with future use of 106 Goulburn Street will be defined under the LTEMP to be prepared for other areas of the site.

7.1 Additional delineation of site contamination

Assessment of the extent of contamination at the northern end of site east of the Goulburn – Bombala main line was refined through additional sampling on 2 March 2021. This included collection of two soil samples (SS202 and SS203) at locations presented on **Figures 2a 2b**, **Appendix 1**. SS203 was collected from surficial soils however localised application of imported clay appeared to have occurred around SS202 during rail loop extension. Clay was observed to be approximately 0.2 m thick and SS202 was collected from the historic site surface (ie: approximately 0.2 mbgl). SS202 and SS203 were submitted for laboratory analyses and lead concentrations were reported at 350 and 28 mg/kg respectively. The laboratory report (ref: 778274-S) are included in **Appendix 3**. Lead concentrations at SS202 and SS203 are below site assessment criteria and supported refinement of the extent of the lead impacted area at this location.

8. SITE CHARACTERISATION

A detailed site characterisation is presented in the Tarago Rail Corridor and Tarago Area Detailed Site Investigation and Addendum (Ramboll 2020a, 2020e). In summary, the primary source of the Contaminant was identified as the ore concentrate from the former Loadout Complex that has been deposited within the rail formation and adjacent shallow soils. Dust accumulated within buildings and as sediment in rainwater tanks close to the site and surface water (including offsite migration) were identified as secondary sources. Further risk assessment targeting the receiving environment concluded that risks within the downstream receiving environment were acceptable (EnRiskS 2021a).

9. 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 environment and the populations (human 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 either a more detailed investigation or exposure controls. The findings of all assessments referenced here-in are considered in the exposure pathway assessment presented below.

CSM figures are presented **Sections A1 – A2** and **B1 – B2**, **Appendix 1** and support the following discussion of SPR linkages.

9.1 Sources of the Contaminant

The primary source of the Contaminant 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; and
- 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 the Contaminant as defined above.

Lead contamination that has been identified but which is not related to the site (i.e.: is not the Contaminant) 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 were 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 should be considered further by the polluters, property owners and relevant regulatory stakeholders. Where it is reasonable to conclude that contamination is not the Contaminant at the site or related to the migration of the Contaminant from the site that contamination has been excluded from further consideration.

9.2 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
- 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.

9.3 SPR Linkages

An assessment of the SPR linkages for the Contaminant onsite (including the former loadout complex) is summarised in **Table 9-1**.

Table 9-1: Exposure Assessment Summary

Exposure Route	Potentially Complete SPR? (Y / N / P)							Justification
	Onsite Workers	Onsite Ecology	Residents	Community Activities	Offsite Workers	Offsite Ecology	Irrigation and Livestock	
Soil and Sediment								
Direct Contact	P[1]	P	N	N	N	N	N	Concentrations in soils exceed onsite assessment criteria however management measures have been defined to mitigate risks to onsite workers (Ramboll 2020e). Potential remains for impacts to onsite ecology. Concentrations in sediment / soil offsite fall below Tier 2 human health and ecological criteria(EnRiskS 2020, 2021a – b).
Inhalation	P[1]	P	N	N	N	N	N	
Incidental Ingestion	P[1]	P	N	N	N	N	N	
Root Uptake	N/A	P	N/A	N/A	N/A	N/A	N/A	
Surface Water								
Direct Contact	N	N	N	N	N	N	N	Concentrations of copper, lead and zinc in the Mulwaree River are consistent upstream and downstream of site discharge points and indicate site contamination has not impacted the River. Contaminant concentrations in surface water between the site and the Mulwaree River are below adopted assessment criteria indicating risks from site contamination in these areas are acceptable.
Incidental Ingestion	N	N	N	N	N	N	N	
Root Uptake	N/A	N	N/A	N/A	N/A	N	N/A	
Migration to groundwater	N	N	N	N	N	N	N	
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
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	

Exposure Route	Potentially Complete SPR? (Y / N / P)							Justification
	Onsite Workers	Onsite Ecology	Residents	Community Activities	Offsite Workers	Offsite Ecology	Irrigation and Livestock	
								ecological exposure considered unlikely.
Dust								
Direct Contact	P[1]	N/A	N	N	N	N/A	N/A	Contaminant migration via airborne dust has occurred to several local houses and lead exceeds assessment criteria however (with one exception) dust has been removed from houses where elevated concentrations were observed. Air quality monitoring indicates levels of airborne lead from the site have been low since dust removal occurred.
Inhalation	P[1]	N/A	N	N	N	N/A	N/A	
Incidental Ingestion	P[1]	N/A	N	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	N	N	N/A	N	N	Contaminant migration via airborne dust has occurred and concentrations in tank sediment exceeded criteria for soil at some houses. Sediment form these tanks was removed and SPR linkages are not considered to exist.
Inhalation	N/A	N/A	N	N	N/A	N	N	
Incidental Ingestion	N/A	N/A	N	N	N/A	N	N	

[1]A complete SPR linkage for onsite workers to dust is not considered to exist because of the Action Plan. If not implemented correctly worker exposure could be expected.

Potential source-pathway-receptor linkages and associated potential exposure risks were identified for onsite workers and onsite ecology. Interim mitigation measures for onsite ecological and worker exposure risks are defined under the Action Pan (Ramboll 2020d).

9.5 Additional Characterisation to Inform Remediation

Further assessment of contaminant distribution by particle size within Woodlawn Siding ballast was completed to refine consideration of remedial requirements. This included:

- Collection of five bulk samples (approx. 20 kg)
- Particle Size Distribution (PSD) analyses presented in **Appendix 4**
- Crushing and analyses of the >19 mm fraction for lead
- Analyses of total lead in ballast (excluding fines) as described below.

Total lead was analysed in 18 sub-samples collected from eight bulk samples. Bulk samples were collected to provide targeted assessment of ballast (excluding fines) within the Woodlawn Siding around the historic loader and systematic assessment of ballast (excluding fines) within the remainder of the Woodlawn Siding. Sampling locations (TP3a, TP5a, TP6a and BAL_01 – BAL_05) are presented on **Figures 2a** – **2e**. Laboratory reports are presented as **Appendix 5**. Assessment of lead concentrations against the SSTL, 95% UCL calculations and laboratory reports are presented in **Appendix 6**. A summary assessment is presented as **Table 9-2**.

Table 9-2: Lead in Woodlawn Siding Ballast (excluding fines)

No. of Samples	Minimum	Maximum	No. > criteria[1]	Average	St Dev	95% UCL
18	13	2,800	1	546	756	1,041

[1]The site specific criterion for lead protective of human health (2200 mg/kg) was adopted.

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:

- The standard deviation of the results should be less than 50% of the relevant investigation or screening level, and
- No single value should exceed 250% of the relevant investigation or screening level.

The maximum lead concentration in Woodlawn Siding ballast (excluding fines) was 2,800 mg/kg (< 250% of the guideline) and the standard deviation was 756 mg/kg (< 50% of the guideline). The 95% UCL was therefore considered relevant and was calculated at 1,041 mg/kg and below the adopted guideline.

Assessment of lead in Woodlawn Siding ballast (excluding fines) indicates this material would be suitable for reuse onsite following separation of fines. A specific resource recovery exemption from the EPA would be required to allow return of these materials to site.

The arithmetic mean percentage of >20 mm and <20 mm fractions were calculated at 54% and 46% respectively and support volume estimates for material types projected for remediation (see waste volume projections presented in **Table 11-1**).[1]

10. REMEDIATION CRITERIA

The proposed remediation criterion is the human health SSTL for lead of 2,200 mg/kg (Ramboll 2019d). This is less than the site specific ecological criteria of 11,000 mg/kg developed for terrestrial ecosystems in the road verges surrounding the site (EnRiskS 2021a) and so is

[1] Projections of ballast and fines proportions are based on limited data and presented to provide an indication of potential volumes only.

considered protective of human health and ecology. Validation criteria including criteria for monitoring of surface water and air quality within the receiving environment are presented in **Section 14.1.5**.

Criteria for remediation waste streams are defined in the NSW EPA Waste Classification Guidelines (2014). Rationale for excluding total lead concentrations from waste classification will be presented in an SIA application to the NSW EPA.

11. REMEDIAL OPTIONS ASSESSMENT

11.1 Remedial Goal

The remedial goal is to address the following commitments made under the VMP:

P1. Assess remedial options to address risks from the Contaminant on, or originating from, the Site.

P2. Select a preferred remedial option integrating consultation with the community and other stakeholders.

P3. Prepare a RAP(s) to define how the selected remedial option will be implemented and validated.

Remedial options have been considered to address risks resulting from potential SPR linkages defined in the CSM in **Section 9**.

11.2 Extent of Remediation Required

Concentrations of the Contaminant were identified as a driver for remediation onsite across approximately 22,000 m^2 as presented on **Figures 2a – 2e**, **Appendix 1**. The depth of contamination was estimated at 0.5 mbgl within the ballast layer of the Woodlawn Siding and 0.3 mbgl in adjacent soils. This area includes approximately 9,000 m^2 of operational rail formation where excavation is not considered practical and where remedial options other than excavation are considered appropriate (See **Section 11.3**). The resultant area of ballast and soil that could practically be excavated during remediation was estimated at 13,000 m^2 and the volume of contaminated material that could be excavated was estimated at 4,850 m^3 (integrating 750 m^3 already stockpiled from Loop extension through the northern portion of the Woodlawn Siding). Additionally, rail sleepers remain within the Woodlawn Siding with a cumulative estimated volume of approximately 100 m^3. Concentrations of lead in rail sleepers are not consistently above the SSTL, however the sleepers are no longer required on site and are not suitable for reuse off site.

Estimate volumes of materials requiring excavation are shown in **Table 11-1.**

Table 11-1: Volume projections for remediation materials

Material Type	Volume (m^3)
>20 mm fraction – onsite reuse	1450
<20 mm fraction – ballast fines requiring immobilisation	1300
Soil adjacent the rail formation – requiring immobilisation	2,100
Railway sleepers – GSW[1]	100
Total	4,950

[1]Lead concentrations in rail sleepers do not consistently exceed site assessment criteria however offsite disposal was adopted during previous works and aesthetics may drive offsite disposal again.

11.3 Remedial Options Assessment

A hierarchy of remedial options was adopted from the NEPM (NEPC, 2013) and is presented as follows:

- Onsite treatment of the contaminant so that it is destroyed, or the associated risk is reduced to an acceptable level; and

- Offsite treatment of excavated soil, so that the contamination is destroyed, or the associated risk is reduced to an acceptable level, after which soil is returned to the site; or,

if the above are not practicable,

- Consolidation and isolation of the soil onsite by containment with a properly designed barrier; and
- Removal of contaminated material to an approved site or facility, followed, where necessary, by replacement with appropriate material.

or,

- Where the assessment indicates remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.

Remedial options for the site were considered consistent with this options hierarchy.

Remedial options not considered included:

- Options that disturb impacted soils can potentially result in dust emissions from the site. Options that include excessive manual handling of impacted soils, such as screening or onsite chemical treatment have been excluded. The proximity of the residential areas and added difficulty in maintaining dust controls through excessive manual handling of impacted soils made these options less preferrable than other remedial options. Even so the options that are considered each include excavation of readily accessible contaminated materials and dust mitigation will remain critical to successful remediation.
- Any option to remove impacted soils from within the operational rail formation. Contaminant concentrations within the main Goulburn - Bombala line and the Tarago Loop line (the operational formation) are lower than in the former Woodlawn Siding and it is feasible that contaminant risks could be adequately reduced without removing contaminants from operational rail lines. The option of retaining contaminated materials beneath operational lines would remain subject to validation that active management measures are not required to mitigate contaminant risks during normal operation of the rail corridor. Remnant contamination within operational lines could be managed under a LTEMP describing controls such as identification of future excavation within active rail formations as lead risk work.
- Any option to transport waste across cadastral boundaries for temporary storage or long term management unless to an appropriately licensed waste receiving facility or under a resource recovery exemption (RRE).

A dust management plan must be prepared by the remediation contractor to prevent contaminant migration offsite. Essential elements of the dust management plan applicable to the remedial strategy is applied to the site are described under **Section 13.10**.

Figures 2a – 2e, **Appendix 1** present the total area requiring remediation, the operational rail formation where disturbance is not proposed, the Woodlawn Siding (including rail sleepers which remain in-situ) and adjacent soils.

11.3.1 Options Evaluation Metrics

The sustainability (environmental, economic and social) of each option has been considered in terms of achieving an appropriate balance between the benefits and effects of undertaking each option. A semi-quantitative approach has been adopted through numeric ranking of the environmental and social elements scoring between 1 (best) and 5 (worst) and numeric scoring of economic sustainability based on 1 point per million dollars (or part thereof) in projected cost. The environmental and social rankings and economic scores are summed for each option and preferred remedial options are defined by the lowest sum.

Figure 11.1: Remedial Options Assessment

Option	Description	Environmental Sustainability	Ranking	Economic Sustainability[1]	Ranking	Social Sustainability	Ranking	Overall Ranking
Option 1 - Return of ore impacted materials from the site to Woodlawn Mine	Return of ore impacted materials to the mine could occur for beneficial reuse including ore recovery through hydraulic mining and tailings dam stabilisation works. This would include: 1. Confirmation with Heron Resources that it will receive ore impacted materials and any limitations associated with receipt (e.g.: chemical or geotechnical properties) 2. Application for a Resource Recovery Exemption and Order to be submitted to the NSW EPA 3. Excavation and cartage of ore impacted materials to the Woodlawn Mine 4. Beneficial reuse	Return of ore impacted materials to the Woodlawn Mine would consolidate contaminated materials in an area where similar contaminant concentrations occur. Extraction of ore through hydraulic mining processes already implemented at the mine represents the most favourable environmental outcome identified. Remnant materials could be beneficially reused in stabilisation of the tailings dam at the mine contributing to a positive environmental outcome at this location. Beneficial reuse at the mine is identified as a higher order remedial outcome than those considered under the hierarchy of remedial options recommended under the NEPM (NEPC 2013). Sustainability as measured by carbon footprint and landfill space consumption is favourable compared with other options.	1	The cost of progressing excavation and cartage to the mine is estimated at $250 – 500k (ex GST).	1	Intergenerational equity is achieved through this option as the contaminant is adequately managed with like materials in perpetuity.	1	**3**
Option 2 - Onsite containment[2]	The onsite containment option considered includes: 1. Location of a cell onsite to mitigate potential risks to human health or the environment in the event of disturbance to the containment system. Onsite containment could occur opposite Tarago Train Station across an area of approximately 6000 m2. Clay fill	Containment systems can provide durable long-term management options however environmental risks remain in the event of containment system failure. Future remediation may therefore be required, and this could place a burden on future generations. Environmental effects as measured by carbon footprint and landfill space consumption is favourable compared with other options.	3	The cost of progressing this option is estimated at $500 – 700k (ex GST) as an immediate investment. Costs for insitu would be less if maintained in-situ due to no requirement to excavate however these would be negated somewhat by the larger cap surface and the need to win clay. Additionally, a financial assurance value has been modelled based on a 100 year containment system	2	A need to manage the contaminated soils in the future may impact future generations.	3	**8**

Option	Description	Environmental Sustainability	Ranking	Economic Sustainability[1]	Ranking	Social Sustainability	Ranking	Overall Ranking
	historically applied across the footprint of the former Loadout Complex could be excavated to the former site surface level and then reused as capping material for the containment cell. 2. Welded 2 mm thick High-Density Polyethylene (HDPE) geomembrane at the base and sides with a 750gm geofabric cushion layer inside the HDPE 3. Vegetation to mitigate erosion of capping or application of a durable surface layer 4. A 100-year design life is projected as a required parameter for engineering design. An insitu option is also considered and would involve retention of impact soils in situ, Soils would be capped with imported clay material of 0.5m thickness following placement of a marker layer over the area. The site surface would be shaped to promote drainage and vegetated. A 100 year design life may not be possible for this option.			design life and estimated at $550,000 (ex GST) net present value. This integrates costs projected for annual monitoring and replacement of topsoil every 10 years[3]. Costs for the financial assurance are likely to be more if maintained in situ due to the cap only containment, and the larger cap area. The cumulative investment is estimated at $1.05M - $1.25M (ex GST) and could be expected to be reset after 100 years.				
			5		5		2	**12**

Option	Description	Environmental Sustainability	Ranking	Economic Sustainability[1]	Ranking	Social Sustainability	Ranking	Overall Ranking
Option 3 - Offsite treatment and disposal[4]	A NSW waste facility capable of receiving the volume and type of material proposed to be generated during onsite remediation has not yet been identified. A pathway for offsite disposal exists however through amendment to the Environment Protection license (EPL) of the local landfill (Woodlawn Veolia) to allow treatment (where lead concentrations warrant treatment) as a precursor to disposal as General Solid Waste. This pathway would include: 1. A treatability trial to confirm an optimal treatment process 2. Application for an immobilisation approval for disposal of treated waste as GSW 3. Sieving to remove >20 mm fraction[5] 4. Reuse of >20 mm fraction onsite[6] 4. Chemical immobilisation of <20 mm fraction prior to offsite disposal as GSW	Chemical immobilisation could be expected to reduce potential for migration of the Contaminant however the Contaminant in surficial soils has been present on site for decades and only localised migration has been identified. Additionally, oversize materials sieved out before treatment would represent a significant secondary waste stream. This indicates the environmental benefit of chemical immobilisation may be limited. Offsite disposal would eliminate contaminant risks from a large part of the site. Further, the chemical immobilisation of contaminated materials as a preliminary stage of this option would reduce risks to an acceptable level before disposal to landfill. Environmental effects as measured by carbon footprint and landfill space consumption is unfavourable compared with other options.		The cost of progressing this option is estimated at $1.9M – 2.9M (ex GST).		Intergenerational equity is however achieved as the contaminant is adequately managed within an appropriate management structure in perpetuity.		

Option	Description	Environmental Sustainability	Ranking	Economic Sustainability[1]	Ranking	Social Sustainability	Ranking	Overall Ranking
Option 4 – continue current management option	Onsite management of soils impacted with lead through a management plan that limits activity in this area, continues with dust suppression and outlines how any works in this area are to be undertaken	Short term environmental sustainable however longer term may see low level impacts to the environment and ultimately remediation requirements with one of the above options	5	Option is a low cost solution in the short term however long term costs are expected to increase as ultimately remediation of the area is likely to be required. Interim costs include dust suppression and continued periodic monitoring. Each work campaign in this area would require appropriate PPE, air and water management.	5	Low as the community have indicated preference to remediate the site and low intergenerational equity as this option does not provide a long term solution.	5	**15**

Notes:

1. Cost estimates have been developed for the purpose of comparing remedial options and are based on provision of limited information to potential remedial contractors. Further consultation with remedial contractors should occur to confirm costs and assumptions. Costs are based on 4100 m^3 or 7380T of material requiring remediation. Remedial cost calculations are presented for each option as **Appendix 7** and are based on preliminary assessment of industry rates in 2020.
2. Onsite containment options were identified within the CRN based on a multi-criteria constraints assessment (Ramboll 2020c).
3. The financial assurance model applied integrates an interest rate of 3%, inflation of 2%, annual inspection and reporting once established, $40k every 10 years for topsoil / capping surface reinstatement. No provision is made for acute damage to the containment system (e.g.: accidental penetration or potential damage from flooding) or for the management of contaminated materials after the 100 year design life. Assumptions adopted in the financial assurance calculation are presented in **Appendix 8**.
4. Offsite disposal options integrate consideration of two local landfills (Hi Quality - Minda landfill, Windellama and Veolia Woodlawn Waste Facility, Woodlawn). The disposal fee adopted for Minda was $115/t. The disposal fee adopted for Woodlawn was $225/t.
5. A nominal particle size upper limit of 20 mm was adopted for optimal operation of immobilization equipment. Particle sizes greater than 20 mm can be effectively immobilized though increase risk of equipment damage.
6. A laboratory scale screening trial of materials from the Woodlawn Siding was completed and included analyses of total and TCLP lead in >20 mm fraction. Significant volumes of >20 mm fraction were qualitatively observed to be limited to the Woodlawn Siding (i.e.: generally not present in adjacent soils). Targeted assessment of the Woodlawn Siding was adopted as a conservative approach to estimating lead concentrations that could be applied to >20 mm fraction in adjacent soils if observed as lead was most concentrated in the siding. Tabulated assessment of lead concentration against site criteria following laboratory scale screening is presented as **Appendix 5** and indicates the >20 mm fraction would be suitable for onsite reuse.

11.4 Preferred Remedial Option

Return of contaminated material to Woodlawn Mine was identified as the most sustainable option and based on preliminary communication with Heron Resources planning for this option was progressed. Woodlawn Mine activities subsequently shifted from Operational to Care and Maintenance modes and Heron Resources has advised that return of contaminated material to the mine is no longer feasible.

Containment of impacted soils within the rail corridor was identified as the second most sustainable option however containment within the Tarago rail yard was considered unsuitable based on limitations to future development / functionality of this area. Alternate locations within the CRN were also considered though considered unsuitable due to complexities in associated environmental planning pathways.

Within this context the remedial strategy that was selected was offsite treatment and disposal. All options considered include in-situ retention of contamination within operational rail formations and so management of remnant contamination will be required under an LTEMP.

TfNSW will implement a structured process of consultation with the community and other stakeholders that will focus on implementation of the preferred remedial option.

12. SUMMARY OF SELECTED REMEDIAL OPTION

The proposed remedial strategy comprises:

- Planning including:
    - A treatability trial to demonstrate a viable process for chemical immobilisation. See attached as **Appendix 12**.
    - Procurement of a waste receiving facility licensed for receipt of GSW including provision to lease a space for screening and immobilisation of site won materials
    - Application for and receipt of a Specific Immobilisation Approval (SIA) from the NSW EPA. See attached as **Appendix 12**.
    - Co-ordination of amendments to the EPL and/or development consent conditions for the nominated receiving facility including provisions for a screening and immobilisation area at the receiving facility.
- Establishment of the screening and immobilisation area including:
    - Heavy vehicle access and a temporary stockpile area for site won materials
    - A mechanical vibratory screen
    - Temporary stockpile areas for oversize material (rail ballast) and screen fines
    - A pugmill to facilitate full scale immobilisation
    - Temporary stockpile areas for validation of immobilised materials
    - Heavy vehicle access to enable excavation and transport of waste streams for placement in the landfill
- Excavation of the non-operational Woodlawn Siding and surrounding contaminated soils and transport by road to the screening and immobilisation area
- Mechanical screening to remove rail ballast and returned to site for beneficial reuse under a Specific Resource Recovery Exemption.
- Design and implementation of an appropriate validation program
- Disposal of immobilised materials as GSW.

Contaminated soils within the active rail formation and at depth around the former loadout complex building and on the eastern side of the rail formation will remain in-situ. These materials will be managed under a long term EMP for the site described further under **Section 13.16**.

13. REMEDIAL ACTION WORKS PLAN

13.1 Key Personnel

All site personnel (including JHR and its contractors) have the responsibility of protecting human health and the environment. Key personnel and their roles and responsibilities are outlined in **Table 13-1**.

Table 13-1: Key Personnel roles and Responsibilities

Personnel	Name and Contact Details	Role / Responsibility
Land Owner	TfNSW	Responsible for addressing the VMP.
Principal	JHR	Current custodian of the CRN and responsible for all works carried out at the site. Responsible for engaging / contracting all other parties.
Principals Environmental Representative	TBA	Personnel employed by JHR or sub-contracted to JHR to oversee / provide technical advice on remediation works and ensure works are completed in accordance with relevant guidelines.
Remediation Contractor	TBA	Company contracted to undertake remediation works. Responsible for supplying all plant and personnel to conduct the works as outlined in this RAP and as required under local, state and federal legislation.
Remediation Supervisor or Project Manager	TBA	Responsible person appointed by contractor to supervise / coordinate all aspects of remedial works on behalf of the contractor. The primary point of contact for the project.
Contaminated Land Auditor	TBA	A Part B4 Contaminated Land Audit will be prepared for the site in accordance with the Contaminated Land Management Act 1997. Approval of remedial plans prior to commencement of works

13.2 Licenses and Approvals

SEPP 55 defines a framework for management of contamination in NSW. It defines requirements for engagement with consent authorities and local councils according to whether remediation is considered Category 1 (requiring development consent) or Category 2 (requiring notification 30 days before remediation). Ramboll consider the long-term management of contamination associated with the Tarago Loop to be Category 2 remediation. Category 2 remediation work is deemed remediation work that is not Category 1 remediation as described in Clause 9 of SEPP 55.

The proposed remediation works do not trigger the criteria in clause 9 (a) – (f) and the proposed remediation works are not ancillary to any other current development requiring Development Consent. Based upon the above information and criteria the remediation works are deemed to be Category 2 works under SEPP55. Refer Notification Letter included in **Appendix 9** which must be provided to Goulburn Mulwaree Council a minimum of 30 days before commencement of remediation. However, modifications to SEPP 55 are currently being made and, once ratified, will require any retention of contamination on sites to be Category 1 remediation. Depending on the timing for remediation this would therefore require development consent for the long-term management of contamination associated with Tarago Loop.

The return of ballast to the site after screening will likely require a Specific Resource Recovery Exemption. Further correspondence with the EPA is recommended to define the appropriate planning pathway.

The proposed chemical immobilisation will require a Specific Immobilsation Approval from the NSW EPA. A treatability trial and immobilization application are presented as **Appendix 12**. The proposed offsite chemical immobilisation and disposal of immobilised waste can only occur at a waste facility with specific development consent and environment protection license conditions allowing for these activities. It is preferred that these activities occur at a waste facility close to the site however preliminary review indicates local waste facilities do not have required consent and licensing. As a result additional planning will likely be required for the waste facility including assessment of environmental impacts associated with immobilization and applications to modify development consent and EPL conditions.

13.3 Remediation Methodology

The proposed remedial methodology comprises the following key steps:

- Acquire necessary approvals for the selected remedial option including:
    - A Specific Immobilisation Approval (SIA) for lead in waste streams not suitable for disposal as GSW
    - Amendment to development consent conditions and the EPL for the nominated receiving facility[2]
    - Apply for a specific resource recovery exemption from the NSW EPA for return of ballast to site.
- Prepare a Remedial Works Plan that details the remediation actions and addresses all consent requirements.
- Contractor to prepare ancillary plans to complete the works. Plans required as a minimum are included in **Sections 13.7** to **13.9**. Plans are required to address consent requirements.
- Remove remnant rails for recycling and sleeper for disposal as GSW. A waste classification for sleepers is presented as **Appendix 10**
- Establish a work zone at the nominated receiving facility for temporary storage, mechanical screening and immobilisation of material excavated from the Woodlawn Siding and adjacent soils
- Excavate and transport materials from the Woodlawn Siding and adjacent soils to the work zone at the receiving facility. Materials will be excavated until lead concentrations at the remnant site surface (as measured by fpXRF) are lower than the site assessment criteria (2200 mg/kg)
- Mechanically screen materials excavated from the Woodlawn Siding and adjacent soils into <20 mm and >20 mm fractions[3]
- Validate suitability of >20 mm fraction for beneficial reuse onsite under a specific resource recovery exemption. Validation of ballast must occur before immobilisation to enable mixing with the >20 mm fraction to allow for contingency actions if characterisation fails, refer **to Section 13.14**.
- Immobilise the <20 mm fraction in accordance with the SIA (TBC)

Dispose of immobilised materials as GSW at the nominated facility

A process diagram for screening and immobilisation is presented as **Figure 2** below.

[2] Screening and immobilization could occur at a location other than the waste receival facility however such a facility would need to have development consent as a contaminated soil treatment facility and hold an appropriate license.

[3] A nominal particle size upper limit of 20 mm was adopted for optimal operation of immobilization equipment. Particle sizes greater than 20 mm can be effectively immobilized though increase risk of equipment damage.

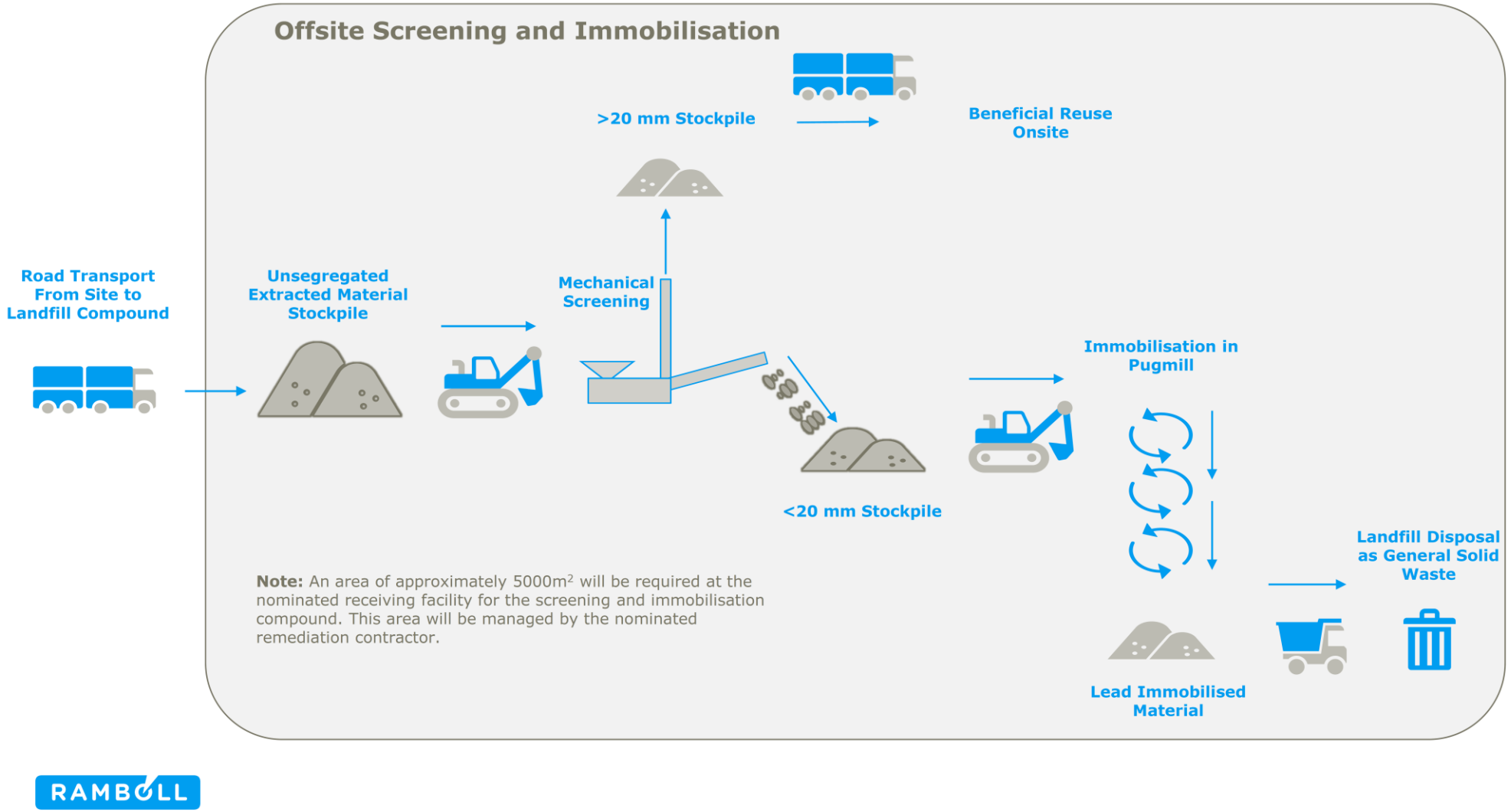

Figure 2: Screening and Immobilisation Process Diagram

13.4 Preliminaries

Environmental impact assessment, co-ordination of a SIA, amendment to receiving facility EPL and/or development consent conditions are key preliminary elements of the remedial strategy. Concurrent with these planning elements, the Remediation Contractor will provide a detailed methodology to JHR and Ramboll for written approval. The methodology is to describe:

- Safety controls that minimise disturbance to the operational Goulburn – Bombala main and Tarago Yard Loop lines. A project specific health and safety plan must be prepared by the Remediation Contractor that satisfies all requirements of the JHR CRN integrated management system. The Principal will retain responsibility for health and safety throughout remediation
- Methods of excavation and materials tracking including specification of environmental control procedures to address relevant provisions within the Action Plan (Ramboll 2020c)
- A detailed description of proposed immobilisation procedures and a plan for the screening and immobilisation compound to be established within the nominated receiving facility. This will address each element of the process as described here-in and include environmental controls to mitigate potential for contamination to migrate from the screening and immobilisation compound

The Remediation Contractor's methodology will include schedule allowances for validation as described in **Section 14** and allowance for earthworks to ensure free drainage across the site in accordance with a final landform design to be provided by the Principal.

13.5 Community Relations

TfNSW has managed community relations through assessment and interim management of contamination at Tarago. TfNSW will continue to manage community relations through remediation according to a formalised community relations plan.

13.6 Protection of Infrastructure, Heritage and Vegetation

The Remediation Contractor's methodology will include measures to ensure the protection of operational infrastructure (including but not limited to rail formations, the railway station, underground and above ground services), heritage (including structures associated with the Tarago Rail Precinct heritage item) and vegetation immediately surrounding the southern rail culvert (refer to **Figure 3**, **Appendix 1**).

The Principal will provide current service plans covering proposed areas of excavation. The Remediation Contractor will make provision for onsite location of services and measures to ensure services are not disturbed.

Excavation that may disturb operational infrastructure, heritage or vegetation around the southern rail culvert (**Figure 2**) is explicitly excluded from the scope of remediation.

13.7 Site Establishment

The required personnel and plant are required to mobilise to site, set up boundaries for the remedial works and implement current lead work controls per the Action Plan (Ramboll 2020c) including notification to WorkSafe NSW.

The Principal's Environmental Representative will refine excavation extents through fpXRF measurement of surface lead concentrations in/around proposed excavation areas and work with the Remediation Contractor to mark-out excavation areas onsite.

13.8 Management Plans

Prior to commencing works at the site management plans are required to be developed and approved by the Site Auditor. Management plans required, at a minimum are as follows.

1. A Remedial Works Plan providing specific detail on the remediation requirements.
2. A Construction Environmental Management Plan that details the controls proposed by the contractor to minimise impacts on the community and the environment during the works. This plan is to include the following subplans as a minimum the plans outlined in Section 13.8 to 13.10.
3. A worker health and safety plan that includes the specific details for working with these materials.

Plans are to be reviewed and approved by the Auditor prior to the commencement of remedial works.

- Stormwater Soil and Water Management Plan

The Remediation Contractor will prepare a Soil and Water management plan to manage soil and water during the works. The Remediation Contractor must define and implement controls to prevent offsite contaminant migration above criteria protective of the receiving environment. Preliminary guidance provided in the Action Plan (Ramboll 2020c) must be addressed.

13.9 Noise Management Plan

The remediation contractor will prepare a noise management plan to manage noise during the works. The Noise Management Plan shall comply with the noise management requirements for the CRN and include monitoring to demonstrate effective implementation of the plan during the works. The following noise control measures should be considered:

- Construction vehicles and machinery would be selected with consideration of noise emissions. Equipment should be fitted with appropriate silencers (where applicable) and be maintained in accordance with manufacturer's requirements. Machines found to produce excessive noise compared to typical noise levels should be removed and replaced or repaired or modified prior to recommencing works
- Where possible construction vehicles and machinery would be turned off or throttled down when not in use
- All site personnel would be informed of their obligations to minimise potential noise impacts on residents during the site induction and need to take reasonable and practical measures to minimise noise

13.10 Dust Management Plan

The remediation contractor will prepare a dust management plan to manage dust during the works. The Dust Management Plan shall comply with the dust management requirements for the CRN and include monitoring to demonstrate effective implementation of the plan during the works. The Remediation Contractor must define and implement dust controls to prevent offsite contaminant migration above criteria protective of the receiving environment. Controls will prevent offsite migration of dust. The following dust control measures should be considered:

- Regularly water vehicle routes and work areas with a watercart.
- Maintain and sweep roads where deposited dust or spillage is visible.
- Avoid unnecessary use of and access to unsealed surfaces.
- Limit vehicle and mobile plant speeds within the work area e.g. 10 km/h.
- Modify or cease operations during adverse meteorological or dust generating conditions.
- Consider use of wind breaks or shielding around material and/or stockpiles.

- Maintain stockpiles at defined height, where the lowest practicable height is preferable.
- Avoid double-handling of material and optimise transfers to limit time stockpiled or handled.
- Visually observe dust levels to adapt operations.
- Cover all loads when transporting material.
- Identify and allocate sufficient resources to manage dust risks.
- Facilitate training and tool-box-talks addressing air quality management objectives, hazards, risks, controls, behaviours and consequences for inappropriate behaviour.

The Dust Management Plan should include onsite air quality monitoring specific to the Remediation Contractor's methodology. There is no available method of measure deposited dust or lead in TSP in real-time so monitoring will include sampling of airborne dust at the site boundaries. The monitoring equipment should be capable of measuring TSP, PM_{10} and $PM_{2.5}$ continuously. The equipment should be capable of alerting to trigger values through telemetry and software that allows alerting at averaged set-points to email and/or SMS. The instrumentation should be maintained in accordance with the manufacturers specifications and hold a current factory calibration certificate.

A three-level air quality alert system is proposed. The trigger levels have been derived based on real-time monitoring from the Station Masters Cottage collected prior to remediation. The values presented below are based on 98%, 99.9% and 100% of the 15-minute averages measured from April 2020 to January 2021 (28,412 15-minute averages). These values are considered appropriate when considering what is acceptable in the community, the low airborne lead measured in absence of remediation and when considered against the air quality criteria at longer averaging periods. Trigger values should be reviewed following the first month of data and potentially revised with consideration of the air quality criteria, monitoring technique and positioning of monitors.

1. Alert Level
    a. Elevated levels of dust measured for one 15-minute averaging period.
    b. Initial trigger values set at 10 $\mu g/m^3$ for $PM_{2.5}$, 24 $\mu g/m^3$ PM_{10} and 29 $\mu g/m^3$ TSP (98 percentile 15-minute average in absence of remediation)
    c. Observe the operation to identify dust generating activities. Consider further action to minimise dust generation or continue to observe closely.
2. Action Level 1
    a. Elevated levels of dust measured for two consecutive 15-minute averaging periods.
    b. Initial trigger values set at 25 $\mu g/m^3$ for $PM_{2.5}$, 44 $\mu g/m^3$ PM_{10} and 50 $\mu g/m^3$ TSP (99.9 percentile 15-minute average in absence of remediation)
    c. Immediately action additional dust mitigation measures and communicate requirement to reduce dust levels to all operational staff.
3. Action Level 2
    a. Elevated levels of dust measured for three consecutive 15-minute averaging periods.
    b. Initial trigger values set at 82 $\mu g/m^3$ for $PM_{2.5}$, 303 $\mu g/m^3$ PM_{10} and 330 $\mu g/m^3$ TSP (100 percentile 15-minute average in absence of remediation)
    c. Cease operation and prioritise dust mitigation measures. Operation can recommence once subsequent alert levels are at Action Level 1 or below.

The Dust Management Plan is to consider historical remediation activities completed in the Tarago area and the sensitivities of neighbouring properties to impacts from dust.

13.11 Material Tracking

All material handled during excavation of lead impacted materials is to be tracked to verify appropriate movement and handling. The system will track materials from cradle-to-grave, and will provide detailed information on the origin, quantity and fate of all materials excavated during remediation. Records will be maintained by Remediation Contractor site personnel defining chainage of origin, material types loaded, and material fate (temporary stockpile ID). These records shall be consolidated digitally according to the tracking spreadsheet attached as **Appendix 11**.

13.12 Survey

The Remediation Contractor will co-ordinate survey to ensure all excavation areas and remnant contamination is accurately defined.

This survey forms part of the validation requirements described in **Table 14-6**.

13.13 Remediation Schedule

The final remediation schedule will be discussed with the Remediation Contractor. A proposed indicative schedule up to the completion of a draft validation report is outlined in **Table 13-2**.

Table 13-2: Remediation Schedule

Task	Estimated Duration
Planning, engagement of Remediation Contractor and receiving facility	3 – 6 months
Establishment of Site and Screening + Immobilisation Compound	2 weeks
Excavation, immobilisation and return of screened ballast	4 – 6 weeks
Total Duration	19 – 32 weeks

13.14 Hours of Operation

The Remediation Contractor shall only undertake works associated with validation works that may generate an audible noise at the closest residential receptor (20 Stewart Street and 17 Wallace Street) during the following hours, unless under direction from relevant authority for safety reasons or in the event of an emergency:

- 7:00 am to 6:00 pm Monday to Friday
- 7:00 am to 1:00 pm Saturdays
- At no time on Sundays or public holidays

Works may also be undertaken outside of these hours if in accordance with EPL 13421.

13.15 Contingency Plan

The contingencies presented in **Table 13-3** are to be implemented where unexpected site conditions or circumstances occur.

Table 13-3: Contingency Plan

Contingency Event	Contingency Action	Personnel Responsible
Receival of a dust complaint	Stop Work Identify dust source and review control measures. Assess requirements for additional monitoring or investigation of impact. Review trigger alert system to determine if unacceptable impact measured at site boundary.	Remediation Contractor following consideration from Principal and Principal's Environmental Representative
Exceedance of dust trigger levels (defined in **Section 13.10)**	Alert level trigger received – observe the operation to identify dust generating activities. Consider further action to minimise dust generation or continue to observe closely. Action Level 1 – Immediately action additional dust mitigation measures and communicate requirement to reduce dust levels to all operational staff. Action Level 2 - Cease operation and prioritise dust mitigation measures. Operation can recommence once subsequent alert levels are at Action Level 1 or below.	Remediation Contractor following consideration from Principal and Principal's Environmental Representative
Validation sampling indicates screened ballast is unsuitable for onsite reuse	Further removal of contaminated fines or immobilisation and disposal	Remediation Contractor following consideration from Principal and Principal's Environmental Representative
Validation sampling of immobilised material indicates not suitable for disposal as immobilised GSW	Further immobilisation will occur	Remediation Contractor following consideration from Principal and Principal's Environmental Representative
Validation sampling of screened ballast indicates concentrations unsuitable to return to site, or a specific RRE cannot be obtained	Characterise ballast for disposal to landfill or mix with <20 mm soils and immobilise for disposal to landfill	Remediation Contractor following consideration from Principal and Principal's Environmental Representative
Surface water or air quality monitoring post remediation (defined in **Section 14) indicates unacceptable offsite risk**	Monitor air quality and surface water post remediation to determine unacceptable offsite risk Consider further remediation of remnant contamination	Principal and Principal's Environmental Representative
Discovery of unexpected materials	Contact the Principal's representative, sort materials into a segregated stockpile and discuss possible disposal options with the	Principal, following notification from the Remediation Contractor

	Principal or the Principal's Representative	
Receival of a noise complaint	Identify noise source and implement noise control measures	Remediation Contractor

13.16 Long Term Environmental Management Plan

A Long-Term Environmental Management Plan (LTEMP) will be required to provide guidance for ongoing maintenance of remnant contamination. The LTEMP will include survey of excavation areas and areas of remnant contamination. A legal requirement to implement the LTEMP should be defined through a covenant to the land title.

14. VALIDATION PLAN

The following is the validation Sampling and Analysis Quality plan (SAQP) to be implemented to validate the remedial objective has been achieved for the site.

14.1 Validation Data Quality Objectives

Specific Data Quality Objectives (DQOs) have been developed for the validation of field and analytical data obtained during the remediation. The DQO process is a systemic, seven step process that defines the criteria that the validation sampling should satisfy in accordance with the requirements of NSW EPA (2017) *Guidelines for the NSW Site Auditor Scheme* (3rd Edition). The DQOs are as follows:

14.1.1 Step 1: State the Problem

Lead impacted soil exists at the site. Remediation is required to mitigate potential exposure risks into the future.

14.1.2 Step 2: Identify the Decisions

The validation SAQP is to ensure that excavation of the Woodlawn Siding and surrounding soils (described in further detail on **Figures 2a** – **2e**) occurs such that remnant lead concentrations are below remediation criteria described in **Section 10**.

Excavation areas will be surveyed after validation as the basis of documenting where contamination remains.

The site will be considered remediated when the remediation and validation program has been carried out successfully.

14.1.3 Step 3: Identify Inputs to the Decision

The following inputs into the decision-making process are required:

- fpXRF measurement of lead concentrations to refine excavation areas onsite before excavation commences
- Documented materials tracking of all material movements including source excavation, transport. Screening and immobilisation, return of ballast to site and disposal of immobilised GSW
- fpXRF measurement of lead during remediation to define vertical and horizontal excavation limits onsite
- Validation sampling of screened ballast and analyses for total lead to confirm suitability for reuse onsite
- Validation sampling of immobilised ballast fines for TCLP lead to confirm suitability for disposal as immobilised GSW
- fpXRF measurement of lead in the screening and immobilisation compound before establishment of the compound and at completion of remediation
- Survey of validation excavations to define contaminated areas remaining onsite
- Completion of surface water and air quality monitoring in the receiving environment. One round of surface water monitoring will occur after >10 mm rainfall in a 24 hour period post remediation. Three months of air quality monitoring will occur post remediation.

14.1.4 Step 4: Define the Study Boundary

The study boundary includes proposed excavation areas onsite (the Woodlawn Siding and surrounding soils as defined on **Figures 2a** – **2e**) and the screening and immobilisation compound.

14.1.5 Step 5: Development of Decision Rules

Data will be considered reliable if it satisfies the limits of decision error defined in **Section 14.1.6**.

Excavation will be considered sufficient when lead concentrations in remnant soils onsite are below the nominated remediation criteria of 2,200 mg/kg or excavation must be limited to preserve the structural integrity of operational lines.

Screened ballast will be considered suitable for reuse if the 95% UCL of lead concentrations in screened ballast after remediation is less than the nominated remediation criteria of 2,200 mg/kg.

Ballast fines will be considered suitable for disposal as immobilised GSW if the 95% UCL of lead leachate (TCLP) is less than the limit for lead leachate in GSW defined in the NSW EPA Waste Classification Guidelines (TCLP1 – 5 mg/L).

Clean-up of the screening and immobilisation compound after remediation will be considered complete when the 95% UCL of lead concentrations in remnant surface soils is below either the Tier 1 health investigation level for lead industrial land or the 95% UCL of lead concentrations in remnant surface soils before establishing the compound.

Potential for offsite contaminant migration after remediation will be considered to be satisfactorily low if contaminant concentrations in surface water and air quality monitoring are reported below validation criteria. Surface water validation criteria are presented in **Table 14-3**.

14.1.5.1 Environmental Monitoring

The effectiveness of remediation at mitigating exposure risks associated with site contamination in the receiving environment will be assessed through post remediation surface water and air quality monitoring. Existing monitoring data indicates exposure risks within the receiving environment are low. A polymer sealant was applied over areas of contamination onsite to limit potential contaminant migration offsite and while continued polymer application is not proposed post remediation, potential for offsite contaminant migration post remediation (integrating removal of the Woodlawn Siding) is likely to be low. Within this context one round of surface water monitoring after >10 mm rainfall in a 24hr period and 3 months of continuous air quality monitoring will be completed. This monitoring program is detailed further in **Section 14**.

Surface Water Criteria

The criteria adopted 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 3.6 updated March 2021, (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)
- Advice on risks to human health and the environment: Boyd Street and publicly accessible areas, Tarago NSW, Site specific criteria – Protection of human health and terrestrial and/or aquatic ecosystems (EnRiskS, 2020)

Rationale for Application of Surface Water Guidelines

The relevance of guidelines was determined based on iterative screening from the broadest and most sensitive water usage scenario which occurs in the Mulwaree River back through agricultural land and public roads to the least sensitive scenario which occurs at site.

All results from Mulwaree River samples (SW8 – SW10) have been screened against Tier 1 / screening guidelines relevant to human health (incidental ingestion), freshwater ecology, irrigation and stock watering as each of these receptors occur within the receiving waters (the Mulwaree River). Should results exceed screening guidelines and indicate site contamination may be the source, it would be appropriate to apply the guidelines that were exceeded to sampling locations upstream as this would inform further assessment of the site as the potential source. Previous monitoring results do not indicate site contamination is adversely affecting the Mulwaree River and site specific guidelines were developed for As, Cd, Pb, Mn, Ni (EnRiskS 2020) that integrate the ephemeral nature of surface water features between the Mulwaree River and the site and in these areas that results have been applied to samples from drainage features onsite (SW1 – SW6) and immediately downstream (SW7) have been applied to the exclusion of Tier 1 criteria.

Additionally, several technical refinements were identified and are relevant to guideline application. These were:

- ADWG Section 6.3.1 (2011) states that guideline values refer to the total amount of the substance present, regardless of its form (e.g. in solution or attached to suspended matter) and so analytical results from unfiltered samples should be assessed against human health criteria
- ANZG (2018) guidelines for metals in freshwater are adopted from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000) which states the major toxic effect of metals comes from the dissolved fraction, so it is valid to filter samples (e.g. to 0.45 µm) and compare the filtered concentration against the trigger values

- Water hardness is identified as a physical parameter with a quantifiable effects correction factors are defined in the guidelines to address the effect of water hardness on the bioavailability of cadmium, chromium, lead, nickel and zinc.

To define appropriate hardness correction factors, water was conservatively presumed to be moderately hard based on the Goulburn Mulwaree Regional State of the Environment Report 2004-2009 (Goulburn Mulwaree Council 2009). Hardness correction factors were adopted from Table 3.4.4 of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000) to develop refine Tier 1 criteria as described in **Table 14-1** below.

Table 14-1: Hardness Corrections for Tier 1 Freshwater Ecology Guidelines

	Original guideline value (mg/L)	Hardness Correction Factor	Corrected guideline value (mg/L)
Cadmium	0.0002	2.7	0.00054
Chromium	0.001	2.5	0.0025
Lead	0.0034	4	0.0136
Nickel	0.011	2.5	0.0275
Zinc	0.008	2.5	0.02

Application of guidelines at each sampling point is summarised in **Table 14-2**.

Table 14-2: Guidelines Applied to Sampling Points

Sampling Point	Location	Human Health - Site Specific[A]	Ecology - Site Specific[A]	Human Health - Recreational Sceening[B]	Ecology - Screening[C]	Irrigation - Screening[D]	Stock Water - Screening[E]
SW1-UP	Upstream of Southern Culvert (offsite)	✓	✓	✓	✓	-	-
SW1	Upstream of Southern Culvert	✓	✓	✓	✓	-	-
SW2	Downstream of Southern Culvert	✓	✓	✓	✓	-	-
SW3	Upstream of Middle Culvert	✓	✓	✓	✓	-	-
SW4	Downstream of Middle Culvert	✓	✓	✓	✓	-	-
SW5	Upstream of Northern Culvert	✓	✓	✓	✓	-	-
SW6	Downstream of Northern Culvert	✓	✓	✓	✓	-	-
SW7	Dam on farm downstream of Northern Culvert (offsite)	-	-	✓	✓	✓	✓
SW8	Mulwaree River upstream of Middle and Northern Culvert Discharge	-	-	✓	✓	✓	✓
SW9	Mulwaree River upstream of Southern Culvert Discharge	-	-	✓	✓	✓	✓
SW10	Mulwaree River downstream of Middle and Northern Culvert Discharge	-	-	✓	✓	✓	✓

Assessment criteria adopted under each guideline are presented in **Table 14-3**.

Table 14-3: Guideline Criteria (mg/L)

Contaminant	Human Health - Site Specific Criteria	Human Health - Recreation Screening	Ecology - Site Specific Criteria	95% Fresh water (ANZG 2018)	Irrigation - Screening	Stock Water - Screening
Total Metals						
Aluminium	-	2	NA	NA	NA	NA
Arsenic	7	0.1	NA	NA	NA	NA
Barium	-	2	NA	NA	NA	NA
Beryllium	-	0.6	NA	NA	NA	NA
Cadmium	1.4	0.002	NA	NA	NA	NA
Chromium	-	0.5	NA	NA	NA	NA
Cobalt	-	-	NA	NA	NA	NA
Copper	-	20	NA	NA	NA	NA
Iron	-	3	NA	NA	NA	NA
Lead	7	0.1	NA	NA	NA	NA
Manganese	350	5	NA	NA	NA	NA
Mercury	-	0.01	NA	NA	NA	NA
Nickel	14	0.2	NA	NA	NA	NA
Zinc	-	30	NA	NA	NA	NA
Dissolved Metals						
Aluminium	NA	NA	-	0.055[a]	20	5
Arsenic	NA	NA	0.5	0.024[b]	2	0.5-5
Barium	NA	NA	-	-	-	-
Beryllium	NA	NA	-	-	0.5	-
Cadmium	NA	NA	10	0.00054[g]	0.05	0.01
Chromium	NA	NA	-	0.002.5[g]	1	1
Cobalt	NA	NA	-	0.0014	0.1	1
Copper	NA	NA	0.5	0.0014	5	0.4-5
Iron	NA	NA	-	-	10	not sufficiently toxic
Lead	NA	NA	0.1	0.0034	5	0.1
Manganese	NA	NA	-	1.9	10	not sufficiently toxic
Mercury	NA	NA	-	0.00006[d, e]	0.002	0.002
Nickel	NA	NA	1	0.0275[g]	2	1
Zinc	NA	NA	20	0.02[g]	5	20

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.This is an aesthetic criteria only based on post flocculation problems,

[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 **Table 14-1**.*

Air Quality CriteriaAir quality criteria are defined in **Table 14-4**.

Table 14-4: Air Quality Criteria

Pollutant	Averaging period	Criteria	Source
Lead	Annual	0.5 µg/m³	NEPC (1998)
TSP	Annual	90 µg/m³	NHMRC (1996)
$PM_{2.5}$	24 hours	25 µg/m³	DoE (2016)
	Annual	8 µg/m³	DoE (2016)
PM_{10}	24 hours	50 µg/m³	DoE (2016)
	Annual	25 µg/m³	DoE (2016)
Deposited dust	Annual	4 g/m²/month	NERDDC (1988)

A post remediation air quality monitoring program shall include monitoring of lead in TSP, with consideration to measure airborne dust and deposited matter.

14.1.6 Step 6: Specify Performance Criteria

Validation performance criteria are defined to assess potential for a false positive or false negative in validation data. Performance criteria for fpXRF measurements of lead in soil, and sampling for laboratory analyses of surface water and airborne dust are presented in **Table 14-5** below.

Table 14-5 Performance Criteria for Validation Sampling

Category	Performance Criteria			
	fpXRF Measurements	**Sampling of Screened Ballast and Immobilised Ballast Fines**	**Surface Water Sampling**	**Air Quality Monitoring**
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 US EPA 2007, *Method 6200, Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment*.	Soil sampling for laboratory analyses will occur in general accordance with *AS 4482.1-2005 Guide to the investigation and sampling of sites with potentially contaminated soil - Non-volatile and semi-volatile compounds* and *AS 1141.3.1 – 2012 Methods for Sampling and Testing Aggregates, Method 3.1: Sampling – Aggregates*	• Calibrated measurement equipment used. The water quality meter will be calibrated by the technical rental company prior to use. • 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*. • Collection of one intra-laboratory duplicate for surface water and one intra-laboratory duplicate for sediment. • 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.	Dust deposition will be measured in accordance with *AS/NZS 3580.10.1 Determination of Particulate Matter – Deposited Matter – Gravimetric method.* Suspended particulates will be measured in accordance with *AS/NZS.9.15 Determination of suspended particulate matter – Particulate metals high or low volume sampler gravimetric collection – Inductively coupled plasma (ICP) spectrometric method.* Continuous airborne dust monitoring will occur using a particle counter (QAMS DMP 7000) configured to measure PM10 and PM2.5 at 5-minute intervals over the course of the program.
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:	• XRF readings will be collected by a experienced scientist holding a NSW EPA license required for field based XRF testing • XRF readings will be collected from soil in-situ and measurements will be taken by placing the XRF directly on the ground surface. • the soil surface to be measured will be cleared of debris and	In the field, precision will be maintained by: • Using standard operating procedures for the collection of soil samples. • Collection of soil samples by suitably experienced environmental scientists. • Use of disposable nitrile rubber gloves between sampling locations.	• Surface water sampling will be completed by experienced scientists • A new pair of disposable nitrile gloves to handle each sample. • Samples will be placed immediately into laboratory supplied and appropriately preserved sampling vessels • Samples will be stored in chilled, insulated containers with ice for transportation to the laboratory	In the field, precision will be maintained by: • Using standard operating procedures for air quality monitoring. • Completion of air quality monitoring by suitably experienced environmental scientists. • Recording of sample identification and analytical

Category	Performance Criteria			
	fpXRF Measurements	**Sampling of Screened Ballast and Immobilised Ballast Fines**	**Surface Water Sampling**	**Air Quality Monitoring**
	grass prior to taking the measurement to ensure that there is no obstruction, that the analyser window is protected and that contact with the sample surface is maintained during measurements. • As moisture is known to affect measured concentrations, visually dry surfaces will be chosen for measurement. • Soil sampling for confirmatory laboratory analyses will occur in general accordance with *AS 4482.1-2005 Guide to the investigation and sampling of sites with potentially contaminated soil - Non-volatile and semi-volatile compounds*. This will include: ○ Collection of samples by a suitably experienced environmental scientist ○ Use of disposable nitrile rubber gloves between locations ○ Soil samples will be placed immediately into laboratory supplied and appropriately preserved sampling vessels. ○ Sample numbers, preservation and analytical requirements are to be recorded on chain of custody documents.	• Placement of samples directly into designated single use sampling containers. • Collection of intra-laboratory and inter-laboratory duplicate samples at a rate of 1 in 20 primary samples. • Collection of one rinsate sample on reusable sampling equipment at the end of each day. • Recording of sample identification and analytical requirements on chain of custody documents. • Samples transported to the laboratory under chain of custody conditions to a laboratory with NATA accreditation for the analytical methods prescribed. • 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.	• 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.	requirements on chain of custody documents. • Samples transported to the laboratory under chain of custody conditions to a laboratory with NATA accreditation for the analytical methods prescribed.

Category	Performance Criteria			
	fpXRF Measurements	**Sampling of Screened Ballast and Immobilised Ballast Fines**	**Surface Water Sampling**	**Air Quality Monitoring**
	• Samples are to be transported to the laboratory under chain of custody conditions to a laboratory with NATA accreditation for COPCs.			
Completeness: The completeness of the data set shall be judged by:	• All locations sampled as outlined in **Section 14.1.7**. • Sampling completed by experienced personnel • Field documentation completed correctly	• All locations sampled as outlined in **Section 14.1.7**. • Sampling completed by experienced personnel • Field documentation completed correctly	• All locations sampled as outlined in **Section 14.1.7**. • Sampling completed by experienced personnel • Field documentation completed correctly	• All locations sampled as outlined in **Section 14.1.7**. • Sampling completed by experienced personnel • Field documentation completed correctly
Representativeness: The representativeness of the field data will be judged by:	• Non-disposable sampling equipment, such as the hand auger, will be thoroughly decontaminated between locations using Decon 90 solution and deionised rinsate water. • 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. • Soil analytical samples will be collected directly into the sampling vessels.	• Non-disposable sampling equipment, such as the hand auger, will be thoroughly decontaminated between locations using Decon®90 solution and deionised rinsate water. • 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. • Soil analytical samples will be collected directly into the sampling containers following size reduction and splitting.	• 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. • 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. • Surface water analytical samples will be collected directly into the sampling vessels using an extendable pole sampler where appropriate.	• Dust deposition gauge bottles will be sourced from a NATA accredited laboratory • 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 • Dust HV filters will be transported in disposable zip-lock bags
Comparability: Comparability to existing field data will be maintained by:	• Use of the same appropriate sampling methodologies • Same sampling depths will be used (i.e.: 0-0.05 mbgl) • Analytical samples will be collected for submission to the laboratory • Photographs will be taken of sampling location conditions at the time of sampling.	• Use of the same appropriate sampling methodologies • Same sampling depths will be used (where practical) • Analytical samples will be collected for submission to the laboratory • Photographs will be taken of sampling location conditions at the time of sampling.	• Use of the same appropriate sampling methodologies • Same sampling depths for surface water (where practical) • Visual and olfactory observations will also be recorded on the field sheet. • Photographs will be taken of sampling location conditions at the time of sampling.	• Use of the same appropriate sampling methodologies • Same sampling locations will be used • Analytical samples will be collected for submission to the laboratory • Photographs will be taken of sampling location conditions at the time of sampling.

Performance criteria for analyses of soil duplicates, surface water samples and air quality samples are defined as follows:

- Data will be analysed adopting RPD control limits of +/- 30%.
  Where concentration levels are less than two times the PQL, the Absolute Difference (AD) shall be calculated. Data will be considered acceptable if the: AD <2.5 times the PQL. Any data which does not conform to these acceptance criteria will be examined for determination of suitability.

- Blank samples will be submitted with the analytical samples and analysed for the contaminants of concern: One Field Blank will be collected 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.

Decision Error Protocol

If the data received is not in accordance with the defined acceptable limits outlined in Steps 5 and 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:

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

Rectifying Non-conformances

If any of the validation procedures or criteria identified are not followed or met, this will constitute a non-conformance. The significance of the non-conformance will determine if rectification is required after discussion with the site auditor. In order to address any non-conformances, the Principal's Environmental Representative must assess the significance of each non-conformance and put their conclusion and recommendation to the auditor for approval.

14.1.7 Step 7: Optimise the Design for Obtaining Data

All validation samples are to be collected in accordance with the DQOs outlined in this Section.

Validation samples, frequency of collection, the analysis required, and justification is presented in **Table 14-6**.

Table 14-6: Validation Plan

Validation Method	Validation Requirements	Measurement / Analyses
Validation of remnant soils	fpXRF measurements onsite demonstrating lead in excavation surface soils is < 2200 mg/kg. fpXRF measurements at the immobilsiation compound deomnstrating the 95% UCL of lead concentrations in remnant surface soils is below either the Tier 1 health investigation level for lead industrial land or the 95% UCL of lead concentrations in remnant surface soils before establishing the compound. Measurements will occur to achieve a density of 1/100 m^2 across the base of excavation areas on 10 meter icnrements along excavation walls. Measurements will occur to achieve a density of 1/100 m^2 across the immobilisation compound. Validation sampling has occurred in areas where excavation of lead impacted soils occurred during loop extension. Analytical results will be provided in the validation report though were observed to fall below site assessment criteria. Excavation for rail loop construction was followed by importation and placemnet of rail construction materials. Further validation is not considered warranted though would also not be feasible without disturbing active rail formation. Review of material tracking demonstrating appropriate and controlled movement of lead impacted materials. Lead impacted soils will remain in onsite following remediation and will be managed under a long term EMP.	fpXRF measurements of lead supplemented by laboratory QC samples and existing primary laboratory analyses.
Validation of screened ballast and immobilised fines	Screened ballast will be considered suitable for reuse if the 95% UCL of lead concentrations in screened ballast after remediation is less than the Industrial Health Investigation Level for lead of 1,500 mg/kg (NEPC 2013). Ballast fines will be considered suitable for disposal as immobilised GSW if the 95% UCL of lead leachate (TCLP) is less than the limit for lead leachate in GSW defined in the NSW EPA Waste Classification Guidelines (TCLP1 – 5 mg/L). Validation sampling of screened ballast and immobilised fines stockpiles will be completed by the Principals environmental representative. Sampling will occur to achieve a density of 1/25 m^3 with a minimum of three samples.	Laboratory analyses of screened ballast for total lead and immobilised fines for lead leachate (TCLP).

Surface water monitoring	One round of surfae water monitoring is proposed post remediation. Risks from site contamination within the downstream receiving environment will be considered acceptable when metals concentrations from surface water samples collected at locations presented on **Figure 3**, **Appendix 1** are below criteria nominated in **Section 14.1.6** or where contaminant concentrations upstream and downstream are comparable.	Laboratory analyses of total and dissolved metals (Al, As, Ba, Be, Cd, Cr, Cu, Fe, Pb, Mg, Hg, Ni, Zn)
Air quality monitoring	Three months of air quality monitoring are proposed post remediation. Risks from site contamination in airborne dust within the surrounding environment will be considered acceptable when lead in samples from airborne and/or deposited dust collected at locations presented on **Figure 3**, **Appendix 1** are below criteria nominated in **Section 14.1.6**.	Laboratory analyses for lead, TSP and deposited dust.

14.1.7.1 Validation Reporting

A validation Report will be prepared in general accordance with the relevant sections of NSW OEH (2020) *Guidelines for Consultants Reporting on Contaminated Land* and the NSW EPA *Guidelines for the NSW Site Auditor Scheme 3rd Edition* (NSW EPA 2017). The Validation Report will include:

- Executive summary
- Scope of work
- Site Description
- Summary of site history and previous investigations
- Remediation activities undertaken, including the extent of the excavation works (survey information) and observations made during excavation works
- Supporting factual evidence of the remediation work including photographic and field records and materials tracking data
- Validation sampling and analysis results
- Quality assurance/ quality control (QA/QC) protocols for field work and laboratory analysis and
- A statement indicating the adequacy of the remediation completed, degree to which lead impacts have been removed and if / where impacts remain.

14.1.7.2 Long Term Environmental Management Plan

A long term EMP will be prepared to define the location of remnant contamination and management measures required to mitigate risks associated with future disturbance of these areas. The Long Term EMP will be prepared in accordance with *Consultants Reporting on Contaminated Land – Contaminated Land Guidelines* (NSW EPA 2020) and will include:

- Purpose
- Background
- Definition of remnant contamination integrating survey data presented on site plans
- Management activities
- Monitoring and inspection requirements
- Triggers for review of the LTEMP
- Mechanism for enforceability

15. CONCLUSIONS

The preferred remedial strategy includes offsite disposal of ballast fines from the Woodlawn Siding and adjacent surface soils. Ballast will be mechanically screened for reuse onsite. Impacted soils will be excavated. Ballast fines and soils will be transported off site to a compound established at a licensed waste facility and chemically immobilised for disposal as General Solid Waste in accordance with a NSW EPA Specific Immobilisation Approval.

Contaminated ballast will remain within operational rail formations and at depth around the footprint of the former Ore Concentrate Loadout Complex buildings. Remnant contamination will be managed under a long term environmental management plan (LTEMP).

The effectiveness of remediation at mitigating exposure risks associated with site contamination in the receiving environment will be assessed through post remediation surface water and air quality monitoring.

It is anticipated that the proposed remedial strategy will appropriately mitigate risks associated with site contamination and that the LTEMP will effective manage risk from residual contamination.

16. 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 to assess site contamination, 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.

16.1 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.

17. REFERENCES

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Ramboll (2019c) *Tarago Crossing Loop Extension Short-Term Lead Management Plan*

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

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

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

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

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

Ramboll (2020c) *Containment Cell Area Selection Tarago Rail Corridor Remediation Project*

Ramboll (2020d) *Tarago Lead Management Action Plan*

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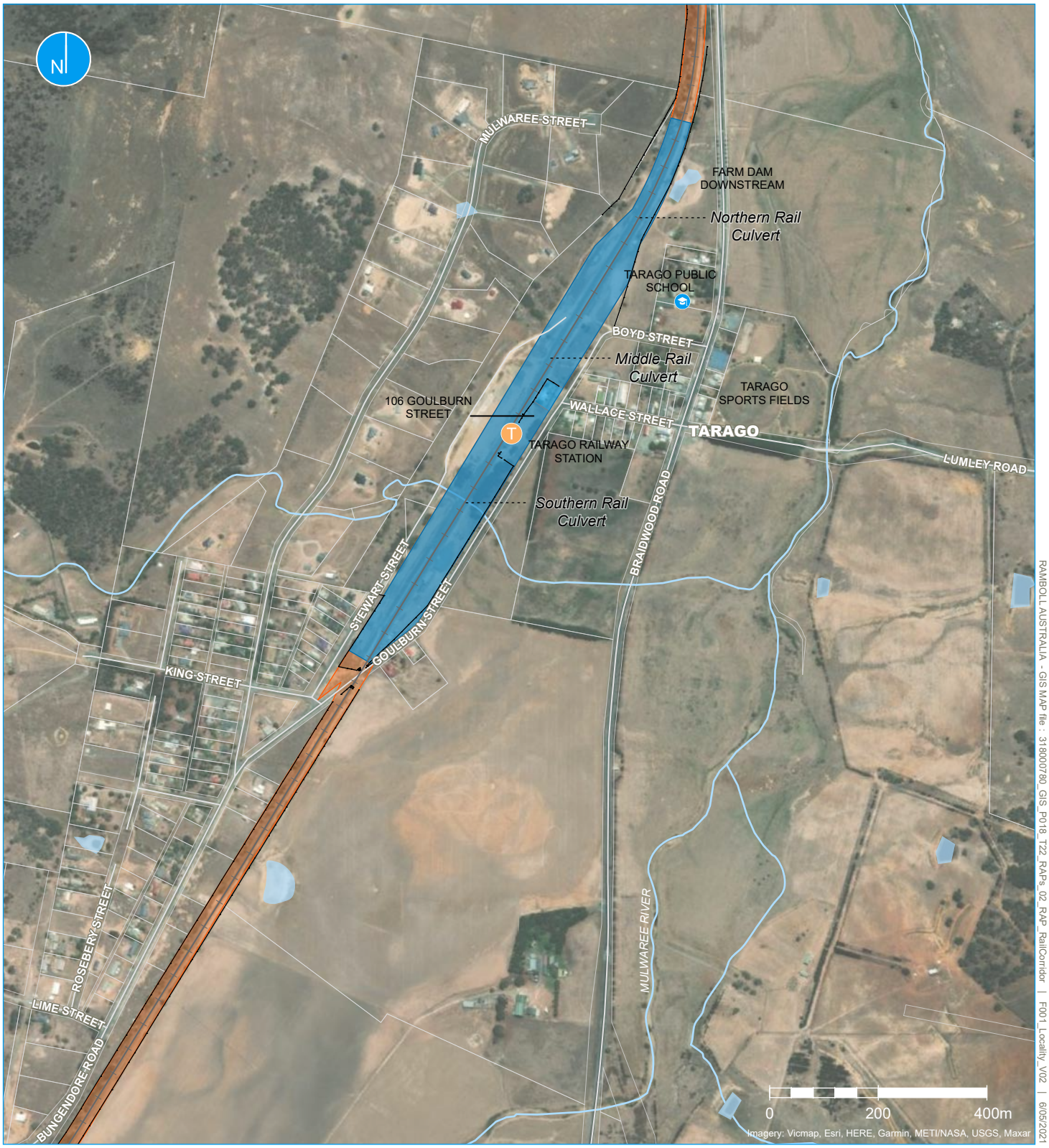
APPENDIX 1
FIGURES



RAMBOLL AUSTRALIA - GIS MAP file : 318000780_GIS_P018_T22_RAPs_02_RAP_RailCorridor | F001_Locality_V02 | 6/05/2021

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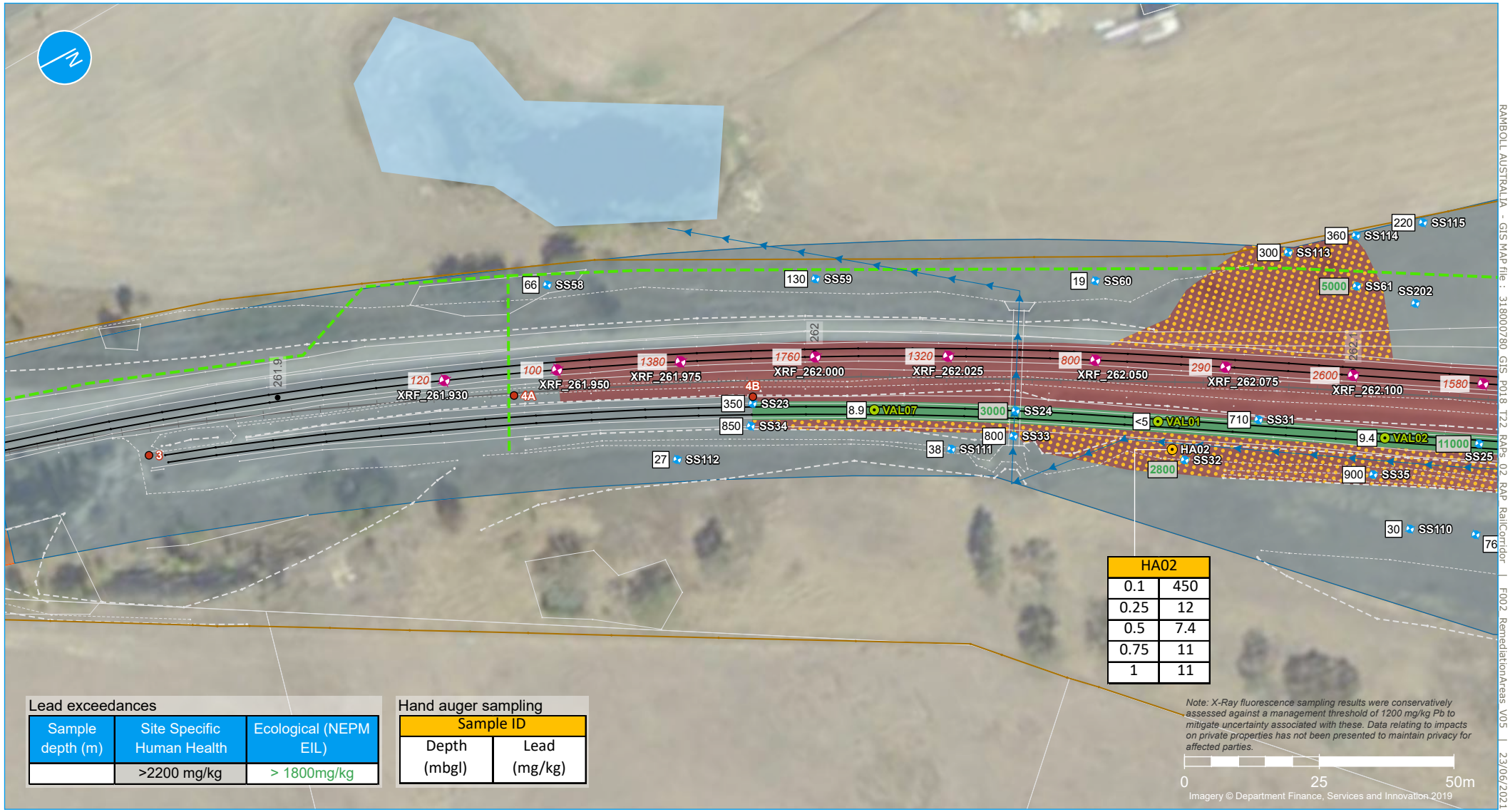
Legend

- Site boundary
- Rail corridor
- Rail corridor fence

Figure 1 | Locality 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)
- 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 to remain
- Lead impacted area surrounding the siding (excluding all rail formation) - proposed excavation depth 0.3 mbgl
- Area of excavation during loop extension (no further excavation proposed)

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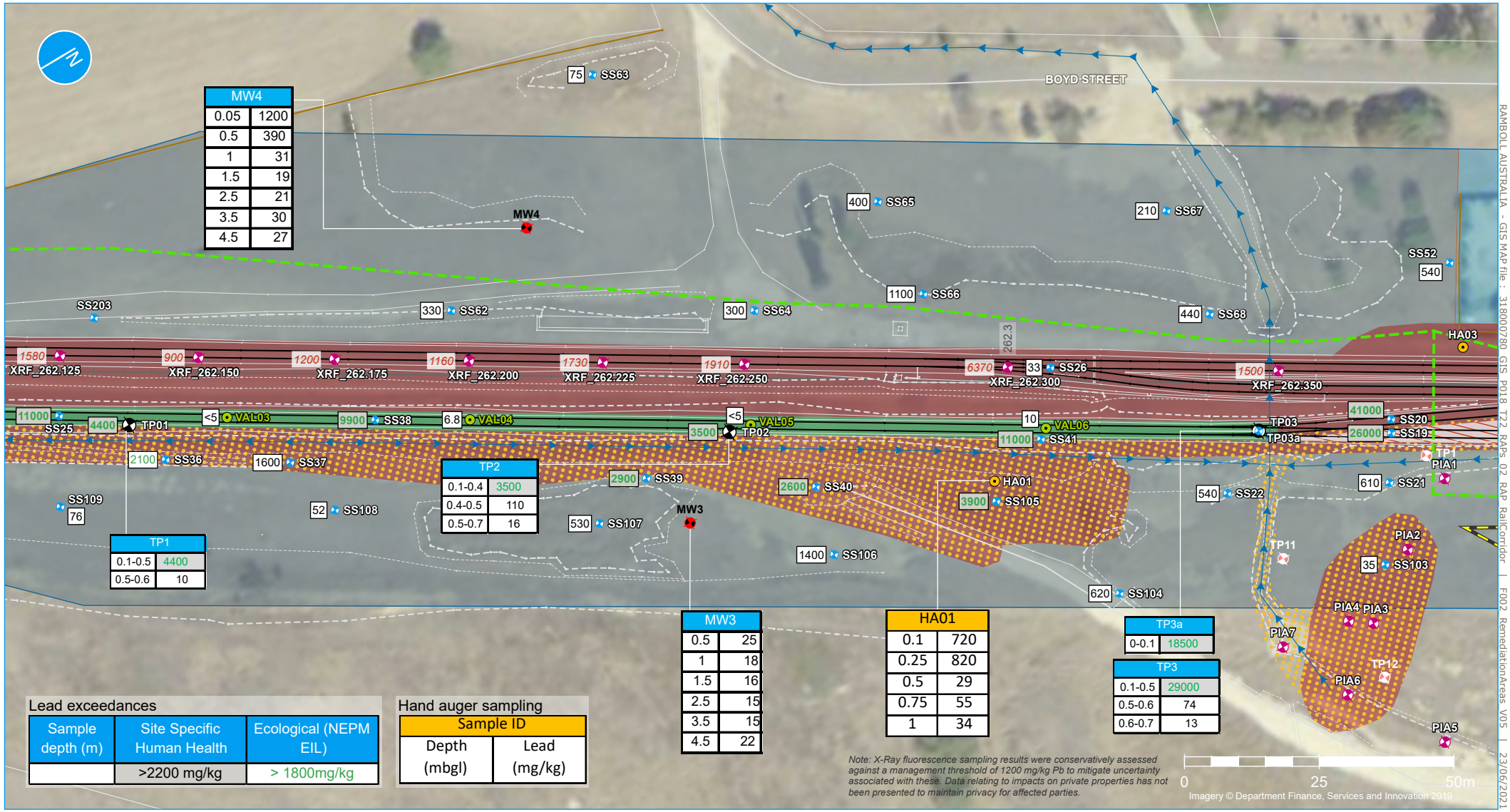
Figure 2a | Site Plan



RAMBOLL AUSTRALIA - GIS MAP file : 318000780 GIS P018 T22 RAPs 02 RAP RailCorridor | F002 RemediationAreas V05 | 23/06/2021

Legend

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

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 to remain
- Redundant Woodlawn siding - propopsed excavation depth 0.5 mbgl
- Lead impacted area surrounding the siding (excluding all rail formation) - proposed excavation depth 0.3 mbgl
- Area of excavation during loop extension (no further excavation proposed)

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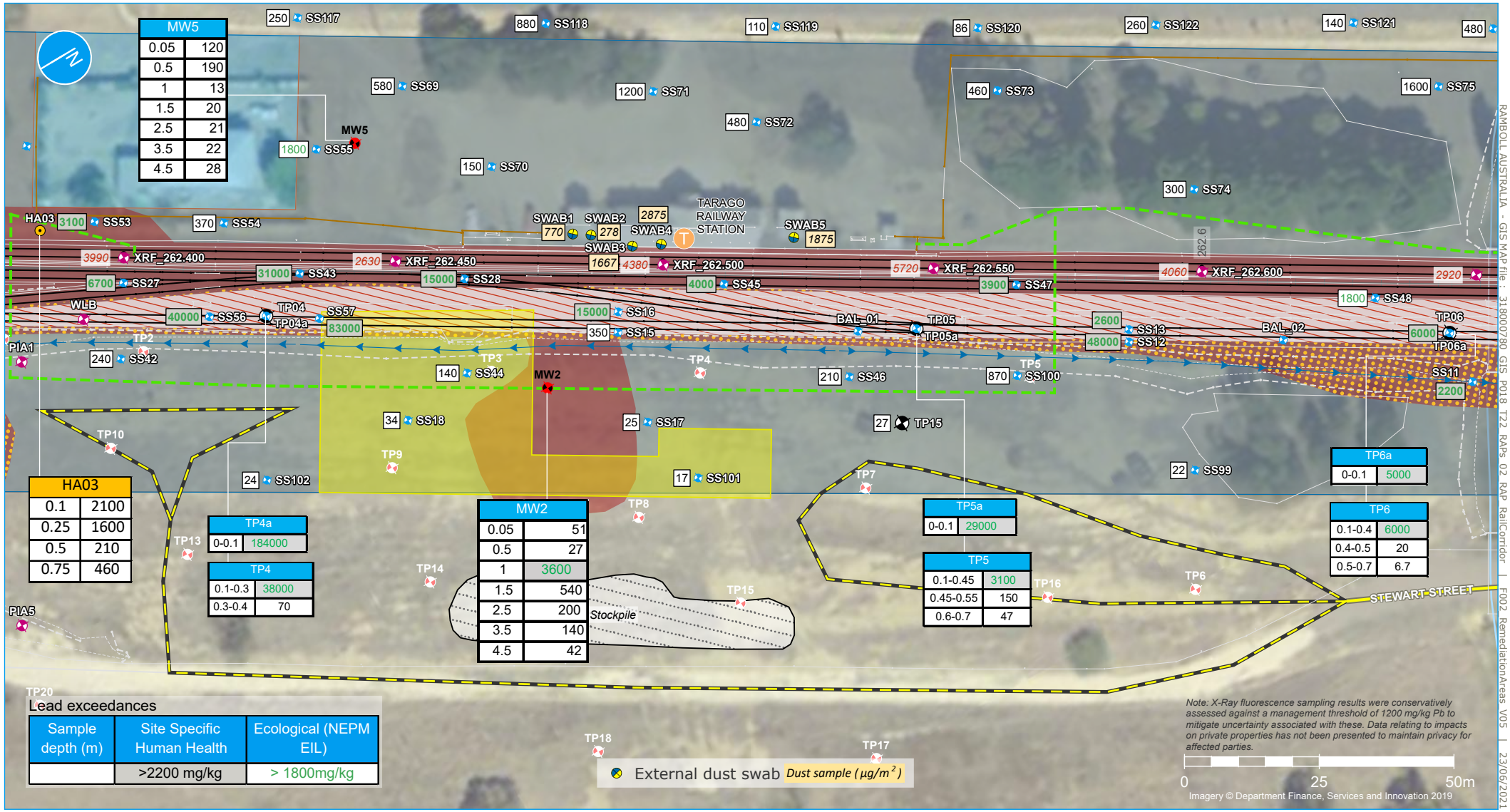
Location

Figure 2b | Site Plan



Legend

- Site boundary
- Rail corridor fence
- 0.1km chainage point
- Signal trench (approximate)
- Surface water flow (indicative)
- Former loadout road (approximate)
- Former loadout complex building footprint

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 to remain
- Redundant Woodlawn siding - propopsed excavation depth 0.5 mbgl
- Lead impacted area surrounding the siding (excluding all rail formation) - proposed excavation depth 0.3 mbgl
- Haul route

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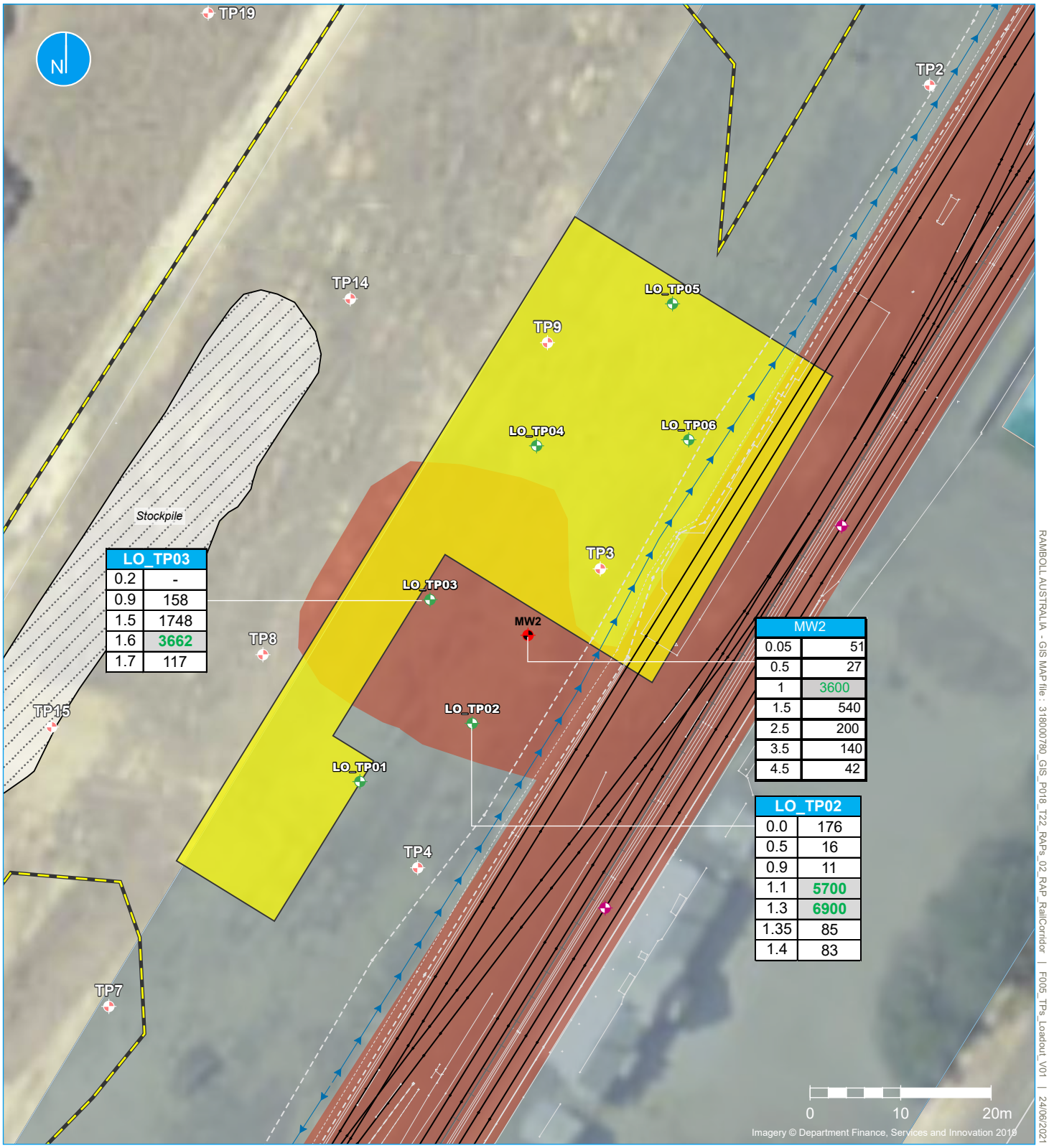
Location

Figure 2c | Site Plan



RAMBOLL AUSTRALIA - GIS MAP file : 318000780_GIS_P018_T22_RAPs_02_RAP_RailCorridor | F005_TPs_Loadout_V01 | 24/06/2021

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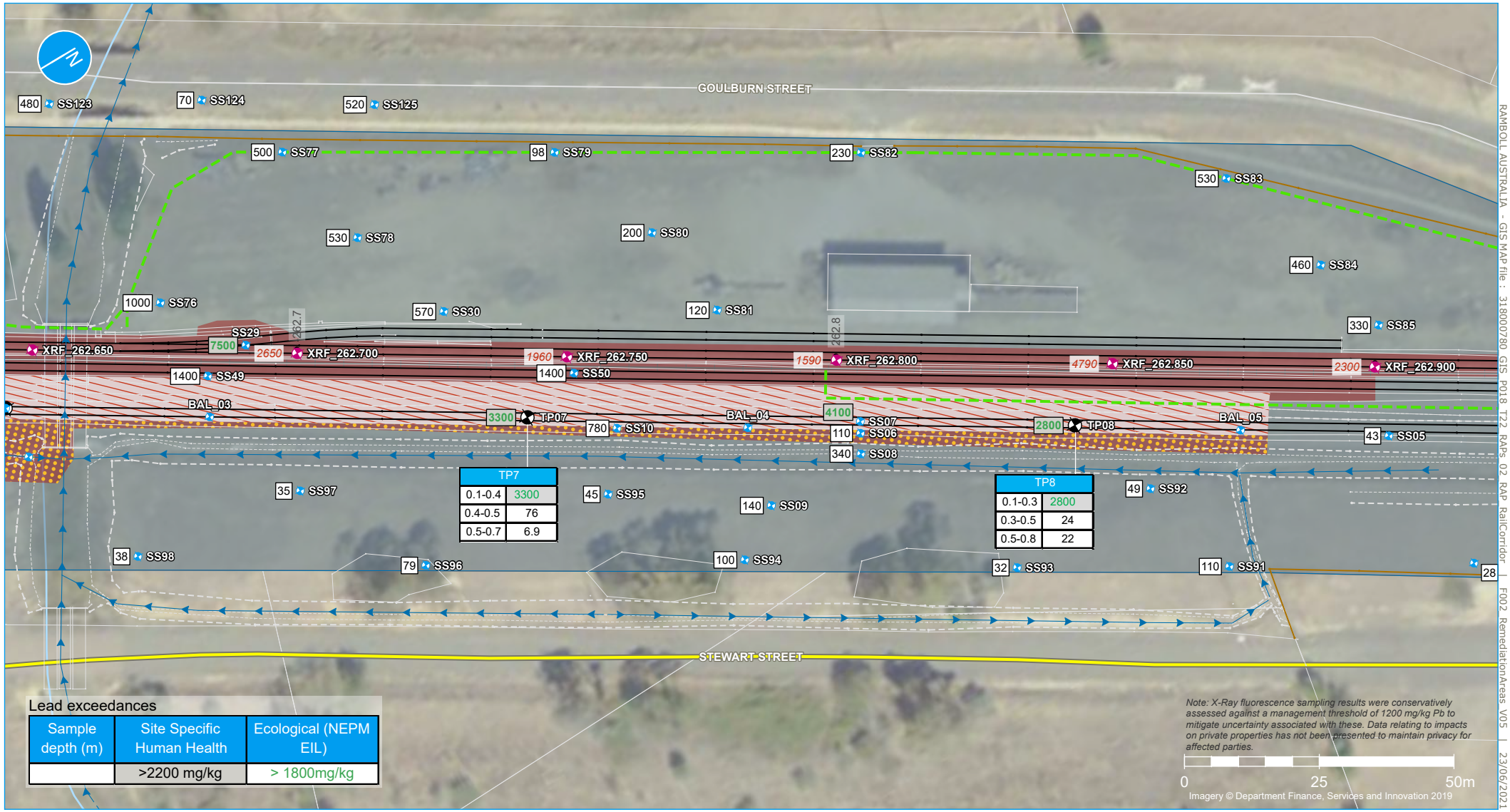
Legend

- Former loadout complex building footprint
- Former loadout road (approximate)
- Site boundary
- Surface water flow (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 2ci | Loadout complex sampling locations



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 to remain
- Redundant Woodlawn siding - propopsed excavation depth 0.5 mbgl
- Lead impacted area surrounding the siding (excluding all rail formation) - proposed excavation depth 0.3 mbgl
- Haul route

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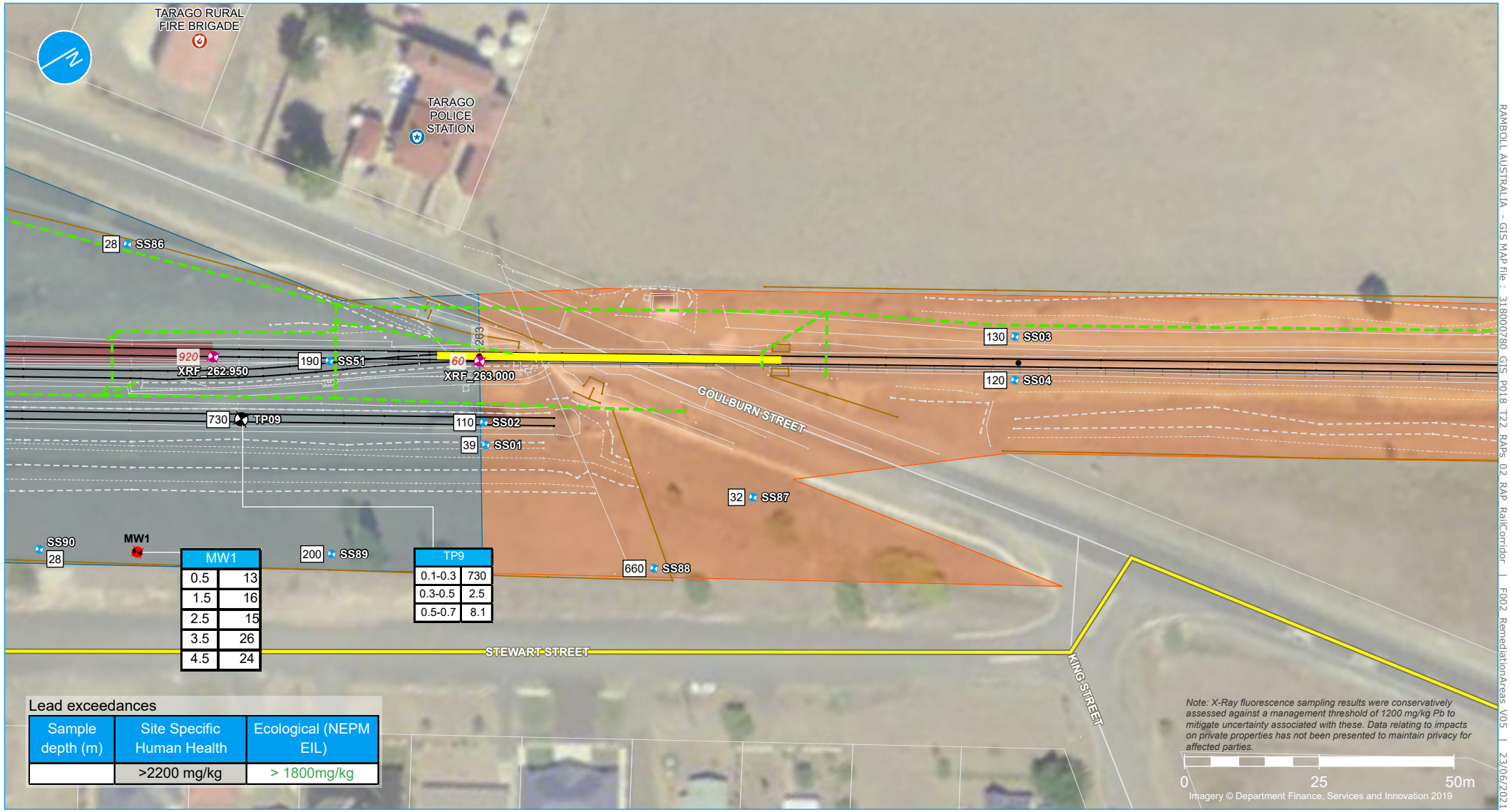
Location

Figure 2d | Site Plan



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 to remain
- Haul route

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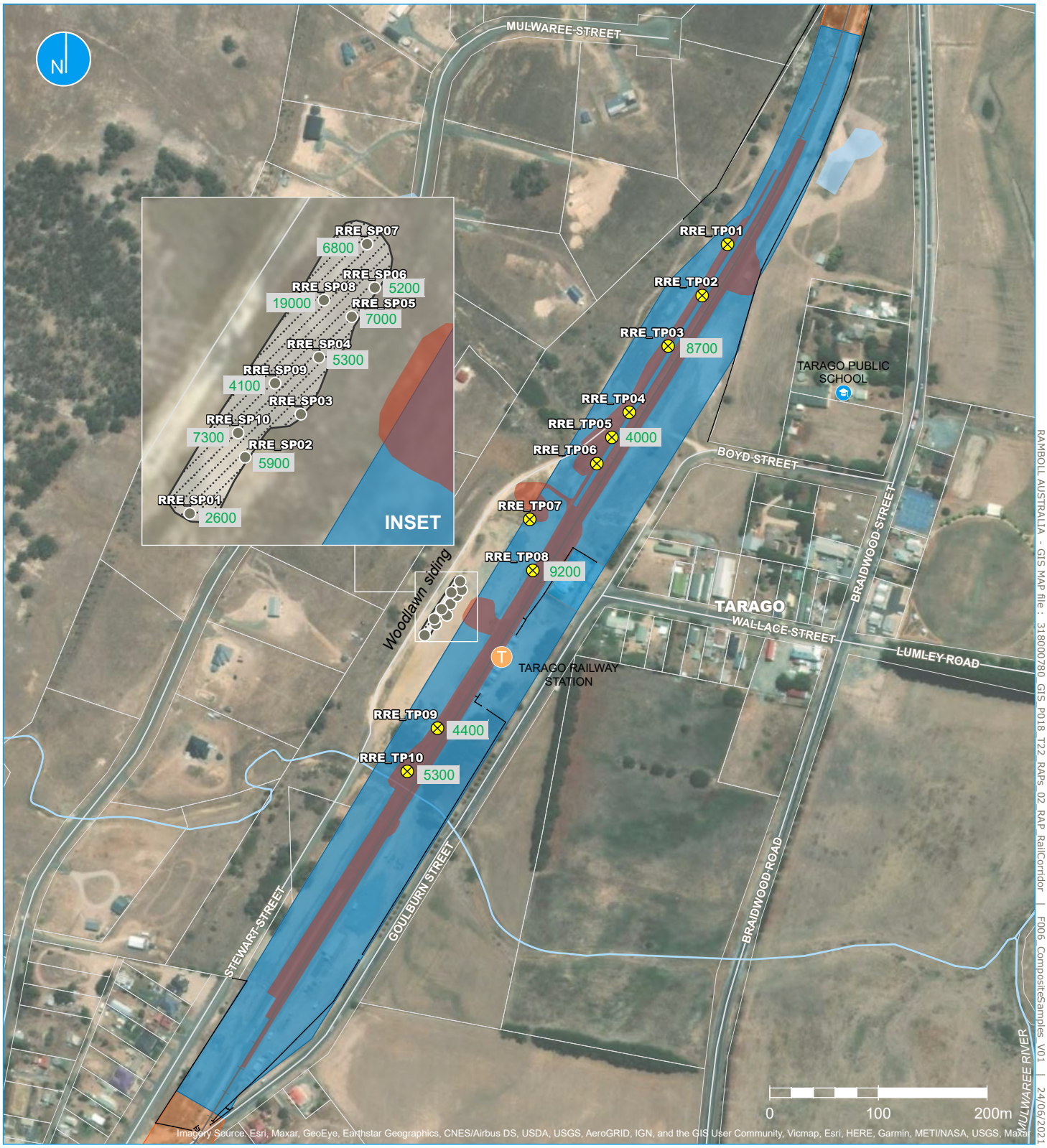
Figure 2e | Site Plan



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Legend

- Site boundary
- Rail corridor
- Rail corridor fence
- Lead impacted area
- Stockpile (JHR)

Composite sampling (Ramboll 2020)

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

Figure 3 | Soil Sampling for the Resource Recovery Exemption

RAMBOLL AUSTRALIA - GIS MAP file : 31800780_GIS_P018_T22_RAPs_02_RAP_RailCorridor | F007_GWcontours_V01 | 24/06/2021

Legend

- Groundwater monitoring location
- Site boundary
- Rail corridor
- Rail corridor fence
- Lead impacted area

Groundwater contours

- 1m contour
- 0.25m contour
- 0.05m contour

Note: MW1 has been excluded from contouring as groundwater is likely to be influenced by the nearby tributary to the Mulwaree River.

A4
1:5,000

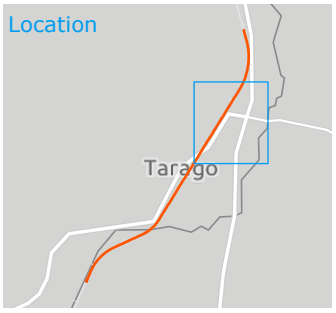
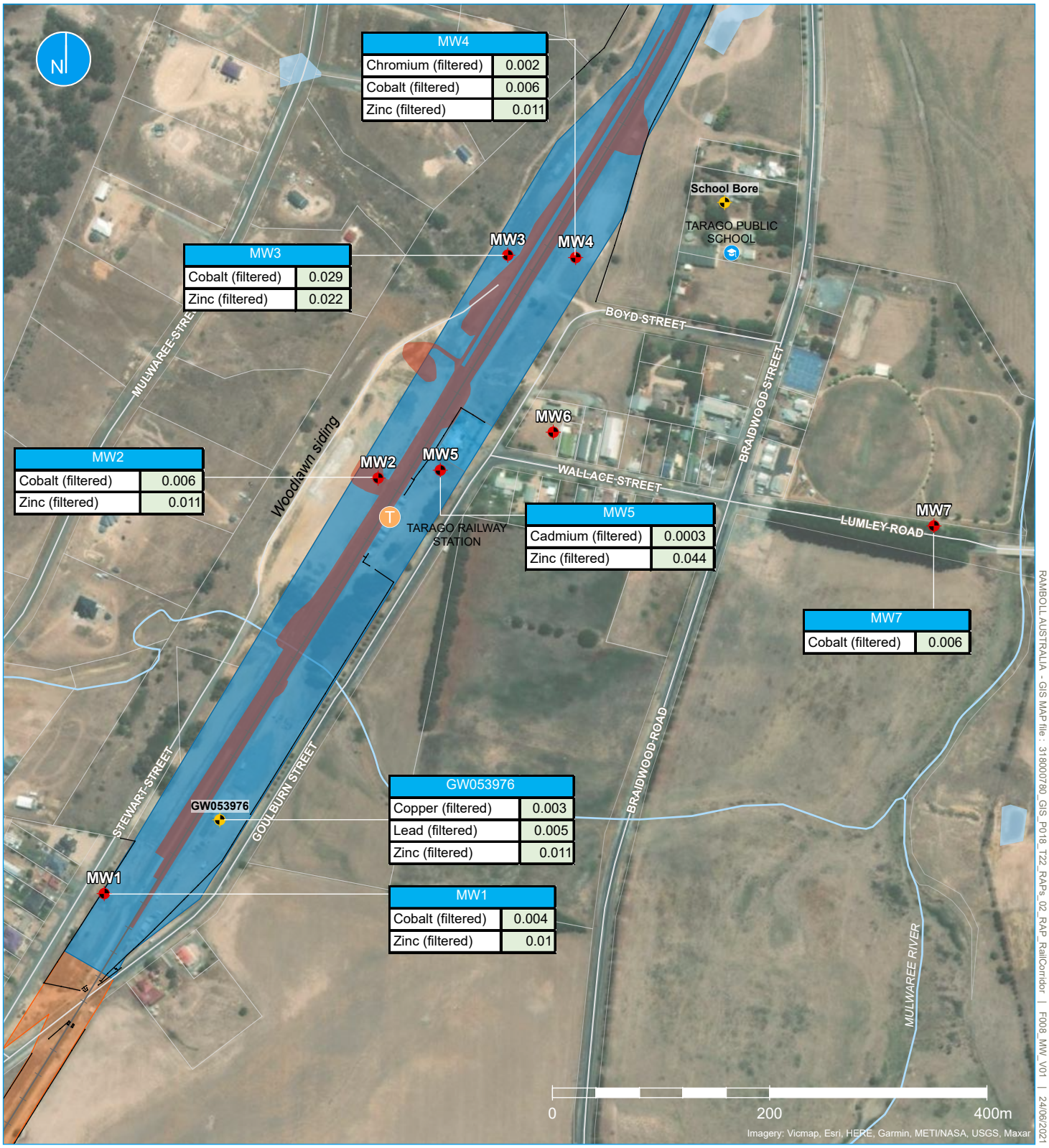


Figure 4 | Groundwater contours



RAMBOLL AUSTRALIA - GIS MAP file : 318000780_GIS_P018_T22_RAPs_02_RAP_RailCorridor | F008_MW_V01 | 24/06/2021

Legend

- Groundwater monitoring location
- Groundwater monitoring location (registered, approximate location)
- Site boundary
- Rail corridor
- Rail corridor fence
- Lead impacted area

Exceedances

Contaminant (mg/L)	> ANZG 2018 Freshwater Ecosystems
Cadmium (filtered)	0.0002
Chromium (filtered)	0.001
Cobalt (filtered)	0.0014
Lead (filtered)	0.0034
Zinc (filtered)	0.008

A4
1:5,000

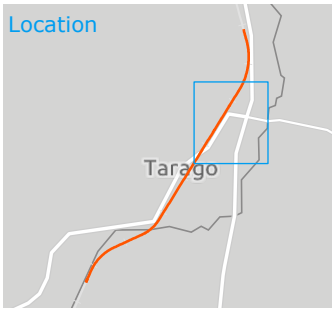


Figure 5 | Groundwater monitoring well locations

RAMBOLL AUSTRALIA - GIS MAP file - 318000780_GIS_P018_T22_RAPs_02_RAP_RailCorridor | F003_SurfaceWaterSamples_V03 | 24/06/2021

A4
1:10,000

Legend

- Surface water sampling location
- Rail corridor
- Rail corridor fence
- Lead impacted area
- Indicative surface water flow path (ie: not ephemeral)
- Indicative ephemeral surface water flow path

Figure 6 | Surface Water Monitoring

A4
1:5,000

Legend

- Site boundary
- Rail corridor
- Rail corridor fence
- Lead impacted area

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 7 | Air quality monitoring locations

APPENDIX 2
HISTORIC RESULTS REMEDIAL OPTION COST ASSESSMENT

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 1:
Summary of EIL Inputs

		SS94	SS95	SS101	SS112	D03_230919	Average
	Units						
Cation exchange capacity	cmol/kg	15	15	10	15	9	12.8
pH (calcium chloride method)	pH Units	5.9	5.4	5.2	4.7	4.9	5.22
Organic carbon content	%	2.2	2.5	0.8	1.3	2.1	1.78
Iron content (aqua regia method)	%	1.1	0.76	0.88	1.4	1.1	1.048
% clay	%	13	13	8.5	18	7.5	12
Measured background concentration							
Copper	mg/kg	-	-	6.9	-	-	-
Nickel	mg/kg	-	-	2.5	-	-	-
Chromium	mg/kg	-	-	7.2	-	-	-
Zinc	mg/kg	-	-	31	-	-	-

Sourced from *Tarago Rail Corridor and Tarago Area Detailed Site Investigation* (Ramboll 2020a).

Underlined values were reported <LOR and have been halved to allow for comparison of data.

SS101 selected for background due to low concentrations.

Table 2:
Soil Sampling Results - Asbestos, metals, PAH, TRH, BTEXN

	NEPM 2013 HIL D Commercial / Industrial	NEPM 2013 ESLCommercial / Industrial [B]	NEPM 2013 Management Limits Commercial/ Industrial [C]	CRC CARE 2011 Direct Contact[D] HSL D	CRC CARE 2011 Direct Contact[D]HSL for Intrusive Maintenance Workers	CRC CARE 2011 Vapour Intrusion HSL for Intrusive Maintenance Workers Sand 0-<2m[A]	NEPC EIL Commercial / Industrial (site specific)	Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
								ALS Sample number:		S19-JI39840	S19-JI39841	S19-JI39842	S19-JI39843	S19-JI39844	S19-JI39845	S19-JI39846	S19-JI39847	S19-JI39848	S19-JI39849	S19-JI39850	S19-JI39851	S19-Se36992	S19-Se36993	S19-Se36994	S19-Se36995
								Sample date:		26/07/19	26/07/19	26/07/19	26/07/19	26/07/19	26/07/19	26/07/19	26/07/19	26/07/19	26/07/19	26/07/19	26/07/19	22-09-19	22-09-19	22-09-19	22-09-19
								Sample ID:		TP4 0.1-0.3	TP5 0.1-0.45	TP6 0.1-0.4	TP7 0.1-0.4	TP8 0.1-0.3	TP9 0.1-0.3	TP10 0.2	TP11 0.1	TP12 0.1	TP13 0.1	TP14 0.1	TP16 0.1	SS52	SS53	SS54	SS55
								Project Name:		Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop Lead Management	Tarago Loop Lead Management	Tarago Loop Lead Management	Tarago Loop Lead Management
								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				
								Sample Description																	
Analyte grouping/Analyte								**Units**	**LOR**																
EA055: Moisture Content																									
Moisture Content (dried @ 103°C)								%	--	3	3.7	2.4	< 1	1.1	21	9.1	10	9.4	11	2.3	7.3	8	2.5	14	17
EA200: AS 4964 - 2004 Identification of Asbestos in Soils																									
Asbestos Detected								g/kg	0.1	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Asbestos Type								--	--	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	N/A	N/A	N/A
Sample weight (dry)								g	0.1	594	540	65	247	430	259	59	53	68	51	66	751	853	1120	937	574
Description								--	--	Brown fine-grained soil and rocks	Brown fine-grained soil and rocks	Brown fine-grained soil and rocks	Brown fine-grained soil and rocks	Brown fine-grained soil and rocks	Brown fine-grained soil and rocks	Brown fine-grained soil and rocks	Brown fine-grained soil and rocks	Brown fine-grained soil and rocks	Brown fine-grained soil and rocks	Brown fine-grained soil and rocks	Brown fine-grained soil and rocks	Brown coarse-grained soil and rocks	Brown coarse-grained soil, rocks and bitumous material	Brown coarse-grained soil, rocks and bitumous material	Brown coarse-grained soil, rcoks and organic debris
EG005T: Total Metals by ICP-AES																									
Arsenic	3000						160	mg/kg	2	47	13	11	5.8	23	8.6	6.1	6.6	1	9.6	1	2.1	25	150	19	32
Cadmium	900							mg/kg	0.4	3.3	1.1	1	0.7	1.6	1	0.2	0.2	0.2	2.1	0.2	0.2	5.6	8.1	0.2	12
Chromium	3600						710	mg/kg	5	25	7.4	7.6	2.5	11	6.8	2.5	29	2.5	8.7	2.5	2.5	12	15	9	13
Copper	240000						160	mg/kg	5	950	180	190	62	150	91	2.5	9.9	2.5	21	2.5	2.5	220	660	95	320
Lead	2200[E]						1800	mg/kg	5	38,000	3,100	6,000	3,300	2800	730	18	43	11	39	6.4	10	540	3100	370	1800
Nickel	6000						340	mg/kg	5	8.8	2.5	2.5	2.5	5.7	2.5	2.5	5.9	2.5	2.5	2.5	2.5	2.5	11	2.5	6.6
Zinc	400000						370	mg/kg	5	940	320	350	130	320	200	17	81	15	300	14	12	770	1300	47	1500
EG035T: Total Recoverable Mercury by FIMS																									
Mercury	730							mg/kg	0.1	0.4	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.3	0.05	0.05	0.05	0.05	0.6	0.05	0.2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons																									
Naphthalene				11000	29000	NL	370	mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Acenaphthylene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Acenaphthene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Fluorene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Phenanthrene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Anthracene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Fluoranthene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.6
Pyrene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.7	0.5	0.25	0.5
Benz(a)anthracene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.7	0.6	0.25	0.6
Chrysene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Benzo(b+j)fluoranthene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Benzo(k)fluoranthene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Benzo(a)pyrene		172						mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.7	0.6	0.25	0.6
Indeno(1.2.3.cd)pyrene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.6	0.25	0.25	0.6
Dibenz(a.h)anthracene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Benzo(g.h.i)perylene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.6	0.25	0.25	0.5
Sum of polycyclic aromatic hydrocarbons	4000							mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	3.3	1.7	0.25	3.4
Benzo(a)pyrene TEQ (zero)								mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.8	0.7	0.25	0.7
Benzo(a)pyrene TEQ (half LOR)								mg/kg	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	1.1	1	0.6	1
Benzo(a)pyrene TEQ (LOR)	40							mg/kg	0.5	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.4	1.3	1.2	1.3
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions																									
C6 - C10 Fraction			700	26000	82000	NL		mg/kg	20	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
C6 - C10 Fraction minus BTEX (F1)		215						mg/kg	20	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
>C10 - C16 Fraction			1000	20000	62000	NL		mg/kg	50	25	25	25	92	25	25	25	25	25	25	25	25	25	25	25	25
>C16 - C34 Fraction (F3)		1700	3500	27000	85000			mg/kg	100	50	140	50	220	50	50	50	50	50	50	150	50	130	300	50	220
>C34 - C40 Fraction (F4)		3300	10000	38000	120000			mg/kg	100	50	50	50	120	50	50	50	50	50	50	50	50	50	130	50	50
>C10 - C40 Fraction (sum)								mg/kg	100	50	140	50	432	50	50	50	50	50	50	150	50	130	430	50	220
>C10 - C16 Fraction minus Naphthalene (F2)		170						mg/kg	50	25	25	25	92	25	25	25	25	25	25	25	25	25	25	25	25
EP080: BTEXN																									
Benzene		75		430	1100	77		mg/kg	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Toluene		135		99000	120000	NL		mg/kg	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Ethylbenzene		165		27000	85000	NL		mg/kg	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
meta- & para-Xylene								mg/kg	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
ortho-Xylene								mg/kg	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Xylenes		95		81000	130000	NL		mg/kg	0.3	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Naphthalene				11000	29000	NL	370	mg/kg	1	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25

Sourced from *Tarago Rail Corridor and Tarago Area Detailed Site Investigation* (Ramboll 2020a).

Blank Cell indicates no criterion available

LOR = Limit of Reporting

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

CRC Care Technical Report no.10, *Health Screening Levels for petroleum hydrocarbons in soil and groundwater* September 2011

[A] For soil texture classification undertaken in accord with AS 1726, the classifications of sand, silt and clay may be applied as coarse, fine with liquid limit <50% and fine with liquid limit>50% respectively, as the underlying properties to develop the HSLs may reasonably be selected to be similar. Where there is uncertainty, either a conservative approach may be adopted or laboratory analysis should be carried out. Generally SAND has been adopted in these scenarios.

[B] The most conservative ESL guideline value has been adopted for all analytes

[C] Management limits are applied after consideration of relevant ESLs and HSLs. Separate management limits for BTEX and naphthalene are not available hence these should not be subtracted from the relevant fractions to obtain F1 and F2.

[D] Direct Contact are applied to surface soils or soils that could result in immediate contact.

[E] Human Health Guideline for Lead adopted from the Human Health Risk Assessment (Ramboll 2019d)

NL = Non Limiting. No HSL is presented for these chemicals as a soil vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario.

Health Investigation Levels for chromium based on chromium (VI)

Chromium (III) EIL, based on a low clay content (% clay) of 1%

Nickel EIL, based on CEC of 5cmol/kg

Copper EIL, based on CEC of 5cmol/kg

Zinc EIL, based on slightly acidic soil pH of 4.0 and CEC of 5cmol/kg

To obtain F1 subtract the sum of BTEX concentrations from the C6-C10 fraction.

To obtain F2 subtract naphthalene from the >C10-C16 fraction.

Benzo(a)Pyrene ESL derived ecological guideline (95% confidence limits) based on CRC CARE Technical Report no. 39 Risk-based remediation and management guidance for benzo(a)pyrene developed using a species sensitivity distribution (SSD) for eco-toxicity data from five independent studies involving one soil bacteria, three soil invertebrate taxa and four plant taxa (13 endpoints) in preference to NEPM low reliability data.

Concentration in **red** font and grey box exceed the adopted HIL/HSL 'D' for Commercial/Industrial

Concentration in **orange** font and grey box exceed the adopted EIL/ESL 'D' for Commercial/Industrial use

Concentrations in box exceed the screening value >2.5 times

Where one or more guideline value is exceeded, the highest guideline exceeded will be highlighted

Underlined values were reported <LOR and have been halved to allow for comparison of data.

Table 2:
Soil Sampling Results - Asbestos, metals, PAH, TRH, BTEXN

	NEPM 2013 HIL D Commercial / Industrial	NEPM 2013 ESLCommercial / Industrial [B]	NEPM 2013 Management Limits Commercial/ Industrial [C]	CRC CARE 2011 Direct Contact[D] HSL D	CRC CARE 2011 Direct Contact[D]HSL for Intrusive Maintenance Workers	CRC CARE 2011 Vapour Intrusion HSL for Intrusive Maintenance Workers Sand 0-<2m[A]	NEPC EIL Commercial / Industrial (site specific)	Sample Type:	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
								ALS Sample number:	S19-Se37002	S19-Se37007	S19-Se37010	S19-Se37012	S19-Se37016	S19-Se37018	S19-Se37036	S19-Se37039	S19-Se37043	S19-Se37046	S19-Se37049	S19-Se37051	S19-Se37052	S19-Se37054
								Sample date:	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19
								Sample ID:	SS58	SS63	SS66	SS68	SS72	SS74	SS92	SS95	SS99	SS102	SS105	SS107	SS108	SS110
								Project Name:	Tarago Loop Lead Management	Tarago Loop Lead Management	Tarago Loop Lead Management	Tarago Loop Lead Management	Tarago Loop Lead Management	Tarago Loop Lead Management	Tarago Loop Lead Management	Tarago Loop Lead Management	Tarago Loop Lead Management	Tarago Loop Lead Management	Tarago Loop Lead Management	Tarago Loop Lead Management	Tarago Loop Lead Management	Tarago Loop Lead Management
								Sampling Method:														
								Sample Description														
Analyte grouping/Analyte								**Units**	**LOR**													
EA055: Moisture Content																						
Moisture Content (dried @ 103°C)								%	--	7.1	9.4	15	12	6.7	11	8.7	14	11	3.5	13	24	9.4	11
EA200: AS 4964 - 2004 Identification of Asbestos in Soils																						
Asbestos Detected								g/kg	0.1	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Asbestos Type								--	--	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 weight (dry)								g	0.1	735	652	690	701	892	742	776	649	823	1006	892	588	673	521
Description								--	--	Brown coarse-grained soil, rocks and organic debris	Brown coarse-grained soil, rocks and bitumous material	Brown coarse-grained soil, rocks and organic debris	Brown coarse-grained soil, rocks and plaster-like material	Brown coarse-grained soil, rocks and cement fragments	Brown coarse-grained soil and rocks	Brown coarse-grained soil and rocks	Brown coarse-grained soil and rocks	Brown coarse-grained soil and rocks	Brown coarse-grained soil and rocks	Brown coarse-grained soil and rocks	Brown coarse-grained soil and rocks	Brown coarse-grained soil and rocks	Brown coarse-grained soil and rocks
EG005T: Total Metals by ICP-AES																						
Arsenic	3000						160	mg/kg	2	3.7	5.4	20	12	15	15	2.9	2.4	3.1	6.2	65	11	4.9	13
Cadmium	900							mg/kg	0.4	0.8	1.6	14	7.4	2.3	6.6	0.8	0.7	0.2	0.2	4.3	3.2	0.9	0.2
Chromium	3600						710	mg/kg	5	7.2	2.5	57	8.2	22	14	8.6	8.3	7.3	9.3	27	13	11	36
Copper	240000						160	mg/kg	5	26	44	700	240	85	76	16	20	8.9	11	750	480	20	14
Lead	2200^						1800	mg/kg	5	66	75	1100	440	480	300	49	45	22	24	3900	530	52	30
Nickel	6000						340	mg/kg	5	2.5	2.5	17	5.4	5.3	8.9	8.4	2.5	2.5	2.5	9.2	6.4	2.5	5.9
Zinc	400000						370	mg/kg	5	210	180	1600	650	320	1300	130	120	38	42	780	350	170	27
EG035T: Total Recoverable Mercury by FIMS																						
Mercury	730							mg/kg	0.1	0.05	0.05	0.05	0.05	0.05	0.6	0.05	0.05	0.05	0.05	0.2	0.05	0.05	0.05
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons																						
Naphthalene				11000	29000	NL	370	mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Acenaphthylene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Acenaphthene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Fluorene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Phenanthrene								mg/kg	0.5	0.25	0.25	0.25	0.25	1.3	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Anthracene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Fluoranthene								mg/kg	0.5	0.25	0.25	0.25	0.25	1.2	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Pyrene								mg/kg	0.5	0.25	0.25	0.25	0.25	1	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Benz(a)anthracene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.7	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Chrysene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Benzo(b+j)fluoranthene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Benzo(k)fluoranthene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Benzo(a)pyrene		172						mg/kg	0.5	0.25	0.25	0.25	0.25	0.7	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Indeno(1.2.3.cd)pyrene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.6	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Dibenz(a.h)anthracene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Benzo(g.h.i)perylene								mg/kg	0.5	0.25	0.25	0.25	0.25	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Sum of polycyclic aromatic hydrocarbons	4000							mg/kg	0.5	0.25	0.25	0.25	0.25	6	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Benzo(a)pyrene TEQ (zero)								mg/kg	0.5	0.25	0.25	0.25	0.25	0.8	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Benzo(a)pyrene TEQ (half LOR)								mg/kg	0.5	0.6	0.6	0.6	0.6	1.1	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (LOR)	40							mg/kg	0.5	1.2	1.2	1.2	1.2	1.4	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions																						
C6 - C10 Fraction			700	26000	82000	NL		mg/kg	20	10	10	10	10	10	10	10	10	10	10	10	10	10	10
C6 - C10 Fraction minus BTEX (F1)		215						mg/kg	20	10	10	10	10	10	10	10	10	10	10	10	10	10	10
>C10 - C16 Fraction			1000	20000	62000	NL		mg/kg	50	25	25	25	25	25	25	25	25	25	25	56	25	25	25
>C16 - C34 Fraction (F3)		1700	3500	27000	85000			mg/kg	100	150	130	160	140	140	250	50	50	50	50	310	50	50	50
>C34 - C40 Fraction (F4)		3300	10000	38000	120000			mg/kg	100	50	50	50	50	50	100	50	50	50	50	140	50	50	50
>C10 - C40 Fraction (sum)								mg/kg	100	150	130	160	140	140	350	50	50	50	50	506	50	50	50
>C10 - C16 Fraction minus Naphthalene (F2)		170						mg/kg	50	25	25	25	25	25	25	25	25	25	25	56	25	25	25
EP080: BTEXN																						
Benzene		75		430	1100	77		mg/kg	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Toluene		135		99000	120000	NL		mg/kg	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Ethylbenzene		165		27000	85000	NL		mg/kg	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
meta- & para-Xylene								mg/kg	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
ortho-Xylene								mg/kg	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Xylenes		95		81000	130000	NL		mg/kg	0.3	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Naphthalene				11000	29000	NL	370	mg/kg	1	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25

Sourced from *Tarago Rail Corridor and Tarago Area Detailed Site Investigation* (Ramboll 2020a).

Blank Cell indicates no criterion available

LOR = Limit of Reporting

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

CRC Care Technical Report no.10, *Health Screening Levels for petroleum hydrocarbons in soil and groundwater* September 2011

[A] For soil texture classification undertaken in accord with AS 1726, the classifications of sand, silt and clay may be applied as coarse, fine with liquid limit <50% and fine with liquid limit>50% respectively, as the underlying properties to develop the HSLs may reasonably be selected to be similar. Where there is uncertainty, either a conservative approach may be adopted or laboratory analysis should be carried out. Generally SAND has been adopted in these scenarios.

[B] The most conservative ESL guideline value has been adopted for all analytes

[C] Management limits are applied after consideration of relevant ESLs and HSLs. Separate management limits for BTEX and naphthalene are not available hence these should not be subtracted from the relevant fractions to obtain F1 and F2.

[D] Direct Contact are applied to surface soils or soils that could result in immediate contact.

[^] Human Health Guideline for Lead adopted from the Human Health Risk Assessment (Ramboll 2019d)

NL = Non Limiting. No HSL is presented for these chemicals as a soil vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario.

Health Investigation Levels for chromium based on chromium (VI)

Chromium (III) EIL, based on a low clay content (% clay) of 1%

Nickel EIL, based on CEC of 5cmol/kg

Copper EIL, based on CEC of 5cmol/kg

Zinc EIL, based on slightly acidic soil pH of 4.0 and CEC of 5cmol/kg

To obtain F1 subtract the sum of BTEX concentrations from the C6-C10 fraction.

To obtain F2 subtract naphthalene from the >C10-C16 fraction.

Benzo(a)Pyrene ESL derived ecological guideline (95% confidence limits) based on CRC CARE Technical Report no. 39 Risk-based remediation and management guidance for benzo(a)pyrene developed using a species sensitivity distribution (SSD) for eco-toxicity data from five independent studies involving one soil bacteria, three soil invertebrate taxa and four plant taxa (13 endpoints) in preference to NEPM low reliability data.

Concentration in **red** font and grey box exceed the adopted HIL/HSL 'D' for Commercial/Industrial

Concentration in **orange** font and grey box exceed the adopted EIL/ESL 'D' for Commercial/Industrial use

Concentrations in box exceed the screening value >2.5 times

Where one or more guideline value is exceeded, the highest guideline exceeded will be highlighted

Underlined values were reported <LOR and have been halved to allow for comparison of data.

Table 3:
Soil Sampling Results - OCP, OPP, PCB

		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
	NEPM 2013 HIL D Commercial Industrial	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	o	< 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)**	45	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	530	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)**	3600	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	2000	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	100	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	50	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	2500	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	2000	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

Sourced from *Tarago Rail Corridor and Tarago Area Detailed Site Investigation Addendum* (2020b)

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

[A] For soil texture classification undertaken in accord with AS 1726, the classifications of sand, silt and clay may be applied as coarse, fine with liquid limit <50% and fine with liquid limit>50% respectively, as the underlying properties to develop the HSLs may reasonably be selected to be similar. Where there is uncertainty, either a conservative approach may be adopted or laboratory analysis should be carried out.

Health Investigation Levels for chromium based on chromium (VI)

Concentrations in *italics* have been moisture adjusted

Concentrations in green box exceed the adopted EIL 'C' for Urban Residential and Open Public Space

Concentration in **bold red font** exceed the adopted HIL/HSL 'C' for Open Space and Recreational Land Use

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial	Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil
			Laboratory Sample number:		S19-Jl39891	S19-Jl39892	S19-Jl39893	S19-Jl39894	S19-Jl39895	Report 677385
			Sample date:		26/07/19	26/07/19	26/07/19	26/07/19	26/07/19	16-09-19
			Sample ID:		TP1 0.1-0.5	TP1 0.5-0.6	TP2 0.1-0.4	TP2 0.4-0.5	TP2 0.5-0.7	TP3a 0-0.1
			Site:		Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop
			Sampling Method:		Test pit	Test pit	Test pit	Test pit	Test pit	Test pit
Analyte grouping/Analyte				**Units**	**LOR**					
EG005T: Total Metals by ICP-AES										
Lead	2,200	1,800		mg/kg	5	**4,400**	10	**3,500**	110	16	**18,500**

Sourced from *Tarago Rail Corridor and Tarago Area Detailed Site Investigation* (Ramboll 2020a).

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Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial		Sample Type:	Soil	Soil	Soil	Soil	Soil	Soil
				Laboratory Sample number	S19-Jl39896	S19-Jl39897	S19-Jl39898	Report 677385	S19-Jl39899	S19-Jl39900
				Sample date:	26/07/19	26/07/19	26/07/19	16-09-19	26/07/19	26/07/19
				Sample ID:	TP3 0.1-0.5	TP3 0.5-0.6	TP3 0.6-0.7	TP4a 0-0.1	TP4 0.1-0.3	TP4 0.3-0.4
				Site:	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop
				Sampling Method:	Test pit	Test pit	Test pit	Test pit	Test pit	Test pit
Analyte grouping/Analyte				**Units**	**LOR**					
EG005T: Total Metals by ICP-AES										
Lead	2,200	1,800		mg/kg	5	**29,000**	74	13	**184,000**	**38,000**	70

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Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial	Sample Type:	Soil	Soil	Soil	Soil	Soil	Soil
			Laboratory Sample number:	Report 677385	S19-Jl39901	S19-Jl39902	S19-Jl39903	S19-Jl39904	S19-Jl39905
			Sample date:	16-09-19	26/07/19	26/07/19	26/07/19	26/07/19	26/07/19
			Sample ID:	TP5a 0-0.1	TP5 0.1-0.45	TP5 0.45-0.55	TP5 0.6-0.7	TP6 0.1-0.4	TP6 0.4-0.5
			Site:	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop
			Sampling Method:	Test pit	Test pit	Test pit	Test pit	Test pit	Test pit
Analyte grouping/Analyte			**Units**	**LOR**					
EG005T: Total Metals by ICP-AES									
Lead	2,200	1,800	mg/kg	5	**29,000**	**3,100**	150	47	**6,000**	20

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Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial	Sample Type:	Soil	Soil	Soil	Soil	Soil	Soil
			Laboratory Sample number	S19-Jl39906	S19-Jl39907	S19-Jl39908	S19-Jl39909	S19-Jl39910	S19-Jl39911
			Sample date:	26/07/19	26/07/19	26/07/19	26/07/19	26/07/19	26/07/19
			Sample ID:	TP6 0.5-0.7	TP7 0.1-0.4	TP7 0.4-0.5	TP7 0.5-0.7	TP8 0.1-0.3	TP8 0.3-0.5
			Site:	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop
			Sampling Method:	Test pit	Test pit	Test pit	Test pit	Test pit	Test pit
Analyte grouping/Analyte			**Units**	**LOR**					
EG005T: Total Metals by ICP-AES									
Lead	2,200	1,800	mg/kg	5	7	**3,300**	76	7	**2,800**	24

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Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial		Sample Type:	Soil	Soil	Soil	Soil	Soil	Soil
				Laboratory Sample number	S19-Jl39912	S19-Jl39845	S19-Jl39914	S19-Jl39915	S19-Jl39846	S19-Jl39847
				Sample date:	26/07/19	26/07/19	26/07/19	26/07/19	26/07/19	26/07/19
				Sample ID:	TP8 0.5-0.8	TP9 0.1-0.3	TP9 0.3-0.5	TP9 0.5-0.7	TP10 0.2	TP11 0.1
				Site:	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop
				Sampling Method:	Test pit	Test pit	Test pit	Test pit	Test pit	Test pit
Analyte grouping/Analyte				**Units**	**LOR**					
EG005T: Total Metals by ICP-AES										
Lead	2,200	1,800		mg/kg	5	22	730	2.50	8	18	43

Sourced from *Tarago Rail Corridor and Tarago Area Detailed Site Investigation* (Ramboll 2020a).

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Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial		Sample Type:	Soil	Soil	Soil	Soil	Soil	Soil
				Laboratory Sample number	S19-Jl39848	S19-Jl39849	S19-Jl39850	S19-Jl39918	S19-Jl39919	S19-Jl39851
				Sample date:	26/07/19	26/07/19	26/07/19	26/07/19	26/07/19	26/07/19
				Sample ID:	TP12 0.1	TP13 0.1	TP14 0.1	TP15 0.1	TP15 0.8	TP16 0.1
				Site:	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop
				Sampling Method:	Test pit	Test pit	Test pit	Test pit	Test pit	Test pit
Analyte grouping/Analyte				**Units**	**LOR**					
EG005T: Total Metals by ICP-AES										
Lead	2,200	1,800		mg/kg	5	11	39	6.4	27	26	10

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Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial		Sample Type:	Soil	Soil	Soil	Soil	Soil	Soil
				Laboratory Sample number	S19-Jl39920	S19-Jl39921	S19-Jl39922	S19-Jl39923	S19-Jl39924	S19-Jl39925
				Sample date:	26/07/19	26/07/19	26/07/19	26/07/19	26/07/19	26/07/19
				Sample ID:	SS1 0.0-0.1	SS2 0.0-0.1	SS3 0.0-0.1	SS4 0.0-0.1	SS5 0.0-0.1	SS6 0.0-0.1
				Site:	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop
				Sampling Method:	Test pit	Test pit	Test pit	Test pit	Test pit	Test pit
Analyte grouping/Analyte				**Units**	**LOR**					
EG005T: Total Metals by ICP-AES										
Lead	2,200	1,800		mg/kg	5	39	110	130	120	43	110

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Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial		Sample Type:	Soil	Soil	Soil	Soil	Soil	Soil
				Laboratory Sample number	S19-Jl39926	S19-Jl39927	S19-Jl39928	S19-Jl39929	S19-Jl39930	Report 67385
				Sample date:	26/07/19	26/07/19	26/07/19	26/07/19	26/07/19	26/07/19
				Sample ID:	SS7 0.0-0.1	SS8 0.0-0.1	SS9 0.0-0.1	SS10 0.0-0.1	SS11 0.0-0.1	SS12 0.0-0.1
				Site:	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop
				Sampling Method:	Test pit	Test pit	Test pit	Test pit	Test pit	Test pit
Analyte grouping/Analyte				**Units**	**LOR**					
EG005T: Total Metals by ICP-AES										
Lead	2,200	1,800		mg/kg	5	**4,100**	340	140	780	**2,200**	**48,000**

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Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial		Sample Type:	Soil	Soil	Soil	Soil	Soil	Soil
				Laboratory Sample number	S19-JI39932	S19-JI39933	S19-JI39934	S19-JI39935	S19-JI39997	S19-JI39998
				Sample date:	26/07/19	26/07/19	26/07/19	26/07/19	26/07/19	26/07/19
				Sample ID:	SS13 0.0-0.1	SS14 0.0-0.1	SS15 0.0-0.1	SS16 0.0-0.1	SS17_0.0-0.1	SS18_0.0-0.1
				Site:	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop
				Sampling Method:	Test pit	Test pit	Test pit	Test pit	Shallow Soil	Shallow Soil
Analyte grouping/Analyte				**Units**	**LOR**					
EG005T: Total Metals by ICP-AES										
Lead	2,200	1,800		mg/kg	5	**2,600**	31	350	**15,000**	25	34

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Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial		Sample Type:	Soil	Soil	Soil	Soil	Soil	Soil
				Laboratory Sample number	S19-Jl39999	Report 67385	S19-Jl40001	S19-Jl40002	S19-Au17274	S19-Au17275
				Sample date:	26/07/19	26/07/19	26/07/19	26/07/19	12-08-19	12-08-19
				Sample ID:	SS19_0.0-0.1	SS20_0.0-0.1	SS21	SS22	SS23	SS24
				Site:	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop
				Sampling Method:	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil
Analyte grouping/Analyte				**Units**	**LOR**					
EG005T: Total Metals by ICP-AES										
Lead	2,200	1,800		mg/kg	5	**26,000**	**41,000**	610	540	350	**3,000**

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Job No: 318000780
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22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial		Sample Type:	Soil	Soil	Soil	Soil	Soil	Soil
				Laboratory Sample number	S19-Au17276	S19-Au17277	S19-Au17278	S19-Au17279	Report 67385	S19-Au17281
				Sample date:	12-08-19	12-08-19	12-08-19	12-08-19	12-08-19	12-08-19
				Sample ID:	SS25	SS26	SS27	SS28	SS29	SS30
				Site:	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop
				Sampling Method:	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil
Analyte grouping/Analyte				**Units**	**LOR**					
EG005T: Total Metals by ICP-AES										
Lead	2,200	1,800		mg/kg	5	**11,000**	33	**6,700**	**15000***	**7,500**	570*

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22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial		Sample Type:	Soil	Soil	Soil	Soil	Soil	Soil
				Laboratory Sample number	S19-Au39076	S19-Au39077	S19-Au39078	S19-Au39079	S19-Au39080	S19-Au39075
				Sample date:	27-08-19	27-08-19	27-08-19	27-08-19	27-08-19	27-08-19
				Sample ID:	SS31	SS32	SS33	SS34	SS35	SS36
				Site:	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop
				Sampling Method:	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil
Analyte grouping/Analyte				**Units**	**LOR**					
EG005T: Total Metals by ICP-AES										
Lead	2,200	1,800		mg/kg	5	710	**2800***	800	850	900	**2,100**

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Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial	Sample Type:	Soil	Soil	Soil	Soil	Soil	Soil
			Laboratory Sample number	S19-Au39082	S19-Au39083	S19-Au39084	S19-Au39085	S19-Au39086	S19-Au39087
			Sample date:	27-08-19	27-08-19	27-08-19	27-08-19	27-08-19	27-08-19
			Sample ID:	SS37	SS38	SS39	SS40	SS41	SS42
			Site:	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop
			Sampling Method:	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil
Analyte grouping/Analyte			**Units**	**LOR**					
EG005T: Total Metals by ICP-AES									
Lead	2,200	1,800	mg/kg	5	1,600	**9,900**	**2,900**	**2,600**	**11,000**	240

Sourced from *Tarago Rail Corridor and Tarago Area Detailed Site Investigation* (Ramboll 2020a).

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Concentration in **red** font and grey box exceed the adopted Human Health Guideline for Commercial/Industrial (Ramboll 2019d)

Concentration in **orange** font and grey box exceed the adopted EIL 'D' for Commercial/Industrial use

Concentrations in box exceed the screening value >2.5 times

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Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial		Sample Type:	Soil	Soil	Soil	Soil	Soil	Soil
				Laboratory Sample number	S19-Au39088	S19-Au39089	S19-Au39090	S19-Au39091	S19-Au39092	S19-Au39093
				Sample date:	27-08-19	27-08-19	27-08-19	27-08-19	27-08-19	27-08-19
				Sample ID:	SS43	SS44	SS45	SS46	SS47	SS48
				Site:	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop	Tarago Loop
				Sampling Method:	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil
Analyte grouping/Analyte				**Units**	**LOR**					
EG005T: Total Metals by ICP-AES										
Lead	2,200	1,800		mg/kg	5	**31,000**	140	**4,000**	210	**3,900**	**1,800**

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Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial		Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil
				Laboratory Sample number		S19-Au39094	S19-Au39095	S19-Au39096	S19-Se36992	S19-Se36993	S19-Se36994
				Sample date:		27-08-19	27-08-19	27-08-19	22-09-19	22-09-19	22-09-19
				Sample ID:		SS49	SS50	SS51	SS52	SS53	SS54
				Site:		Tarago Loop	Tarago Loop	Tarago Loop	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor
				Sampling Method:		Shallow Soil	Shallow Soil	Shallow Soil	Discrete	Discrete	Discrete
Analyte grouping/Analyte				**Units**	**LOR**						
EG005T: Total Metals by ICP-AES											
Lead	2,200	1,800		mg/kg	5	1,400	1,400	190	540	**3,100**	370

Sourced from *Tarago Rail Corridor and Tarago Area Detailed Site Investigation* (Ramboll 2020a).

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Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial	Sample Type:	Soil	Soil	Soil	Soil	Soil	Soil
			Laboratory Sample number	S19-Se36995	S19-Se36998	S19-Se37001	S19-Se37002	S19-Se37003	S19-Se37004
			Sample date:	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19
			Sample ID:	SS55	SS56_0.1g	SS57_0.1g	SS58	SS59	SS60
			Site:	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor
			Sampling Method:	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete
Analyte grouping/Analyte			**Units**	**LOR**					
EG005T: Total Metals by ICP-AES									
Lead	2,200	1,800	mg/kg	5	1,800	40,000	83,000	66	130	19

Sourced from *Tarago Rail Corridor and Tarago Area Detailed Site Investigation* (Ramboll 2020a).

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Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial	Sample Type:	Soil	Soil	Soil	Soil	Soil	Soil
			Laboratory Sample number	S19-Se37005	S19-Se37006	S19-Se37007	S19-Se37008	S19-Se37009	S19-Se37010
			Sample date:	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19
			Sample ID:	SS61	SS62	SS63	SS64	SS65	SS66
			Site:	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor
			Sampling Method:	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete
Analyte grouping/Analyte			**Units**	**LOR**					
EG005T: Total Metals by ICP-AES									
Lead	2,200	1,800	mg/kg	5	**5,000**	330	75	300	400	1,100

Sourced from *Tarago Rail Corridor and Tarago Area Detailed Site Investigation* (Ramboll 2020a).

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Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial	Sample Type:	Soil	Soil	Soil	Soil	Soil	Soil
			Laboratory Sample number	S19-Se37011	S19-Se37012	S19-Se37013	S19-Se37014	S19-Se37015	S19-Se37016
			Sample date:	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19
			Sample ID:	SS67	SS68	SS69	SS70	SS71	SS72
			Site:	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor
			Sampling Method:	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete
Analyte grouping/Analyte			**Units**	**LOR**					
EG005T: Total Metals by ICP-AES									
Lead	2,200	1,800	mg/kg	5	210	440	580	150	1,200	480

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Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial		Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil
				Laboratory Sample number		S19-Se37017	S19-Se37018	S19-Se37019	S19-Se37020	S19-Se37021	S19-Se37022
				Sample date:		22-09-19	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19
				Sample ID:		SS73	SS74	SS75	SS76	SS77	SS78
				Site:		Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor
				Sampling Method:		Discrete	Discrete	Discrete	Discrete	Discrete	Discrete
Analyte grouping/Analyte				**Units**	**LOR**						
EG005T: Total Metals by ICP-AES											
Lead	2,200	1,800		mg/kg	5	460	300	1,600	1,000	500	530

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Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial	Sample Type:	Soil	Soil	Soil	Soil	Soil	Soil
			Laboratory Sample number	S19-Se37023	S19-Se37024	S19-Se37025	S19-Se37026	S19-Se37027	S19-Se37028
			Sample date:	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19
			Sample ID:	SS79	SS80	SS81	SS82	SS83	SS84
			Site:	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor
			Sampling Method:	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete
Analyte grouping/Analyte			**Units**	**LOR**					
EG005T: Total Metals by ICP-AES									
Lead	2,200	1,800	mg/kg	5	98	200	120	230	530	460

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Job No: 318000780
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22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial		Sample Type:	Soil	Soil	Soil	Soil	Soil	Soil
				Laboratory Sample number	S19-Se37029	S19-Se37030	S19-Se37031	S19-Se37032	S19-Se37033	S19-Se37034
				Sample date:	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19
				Sample ID:	SS85	SS86	SS87	SS88	SS89	SS90
				Site:	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor
				Sampling Method:	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete
Analyte grouping/Analyte				**Units**	**LOR**					
EG005T: Total Metals by ICP-AES										
Lead	2,200	1,800		mg/kg	5	330	28	32	660	200	28

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Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial		Sample Type:	Soil	Soil	Soil	Soil	Soil	Soil
				Laboratory Sample number	S19-Se37035	S19-Se37036	S19-Se37037	S19-Se37038	S19-Se37039	S19-Se37040
				Sample date:	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19
				Sample ID:	SS91	SS92	SS93	SS94	SS95	SS96
				Site:	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor
				Sampling Method:	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete
Analyte grouping/Analyte				**Units**	**LOR**					
EG005T: Total Metals by ICP-AES										
Lead	2,200	1,800		mg/kg	5	110	49	32	100	45	79

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Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial		Sample Type:	Soil	Soil	Soil	Soil	Soil	Soil
				Laboratory Sample number	S19-Se37041	S19-Se37042	S19-Se37043	S19-Se37044	S19-Se37045	S19-Se37046
				Sample date:	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19
				Sample ID:	SS97	SS98	SS99	SS100	SS101	SS102
				Site:	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor
				Sampling Method:	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete
Analyte grouping/Analyte				**Units**	**LOR**					
EG005T: Total Metals by ICP-AES										
Lead	2,200	1,800		mg/kg	5	35	38	22	870	17	24

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Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial		Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil
				Laboratory Sample number		S19-Se37047	S19-Se37048	S19-Se37049	S19-Se37050	S19-Se37051	S19-Se37052
				Sample date:		22-09-19	22-09-19	22-09-19	22-09-19	22-09-19	22-09-19
				Sample ID:		SS103	SS104	SS105	SS106	SS107	SS108
				Site:		Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor
				Sampling Method:		Discrete	Discrete	Discrete	Discrete	Discrete	Discrete
Analyte grouping/Analyte				**Units**	**LOR**						
EG005T: Total Metals by ICP-AES											
Lead	2,200	1,800		mg/kg	5	35	620	**3,900**	1,400	530	52

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Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 4:
Soil Results - Lead

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial		Sample Type:	Soil	Soil	Soil	Soil
				Laboratory Sample number	S19-Se37053	S19-Se37054	S19-Se37145	S19-Se37146
				Sample date:	22-09-19	22-09-19	22-09-19	22-09-19
				Sample ID:	SS109	SS110	SS111	SS112
				Site:	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor
				Sampling Method:	Discrete	Discrete	Discrete	Discrete
Analyte grouping/Analyte				**Units**	**LOR**			
EG005T: Total Metals by ICP-AES								
Lead	2,200	1,800		mg/kg	5	76	30	38	27

Sourced from *Tarago Rail Corridor and Tarago Area Detailed Site Investigation* (Ramboll 2020a).

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Table 5: Lead Leachate

	Sample Type:		Leachate	Leachate	Leachate	Leachate	Leachate	Leachate
	Sample number:		S19-JI50740	S19-JI50741	S19-JI50742	S19-JI50743	S19-JI50744	S19-JI50745
	Sample date:		26-Jul-19	26-Jul-19	26-Jul-19	26-Jul-19	26-Jul-19	26-Jul-19
	Sample ID:		TP1 0.1-0.5	TP5 0.1-0.45	TP7 0.1-0.4	TP3 0.1-0.5	SS20 0-0.1	TP4 0.1-0.3
	Project Name:		John Holland	John Holland	John Holland	John Holland	John Holland	John Holland
	Compound:							
	Site:		US Leachate	US Leachate	US Leachate	AUS Leachate - Reagent Water	AUS Leachate - Reagent Water	AUS Leachate - Reagent Water
	Sampling Method:		NA	NA	NA	NA	NA	NA
	Sample Description		Leachate	Leachate	Leachate	Leachate	Leachate	Leachate
Analyte grouping/Analyte	**Units**	**LOR**						
Metals TCLP								
Arsenic	mg/L	0.1	--	--	--	--	--	--
Cadmium	mg/L	0.05	--	--	--	--	--	--
Chromium (VI)	mg/L	0.1	--	--	--	--	--	--
Copper	mg/L	0.1	--	--	--	--	--	--
Lead	mg/L	0.1	4.3	32	8.2	1.1	0.03	<0.01
Nickel	mg/L	0.1	--	--	--	--	--	--
Zinc	mg/L	0.1	--	--	--	--	--	--
Mercury	mg/L	0.001	--	--	--	--	--	--

Blank Cell indicates no criterion available
LOR = Limit of Reporting
PFOS/PFOA values adopted from Addendum to the Waste Classification Guidelines (2014) – Part 1: classifying waste, October 2016 (NSW EPA). Noting these values have been based on the enHealth TDI values
Blank cell indicates no screening criterion available
For Limit of Reporting (LOR) refer to laboratory certificates of analysis
--- Indicates sample not analysed
Concentrations below the LOR noted as <value

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 6:
Loadout Complex Soil Results

	NEPM 2013 HIL D Commercial / Industrial	NEPM EIL Commercial / Industrial (site specific)	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-Ap02695	S20-Ap02696	S20-Ap02697	S20-Ap02698	S20-Ap02699	S20-Ap02700	S20-Ap02701	S20-Ap02702	S20-Ap02703	S20-Ap02704
			Sample date:		31-03-20	31-03-20	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:		TP1_0.0-0.1	TP1_0.2-0.3	TP1_1.0-1.1	TP1_1.8-1.9	TP2_0.0-0.1	TP2_0.5-0.6	TP2_1.0-1.1	TP3_0.0-0.1	TP3_0.5-0.6	TP3_0.6-0.7
			Project Name:		Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI
			Sampling Method:		Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator
Analyte grouping/Analyte			**Units**	**LOR**										
LTM-GEN-7080 Moisture														
Moisture Content (dried @ 103°C)			%	--	12	8.1	10	12	8.3	5.9	5.9	7.6	4.2	9.5
LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS														
Lead	2200[a]	1800	mg/kg	5	290	490	42	28	140	38	16	29	1100	< 5

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Concentration in **red** font and grey box exceed the adopted HIL for Commercial/Industrial use

Concentration in **orange** font and grey box exceed the adopted EIL/ESL 'D' for Commercial/Industrial use

Concentrations in box exceed the screening value >2.5 times

Where one or more guideline value is exceeded, the highest guideline exceeded will be highlighted

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22-06-21

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	NEPM 2013 HIL D Commercial / Industrial	NEPM EIL Commercial / Industrial (site specific)	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-Ap44310	S20-Ap44311	S20-Ap44312	S20-Ap44313	S20-Ap02705	S20-Ap02706	S20-Ap02707	S20-Ap02708	S20-Ap02709	S20-Ap02710
			Sample date:		31-05-20	31-05-20	31-05-20	31-05-20	31-03-20	31-03-20	31-03-20	31-03-20	31-03-20	31-03-20
			Sample ID:		TP4_0.0-0.1	TP4_0.5-0.6	TP4_1.0-1.1	TP4_1.9-2.0	TP5_0.0-0.1	TP5_0.6-0.7	TP5_1.0-1.1	TP5_1.9-2.0	TP6_0.0-0.1	TP6_0.5-0.6
			Project Name:		Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI
			Sampling Method:		Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator
Analyte grouping/Analyte			**Units**	**LOR**										
LTM-GEN-7080 Moisture														
Moisture Content (dried @ 103°C)			%	--	9.7	8.8	7.3	8	6.5	11	10	14	4.2	17
LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS														
Lead	2200[a]	1800	mg/kg	5	380	170	90	29	51	160	28	18	33	16

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	NEPM 2013 HIL D Commercial / Industrial	NEPM EIL Commercial / Industrial (site specific)	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-Ap02711	S20-Ap02712	S20-Ap02713	S20-Ap02714	S20-Ap02715	S20-Ap02716	S20-Ap02717	S20-Ap02718	S20-Ap02719	S20-Ap02720
			Sample date:		31-03-20	31-03-20	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:		TP6_1.9-2.0	TP7_0.0-0.1	TP7_0.5-0.6	TP7_1.9-2.0	TP8_0.0-0.1	TP8_0.5-0.6	TP8_1.1-1.2	TP8_1.9-2.0	TP9_0.0-0.1	TP9_0.5-0.6
			Project Name:		Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI
			Sampling Method:		Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator
Analyte grouping/Analyte			**Units**	**LOR**										
LTM-GEN-7080 Moisture														
Moisture Content (dried @ 103°C)			%	--	13	6.4	19	13	6.9	7.7	7.4	6.6	8.8	7.6
LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS														
Lead	2200[a]	1800	mg/kg	5	15	13	22	16	37	83	210	220	40	140

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22-06-21

Table 6:
Loadout Complex Soil Results

	NEPM 2013 HIL D Commercial / Industrial	NEPM EIL Commercial / Industrial (site specific)	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-Ap02721	S20-Ap02722	S20-Ap02723	S20-Ap02724	S20-Ap02725	S20-Ap02726	S20-Ap02727	S20-Ap02728	S20-Ap02729	S20-Ap02730
			Sample date:		31-03-20	31-03-20	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:		TP9_1.2-1.3	TP10_0.05-0.15	TP10_0.5-0.6	TP10_1.5-1.6	TP11_0.0-0.1	TP11_0.5-0.6	TP12_0.0-0.1	TP12_0.5-0.6	TP13_0.0-0.1	TP13_0.5-0.6
			Project Name:		Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI
			Sampling Method:		Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator
Analyte grouping/Analyte			**Units**	**LOR**										
LTM-GEN-7080 Moisture														
Moisture Content (dried @ 103°C)			%	--	7.3	8.8	12	9.3	9.8	19	15	18	6.7	7.1
LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS														
Lead	2200[a]	1800	mg/kg	5	1200	25	140	17	550	23	810	130	17	18

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Job No: 318000780
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22-06-21

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	NEPM 2013 HIL D Commercial / Industrial	NEPM EIL Commercial / Industrial (site specific)	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-Ap02731	S20-Ap02732	S20-Ap02733	S20-Ap02734	S20-Ap02735	S20-Ap02736	S20-Ap06337	S20-Ap06338	S20-Ap06339	S20-Ap06340
			Sample date:		31-03-20	31-03-20	31-03-20	31-03-20	31-03-20	31-03-20	01-04-20	01-04-20	01-04-20	01-04-20
			Sample ID:		TP13_1.2-1.3	TP13_1.9-2.0	TP14_0.0-0.1	TP14_0.5-0.6	TP14_0.8-0.9	TP14_1.9-2.0	TP15_0.0-0.1	TP15_0.5-0.6	TP15_1.9-2.0	TP16_0.0-0.1
			Project Name:		Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI
			Sampling Method:		Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator
Analyte grouping/Analyte			**Units**	**LOR**										
LTM-GEN-7080 Moisture														
Moisture Content (dried @ 103°C)			%	--	7.4	11	7	8.1	5.9	8.1	7.1	8.4	5.6	13
LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS														
Lead	2200[a]	1800	mg/kg	5	7.9	18	23	29	72	52	49	17	21	31

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	NEPM 2013 HIL D Commercial / Industrial	NEPM EIL Commercial / Industrial (site specific)	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-Ap06341	S20-Ap06342	S20-Ap06343	S20-Ap06344	S20-Ap06345	S20-Ap06346	S20-Ap06347	S20-Ap06348	S20-Ap06349	S20-Ap06350
			Sample date:		01-04-20	01-04-20	01-04-20	01-04-20	01-04-20	01-04-20	01-04-20	01-04-20	01-04-20	01-04-20
			Sample ID:		TP16_0.5-0.6	TP16_1.5-1.6	TP17_0.0-0.1	TP17_0.5-0.6	TP18_0.0-0.1	TP18_0.5-0.6	TP18_1.0-1.1	TP19_0.0-0.1	TP19_0.3-0.4	TP19_1.0-1.1
			Project Name:		Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI
			Sampling Method:		Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator	Excavator
Analyte grouping/Analyte			**Units**	**LOR**										
LTM-GEN-7080 Moisture														
Moisture Content (dried @ 103°C)			%	--	8.6	19	9.5	5.1	18	15	12	17	11	12
LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS														
Lead	2200[a]	1800	mg/kg	5	31	24	49	18	210	23	46	180	25	33

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			Site:		Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Load Out Footprint	Load Out Footprint	Load Out Footprint	Load Out Footprint	Load Out Footprint	Load Out Footprint
			Lab Sample number:		S20-Ap06351	S20-Ap06352	S20-Ap06353	S20-Ap44309	N/A	N/A	N/A	N/A	N/A	N/A
			Sample date:		01-04-20	01-04-20	01-04-20	31-05-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20	19-08-20
			Sample ID:		TP20_0.0-0.1	TP20_0.5-0.6	TP20_1.2-1.3	TP3_1.5-1.6	LO_TP01_0.0	LO_TP01_0.5	LO_TP01_1.0	LO_TP01_1.3	LO_TP02_0.0	LO_TP02_0.5
			Project Name:		Community DSI	Community DSI	Community DSI	Community DSI	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum
			Sampling Method:		Excavator	Excavator	Excavator	Excavator	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit
Analyte grouping/Analyte			**Units**	**LOR**										
LTM-GEN-7080 Moisture														
Moisture Content (dried @ 103°C)			%	--	7.6	15	13	10						
LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS														
Lead	2200[a]	1800	mg/kg	5	62	95	28	44	31	96	50	58	176	16

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			Site:		Load Out Footprint	Load Out Footprint	Load Out Footprint	Load Out Footprint	Load Out Footprint	Load Out Footprint	Load Out Footprint	Load Out Footprint	Load Out Footprint	Load Out Footprint
			Lab Sample number:		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
			Sample ID:		LO_TP02_0.9	LO_TP02_1.1	LO_TP02_1.3	LO_TP02_1.35	LO_TP02_1.4	LO_TP03_0.2	LO_TP03_0.9	LO_TP03_1.5	LO_TP03_1.6	LO_TP03_1.7
			Project Name:		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
Analyte grouping/Analyte			**Units**	**LOR**										
LTM-GEN-7080 Moisture														
Moisture Content (dried @ 103°C)			%	--										
LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS														
Lead	2200[a]	1800	mg/kg	5	11	*5700*	6900	85	83		158	1748	3662	117

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	NEPM 2013 HIL D Commercial / Industrial	NEPM EIL Commercial / Industrial (site specific)	Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Site:		Load Out Footprint	Load Out Footprint	Load Out Footprint	Load Out Footprint	Load Out Footprint	Load Out Footprint	Load Out Footprint	Load Out Footprint	Load Out Footprint	Load Out Footprint
			Lab Sample number:		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
			Sample ID:		LO_TP04_0.25	LO_TP04_0.7	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
			Project Name:		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
Analyte grouping/Analyte			**Units**	**LOR**										
LTM-GEN-7080 Moisture														
Moisture Content (dried @ 103°C)			%	--										
LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS														
Lead	2200[a]	1800	mg/kg	5	18	199	90	883	605	150	8	14	ND	273

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	NEPM 2013 HIL D Commercial / Industrial	NEPM EIL Commercial / Industrial (site specific)			
			Sample Type:		**Soil**
			Site:		**Load Out Footprint**
			Lab Sample number:		N/A
			Sample date:		19-08-20
			Sample ID:		LO_TP06_1.2
			Project Name:		DSI Addendum
			Sampling Method:		Test Pit
Analyte grouping/Analyte			**Units**	**LOR**	
LTM-GEN-7080 Moisture					
Moisture Content (dried @ 103°C)			%	--	
LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS					
Lead	2200[a]	1800	mg/kg	5	31

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Project Name: Tarago Lead Management
22-06-21

Table 7:
Resource Recovery Exemption Soil Sampling

	NEPM 2013 HIL D Commercial Industrail	NEPM 2013 EIL Commercial Industrial										
Sample Type:					**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**
Lab Sample number:					S20-Au35780	S20-Au35781	S20-Au35782	S20-Au35783	S20-Au35784	S20-Au35785	S20-Au35786	S20-Au35787
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
Sample ID:					RRE_SP01	RRE_SP02	RRE_SP03	RRE_SP04	RRE_SP05	RRE_SP06	RRE_SP07	RRE_SP08
Project Name:					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
Analyte grouping/Analyte			**Units**	**LOR**								
LTM-GEN-7080 Moisture												
Moisture Content (dried @ 103°C)			%	1	6.4	7.1	7	6.1	5.3	6.3	8.1	9
Conductivity (1:5 aqueous extract at 25°C as rec.)			uS/cm	10	170	540	91	970	620	1100	970	1100
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
Sulphur			mg/kg	5	910	4300	460	14000	3900	11000	8600	16000
Total Organic Carbon			%	0.1	0.5	0.6	1.8	1.2	1.5	0.5	2.3	0.7
LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS												
Antimony			mg/kg	10	< 10	19	24	23	31	23	25	39
Arsenic	3000	160	mg/kg	2	21	70	48	130	**190**	150	130	**190**
Beryllium	500		mg/kg	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Boron	300000		mg/kg	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
Chromium	3600	710	mg/kg	5	25	59	24	60	58	130	79	*81*
Cobalt	4000		mg/kg	5	7.4	14	30	8.3	11	14	12	*12*
Copper	240000	160	mg/kg	5	**510**	**960**	**450**	**2100**	**1700**	**2200**	**1900**	**1600**
Lead	2200*	1800	mg/kg	5	**2600**	**5900**	1300	**5300**	**7000**	**5200**	**6800**	**19000**
Manganese	19000		mg/kg	5	340	640	520	550	630	970	680	710
Mercury	730		mg/kg	0.1	0.2	0.5	0.2	0.7	1.2	1.2	1.1	1.6
Molybdenum			mg/kg	5	< 5	< 5	< 5	6.7	8.5	5.8	6.4	7.3
Nickel	6000	340	mg/kg	5	10	29	18	32	22	45	75	40
Selenium	10000		mg/kg	2	4.3	9.5	< 2	19	23	18	17	27
Tin			mg/kg	10	15	30	23	49	190	140	120	80
Vanadium			mg/kg	10	52	64	58	64	78	77	69	89
Zinc	400000	370	mg/kg	5	**550**	**1700**	**2100**	**1400**	**1500**	**2800**	**1500**	***1400***

National Environment Protection Council (2013) National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) (NEPM).
^ For soil texture classification undertaken in accord with AS 1726, the classifications of sand, silt and clay may be applied as coarse, fine with liquid limit <50% and fine with liquid limit>50% respectively, as the underlying properties to develop the HSLs may reasonably be selected to be similar. Where there is uncertainty, either a conservative approach may be adopted or laboratory Health Investigation Levels for chromium based on chromium (VI)

Concentrations in *italics* have been moisture adjusted

Concentrations in green box exceed the adoped EIL 'C' for Urban Residential and Open Public Space

Concentration in **bold red font** exceed the adopted HIL/HSL 'C' for Open Space and Recreational Land Use

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 7:
Resource Recovery Exemption Soil Sampling

Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Rail Corridor	**Rail Corridor**	**Rail Corridor**	**Rail Corridor**	**Rail Corridor**	**Rail Corridor**	**Rail Corridor**	**Rail Corridor**	**Rail Corridor**	**Rail Corridor**	**Rail Corridor**	**Rail Corridor**
S20-Au35788	S20-Au35789	S20-Au35790	S20-Au35791	S20-Au35792	S20-Au35793	S20-Au35794	S20-Au35795	S20-Au35796	S20-Au35797	S20-Au35798	S20-Au35799
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
RRE_SP09	RRE_SP10	RRE_TP01	RRE_TP02	RRE_TP03	RRE_TP04	RRE_TP05	RRE_TP06	RRE_TP07	RRE_TP08	RRE_TP09	RRE_TP10
DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum
Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample
7.9	9.5	4.3	6.1	14	7.6	10	9.3	11	14	13	9.3
410	730	33	53	220	250	620	300	74	1000	29	38
4.4	4.2	6.7	6.1	4.9	5.2	4.2	6.5	5.7	5.1	5	5
5900	4100	79	260	2200	1700	3600	450	2900	12000	3400	2000
< 0.1	0.5	0.3	0.3	1.4	1.5	2.2	0.4	2.7	6.5	1.9	2
10	32	< 10	< 10	18	< 10	11	< 10	< 10	55	14	18
49	**170**	15	14	130	25	77	31	40	79	52	66
< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
3.3	4.6	5.5	7.3	9.6	5.5	3.5	8	4	170	2.4	2.5
37	71	31	12	24	15	34	12	52	130	19	19
8.4	11	7.5	< 5	< 5	< 5	< 5	< 5	8.2	18	< 5	< 5
700	**1200**	**490**	**280**	**1200**	**670**	**830**	**240**	**580**	**4100**	**1200**	**1300**
4100	**7300**	570	820	**8700**	1600	**4000**	230	1600	**9200**	**4400**	**5300**
540	1100	420	530	150	150	230	70	690	720	170	220
0.4	0.6	0.2	0.1	2.9	0.5	0.3	< 0.1	0.2	0.9	0.4	0.4
5.4	< 5	< 5	5.3	12	10	12	20	< 5	*5.6*	9.5	11
18	28	12	22	85	11	11	< 5	19	79	8.9	8.1
8.1	15	< 2	< 2	23	3.9	7.7	2.9	2.8	*16*	12	14
28	47	< 10	11	400	24	13	< 10	10	54	34	38
34	93	76	30	58	43	69	53	45	67	50	72
1100	**1300**	**810**	**770**	**1500**	**1100**	**600**	**1100**	**1300**	**12000**	**570**	**580**

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 7:
Resource Recovery Exemption Soil Sampling

20	4.3	14	8.6			
20	29	1100	465.9			
20	4	8.3	5.4			
20	79	16000	4888.0			
19	0.3	6.5	1.5			

count	min	max	average	> HIL		
14	10	55	24.4			
20	14	190	83.9	0	3	160
0	0	0	#DIV/0!	0		
0	0	0	#DIV/0!	0		
20	1.8	170	14.9	0		
20	12	130	48.6	0	0	710
13	7.4	30	12.4	0		
20	240	4100	1210.5	0	20	160
20	230	19000	5046.0	14	14	1800
20	70	1100	501.5	0		
19	0.1	2.9	0.7	0		
14	5.3	20	9.0			
19	8.1	85	30.2	0	0	340
17	2.8	27	13.1	0		
18	10	400	72.6			
20	30	93	62.1			
20	550	12000	1784.0	0	20	370

Analyte	Unit	Count	Min	Max	Average
Antimony	mg/kg	14	10	55	24.42857143
Arsenic	mg/kg	20	14	190	83.85
Beryllium	mg/kg	0	0	0	#DIV/0!
Boron	mg/kg	0	0	0	#DIV/0!
Cadmium	mg/kg	20	1.8	170	14.855
Chromium	mg/kg	20	12	130	48.6
Cobalt	mg/kg	13	7.4	30	12.44615385
Copper	mg/kg	20	240	4100	1210.5
Lead	mg/kg	20	230	19000	5046
Manganese	mg/kg	20	70	1100	501.5
Mercury	mg/kg	19	0.1	2.9	0.715789474
Molybdenum	mg/kg	14	5.3	20	8.964285714
Nickel	mg/kg	19	8.1	85	30.15789474
Selenium	mg/kg	17	2.8	27	13.12941176
Tin	mg/kg	18	10	400	72.55555556
Vanadium	mg/kg	20	30	93	62.05
Zinc	mg/kg	20	550	12000	1784

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 8:
Waste Classification Total Contaminant Concentrations

	CT1 - General Solid Waste[1]	CT2 - Restricted Solid Waste[1]	Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			ALS Sample number:		S19-Jl39840	S19-Jl39841	S19-Jl39842	S19-Jl39843	S19-Jl39844	S19-Jl39845	S19-Au17281	S19-Au39076
			Sample date:		26-07-2019	26-07-2019	26-07-2019	26-07-2019	26-07-2019	26-07-2019	12-08-2019	27-08-2019
			Sample ID:		TP4 0.1-0.3	TP5 0.1-0.45	TP6 0.1-0.4	TP7 0.1-0.4	TP8 0.1-0.3	TP9 0.1-0.3	SS30	SS31
			Project Name:		Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management
			Sampling Method:		Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Shallow Soil	Shallow Soil
			Sample Description									
Analyte grouping/Analyte			**Units**	**LOR**								
EA055: Moisture Content												
Moisture Content (dried @ 103°C)			%	--	3	3.7	2.4	0.5	1.1	21	---	---
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	---	---	---	---	---	---	---	---
EA200: AS 4964 - 2004 Identification of Asbestos in Soils												
Asbestos Detected			g/kg	0.1	Nil	Nil	Nil	Nil	Nil	Nil	---	---
Asbestos Type			--	--	N/A	N/A	N/A	N/A	N/A	N/A	---	---
Sample weight (dry)			g	0.1	594	540	65	247	430	259	---	---
Description			--	--	Brown fine-grained soil and rocks	Brown fine-grained soil and rocks	Brown fine-grained soil and rocks	Brown fine-grained soil and rocks	Brown fine-grained soil and rocks	Brown fine-grained soil and rocks	---	---
EG005T: Total Metals by ICP-AES												
Antimony			mg/kg	10	---	---	---	---	---	---	---	---
Arsenic	100	400	mg/kg	2	47	13	11	5.8	23	8.6	---	---
Beryllium			mg/kg	2	---	---	---	---	---	---	---	---
Boron			mg/kg	10	---	---	---	---	---	---	---	---
Cadmium	20	80	mg/kg	0.4	3.3	1.1	1	0.7	1.6	1	7.4	2.2
Chromium	100	400	mg/kg	5	25	7.4	7.6	2.5	11	6.8	---	---
Cobalt			mg/kg	5	---	---	---	---	---	---	---	---
Copper			mg/kg	5	990	180	190	62	190	91	---	---
Lead	100	400	mg/kg	5	**38,000**	**3,100**	**6,000**	**3,300**	**2800**	**730**	570*	710
Manganese			mg/kg	5	---	---	---	---	---	---	---	---
Mercury	4	16	mg/kg	0.1	0.4	0.1	0.05	0.05	0.05	0.05	---	---
Molybdenum	100	400	mg/kg	5	---	---	---	---	---	---		
Nickel	40	160	mg/kg	5	8.8	2.5	2.5	2.5	5.7	2.5	---	---
Selenium	20	80	mg/kg	2	---	---	---	---	---	---	---	---
Tin			mg/kg	10	---	---	---	---	---	---	---	---
Vanadium			mg/kg	10	---	---	---	---	---	---	---	---
Zinc			mg/kg	5	940	320	350	130	320	200	---	---
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons												
Naphthalene			mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	---	---
Acenaphthylene			mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25		
Acenaphthene			mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	---	---
Fluorene			mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	---	---
Phenanthrene			mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	---	---
Anthracene			mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	---	---
Fluoranthene			mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	---	---
Pyrene			mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	---	---
Benz(a)anthracene			mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25		
Chrysene			mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	---	---
Benzo(b+j)fluoranthene			mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	---	---
Benzo(k)fluoranthene			mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	---	---
Benzo(a)pyrene	0.8	3.2	mg/kg	0.5	0.25	0.25	0.25	0.25	0.25	0.25	---	---

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 8:
Waste Classification Total Contaminant Concentrations

	CT1 - General Solid Waste[1]	CT2 - Restricted Solid Waste[1]												
Sample Type:						**Soil**	**Soil**	**Soil**	**Soil**	**Soil**	**Soil**	**Soil**	**Soil**
ALS Sample number:						S19-JI39840	S19-JI39841	S19-JI39842	S19-JI39843	S19-JI39844	S19-JI39845	S19-Au17281	S19-Au39076
Sample date:						26-07-2019	26-07-2019	26-07-2019	26-07-2019	26-07-2019	26-07-2019	12-08-2019	27-08-2019
Sample ID:						TP4 0.1-0.3	TP5 0.1-0.45	TP6 0.1-0.4	TP7 0.1-0.4	TP8 0.1-0.3	TP9 0.1-0.3	SS30	SS31
Project Name:						Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management
Sampling Method:						Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Test Pit	Shallow Soil	Shallow Soil
Sample Description													
Indeno(1.2.3.cd)pyrene			mg/kg	0.5		0.25	0.25	0.25	0.25	0.25	0.25	---	---
Dibenz(a.h)anthracene			mg/kg	0.5		0.25	0.25	0.25	0.25	0.25	0.25	---	---
Benzo(g.h.i)perylene			mg/kg	0.5		0.25	0.25	0.25	0.25	0.25	0.25		
Sum of polycyclic aromatic hydrocarbons	200	800	mg/kg	0.5		0.25	0.25	0.25	0.25	0.25	0.25	---	---
Benzo(a)pyrene TEQ (zero)			mg/kg	0.5		0.25	0.25	0.25	0.25	0.25	0.25	---	---
Benzo(a)pyrene TEQ (half LOR)			mg/kg	0.5		0.6	0.6	0.6	0.6	0.6	0.6	---	---
Benzo(a)pyrene TEQ (LOR)			mg/kg	0.5		1.2	1.2	1.2	1.2	1.2	1.2	---	---
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions													
C6 - C10 Fraction			mg/kg	20		10	10	10	10	10	10	---	---
C6 - C10 Fraction minus BTEX (F1)			mg/kg	20		10	10	10	10	10	10	---	---
>C10 - C16 Fraction			mg/kg	50		25	25	25	92	25	25	---	---
>C16 - C34 Fraction (F3)			mg/kg	100		50	140	50	220	50	50	---	---
>C34 - C40 Fraction (F4)			mg/kg	100		50	50	50	120	50	50	---	---
>C10 - C40 Fraction (sum)			mg/kg	100		50	140	50	432	50	50	---	---
>C10 - C16 Fraction minus Naphthalene (F2)			mg/kg	50		25	25	25	92	25	25	---	---
EP080: BTEXN													
Benzene	10	40	mg/kg	0.1		0.05	0.05	0.05	0.05	0.05	0.05	---	---
Toluene	288	1152	mg/kg	0.1		0.05	0.05	0.05	0.05	0.05	0.05	---	---
Ethylbenzene	600	2400	mg/kg	0.1		0.05	0.05	0.05	0.05	0.05	0.05	---	---
meta- & para-Xylene			mg/kg	0.2		0.1	0.1	0.1	0.1	0.1	0.1	---	---
ortho-Xylene			mg/kg	0.1		0.05	0.05	0.05	0.05	0.05	0.05	---	---
Total Xylenes	1000	4000	mg/kg	0.3		0.15	0.15	0.15	0.15	0.15	0.15	---	---
Naphthalene			mg/kg	1		0.25	0.25	0.25	0.25	0.25	0.25	---	---

2019 - 2020 analytical data sourced from *Tarago Rail Corridor and Tarago Area Detailed Site Investigation (Ramboll 2020a)* and the *Tarago Rail Corridor and Tarago Area Detailed Site Investigation Addendum* (Ramboll 2020e). 2021 data sourced by sub-sampling bulk samples collected in 2020 and held by Ramboll.

[1] Maximum values of specific contaminant concentration (SCC) for classification without TCLP

[2] Assumed chromium VI

LOR = Limit of Reporting

Concentrations below the LOR noted as <value

Concentrations in a grey box exceed CT1 screening criteria

Concentrations in **red font** exceed CT2 screening

Underlined values were reported <LOR and have been halved to allow for comparison of data.

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 8:
Waste Classification Total Contaminant Concentrations

	CT1 - General Solid Waste[1]	CT2 - Restricted Solid Waste[1]	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			S19-Au39077	S19-Au39078	S19-Au39079	S19-Au39080	S19-Au39075	S19-Au39082	S19-Au39083	S19-Au39084	S19-Au39085	S19-De30523
			27-08-2019	27-08-2019	27-08-2019	27-08-2019	27-08-2019	27-08-2019	27-08-2019	27-08-2019	27-08-2019	18-12-2019
			SS32	SS33	SS34	SS35	SS36	SS37	SS38	SS39	SS40	HA01_0.1
			Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management
			Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil	Hand Auger
Analyte grouping/Analyte												
EA055: Moisture Content												
Moisture Content (dried @ 103°C)			---	---	---	---	---	---	---	---	---	---
Conductivity (1:5 aqueous extract at 25°C as rec.)			---	---	---	---	---	---	---	---	---	---
pH (1:5 Aqueous extract at 25°C as rec.)			---	---	---	---	---	---	---	---	---	---
Sulphur			---	---	---	---	---	---	---	---	---	---
Total Organic Carbon			---	---	---	---	---	---	---	---	---	---
EA200: AS 4964 - 2004 Identification of Asbestos in Soils												
Asbestos Detected			---	---	---	---	---	---	---	---	---	---
Asbestos Type			---	---	---	---	---	---	---	---	---	---
Sample weight (dry)			---	---	---	---	---	---	---	---	---	---
Description			---	---	---	---	---	---	---	---	---	---
EG005T: Total Metals by ICP-AES												
Antimony			---	---	---	---	---	---	---	---	---	---
Arsenic	100	400	---	---	---	---	---	---	---	---	---	---
Beryllium			---	---	---	---	---	---	---	---	---	---
Boron			---	---	---	---	---	---	---	---	---	---
Cadmium	20	80	2.2	4.2	3.4	2.1	7.2	4.2	14	5.9	8.7	4.2
Chromium	100	400	---	---	---	---	---	---	---	---	---	---
Cobalt			---	---	---	---	---	---	---	---	---	---
Copper			---	---	---	---	---	---	---	---	---	---
Lead	100	400	2800*	800	850	900	2100	1600	9900	2900	2600	720
Manganese			---	---	---	---	---	---	---	---	---	---
Mercury	4	16	---	---	---	---	---	---	---	---	---	---
Molybdenum	100	400										
Nickel	40	160	---	---	---	---	---	---	---	---	---	---
Selenium	20	80	---	---	---	---	---	---	---	---	---	---
Tin			---	---	---	---	---	---	---	---	---	---
Vanadium			---	---	---	---	---	---	---	---	---	---
Zinc			---	---	---	---	---	---	---	---	---	---
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons												
Naphthalene			---	---	---	---	---	---	---	---	---	---
Acenaphthylene												
Acenaphthene			---	---	---	---	---	---	---	---	---	---
Fluorene			---	---	---	---	---	---	---	---	---	---
Phenanthrene			---	---	---	---	---	---	---	---	---	---
Anthracene			---	---	---	---	---	---	---	---	---	---
Fluoranthene			---	---	---	---	---	---	---	---	---	---
Pyrene			---	---	---	---	---	---	---	---	---	---
Benz(a)anthracene												
Chrysene			---	---	---	---	---	---	---	---	---	---
Benzo(b+j)fluoranthene			---	---	---	---	---	---	---	---	---	---
Benzo(k)fluoranthene			---	---	---	---	---	---	---	---	---	---
Benzo(a)pyrene	0.8	3.2	---	---	---	---	---	---	---	---	---	---

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 8:
Waste Classification Total Contaminant Concentrations

	CT1 - General Solid Waste[1]	CT2 - Restricted Solid Waste[1]	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			S19-Au39077	S19-Au39078	S19-Au39079	S19-Au39080	S19-Au39075	S19-Au39082	S19-Au39083	S19-Au39084	S19-Au39085	S19-De30523
			27-08-2019	27-08-2019	27-08-2019	27-08-2019	27-08-2019	27-08-2019	27-08-2019	27-08-2019	27-08-2019	18-12-2019
			SS32	SS33	SS34	SS35	SS36	SS37	SS38	SS39	SS40	HA01_0.1
			Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management
			Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil	Shallow Soil	Hand Auger
Indeno(1.2.3.cd)pyrene			---	---	---	---	---	---	---	---	---	---
Dibenz(a.h)anthracene			---	---	---	---	---	---	---	---	---	---
Benzo(g.h.i)perylene												
Sum of polycyclic aromatic hydrocarbons	200	800	---	---	---	---	---	---	---	---	---	---
Benzo(a)pyrene TEQ (zero)			---	---	---	---	---	---	---	---	---	---
Benzo(a)pyrene TEQ (half LOR)			---	---	---	---	---	---	---	---	---	---
Benzo(a)pyrene TEQ (LOR)			---	---	---	---	---	---	---	---	---	---
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 F												
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)			---	---	---	---	---	---	---	---	---	---
EP080: BTEXN												
Benzene	10	40	---	---	---	---	---	---	---	---	---	---
Toluene	288	1152	---	---	---	---	---	---	---	---	---	---
Ethylbenzene	600	2400	---	---	---	---	---	---	---	---	---	---
meta- & para-Xylene			---	---	---	---	---	---	---	---	---	---
ortho-Xylene			---	---	---	---	---	---	---	---	---	---
Total Xylenes	1000	4000	---	---	---	---	---	---	---	---	---	---
Naphthalene			---	---	---	---	---	---	---	---	---	---

2019 - 2020 analytical data sourced from *Tarago Rail Corridor and Tarago Area Detailed Site Investigation (Ramboll 2020a)* and the *Tarago Rail Corridor and Tarago Area Detailed Site Investigation Addendum* (Ramboll 2020e). 2021 data sourced by sub-sampling bulk samples collected in 2020 and held by Ramboll.

[1] Maximum values of specific contaminant concentration (SCC) for classific

[2] Assumed chromium VI

LOR = Limit of Reporting

Concentrations below the LOR noted as <value

Concentrations in a grey box exceed CT1 screening criteria

Concentrations in **red font** exceed CT2 screening

Underlined values were reported <LOR and have been halved to allow for c

Client: John Holland Rail
Job No: 318000780
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22-06-21

Table 8:
Waste Classification Total Contaminant Concentrations

	CT1 - General Solid Waste[1]	CT2 - Restricted Solid Waste[1]	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			S19-De30524	S19-Se36992	S19-Se36993	S19-Se36995	S19-Se37049	S19-Se37052	S20-Au35780	S20-Au35781	S20-Au35782	S20-Au35783
			18-12-2019	22-09-2019	22-09-2019	22-09-2019	22-09-2019	22-09-2019	19-08-2020	19-08-2020	19-08-2020	19-08-2020
			HA01_0.25	SS52	SS53	SS55	SS105	SS108	RRE_SP01	RRE_SP02	RRE_SP03	RRE_SP04
			Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management
			Hand Auger						DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum
									Composite Sample	Composite Sample	Composite Sample	Composite Sample
Analyte grouping/Analyte												
EA055: Moisture Content												
Moisture Content (dried @ 103°C)			---	8	2.5	17	13	9.4	6.4	7.1	7	6.1
Conductivity (1:5 aqueous extract at 25°C as rec.)			---	---	---	---	---	---	170	540	91	970
pH (1:5 Aqueous extract at 25°C as rec.)			---	---	---	---	---	---	7.4	4.3	8.3	6.4
Sulphur			---	---	---	---	---	---	910	4300	460	14000
Total Organic Carbon			---	---	---	---	---	---	0.5	0.6	1.8	1.2
EA200: AS 4964 - 2004 Identification of Asbestos in Soils												
Asbestos Detected			---	Nil	Nil	Nil	Nil	Nil	---	---	---	---
Asbestos Type			---	N/A	N/A	N/A	N/A	N/A	---	---	---	---
Sample weight (dry)			---	853	1120	574	892	673	---	---	---	---
Description			---	Brown coarse-grained soil and rocks	Brown coarse-grained soil, rocks and bitumous material	Brown coarse-grained soil, rcoks and organic debris	Brown coarse-grained soil and rocks	Brown coarse-grained soil and rocks	---	---	---	---
EG005T: Total Metals by ICP-AES												
Antimony			---	**---**	**---**	**---**	**---**	**---**	5	19	24	23
Arsenic	100	400	---	25	150	32	65	4.9	21	70	48	130
Beryllium			---	**---**	**---**	**---**	**---**	**---**	1	1	1	1
Boron			---	**---**	**---**	**---**	**---**	**---**	5	5	5	5
Cadmium	20	80	1.9	5.6	8.1	12	4.3	0.9	2.9	7	1.8	10
Chromium	100	400	---	12	15	13	27	11	25	59	24	60
Cobalt			---	**---**	**---**	**---**	**---**	**---**	7.4	14	30	8.3
Copper			---	220	660	320	790	20	510	960	450	2100
Lead	100	400	820	**540**	**3100**	**1800**	**3900**	52	**2600**	**5900**	**1300**	**5300**
Manganese			---	**---**	**---**	**---**	**---**	**---**	340	640	520	550
Mercury	4	16	---	0.05	0.6	0.2	0.2	0.05	0.2	0.5	0.2	0.7
Molybdenum	100	400		**---**	**---**	**---**	**---**	**---**	2.5	2.5	2.5	6.7
Nickel	40	160	---	2.5	11	6.6	9.2	2.5	10	29	18	32
Selenium	20	80	---	**---**	**---**	**---**	**---**	**---**	4.3	9.5	1	19
Tin			---	**---**	**---**	**---**	**---**	**---**	15	30	23	49
Vanadium			---	**---**	**---**	**---**	**---**	**---**	52	64	58	64
Zinc			---	770	1300	1500	780	170	550	1700	2100	1400
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons												
Naphthalene			---	0.25	0.25	0.25	0.25	0.25	**---**	**---**	**---**	**---**
Acenaphthylene				0.25	0.25	0.25	0.25	0.25	**---**	**---**	**---**	**---**
Acenaphthene			---	0.25	0.25	0.25	0.25	0.25	**---**	**---**	**---**	**---**
Fluorene			---	0.25	0.25	0.25	0.25	0.25	**---**	**---**	**---**	**---**
Phenanthrene			---	0.25	0.25	0.25	0.25	0.25	**---**	**---**	**---**	**---**
Anthracene			---	0.25	0.25	0.25	0.25	0.25	**---**	**---**	**---**	**---**
Fluoranthene			---	0.25	0.25	0.6	0.25	0.25	**---**	**---**	**---**	**---**
Pyrene			---	0.7	0.5	0.5	0.25	0.25	**---**	**---**	**---**	**---**
Benz(a)anthracene				0.7	0.6	0.6	0.25	0.25	**---**	**---**	**---**	**---**
Chrysene			---	0.25	0.25	0.25	0.25	0.25	**---**	**---**	**---**	**---**
Benzo(b+j)fluoranthene			---	0.25	0.25	0.25	0.25	0.25	**---**	**---**	**---**	**---**
Benzo(k)fluoranthene			---	0.25	0.25	0.25	0.25	0.25	**---**	**---**	**---**	**---**
Benzo(a)pyrene	0.8	3.2	---	0.7	0.6	0.6	0.25	0.25	**---**	**---**	**---**	**---**

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Job No: 318000780
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Table 8:
Waste Classification Total Contaminant Concentrations

	CT1 - General Solid Waste[1]	CT2 - Restricted Solid Waste[1]	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			S19-De30524	S19-Se36992	S19-Se36993	S19-Se36995	S19-Se37049	S19-Se37052	S20-Au35780	S20-Au35781	S20-Au35782	S20-Au35783
			18-12-2019	22-09-2019	22-09-2019	22-09-2019	22-09-2019	22-09-2019	19-08-2020	19-08-2020	19-08-2020	19-08-2020
			HA01_0.25	SS52	SS53	SS55	SS105	SS108	RRE_SP01	RRE_SP02	RRE_SP03	RRE_SP04
			Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management
			Hand Auger						DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum
									Composite Sample	Composite Sample	Composite Sample	Composite Sample
Indeno(1.2.3.cd)pyrene			---	0.6	0.25	0.6	0.25	0.25	---	---	---	---
Dibenz(a.h)anthracene			---	0.25	0.25	0.25	0.25	0.25	---	---	---	---
Benzo(g.h.i)perylene				0.6	0.25	0.5	0.25	0.25	---	---	---	---
Sum of polycyclic aromatic hydrocarbons	200	800	---	3.3	1.7	3.4	0.25	0.25	---	---	---	---
Benzo(a)pyrene TEQ (zero)			---	0.8	0.7	0.7	0.25	0.25	---	---	---	---
Benzo(a)pyrene TEQ (half LOR)			---	1.1	1	1	0.6	0.6	---	---	---	---
Benzo(a)pyrene TEQ (LOR)			---	1.4	1.3	1.3	1.2	1.2	---	---	---	---
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 F												
C6 - C10 Fraction			---	10	10	10	10	10	---	---	---	---
C6 - C10 Fraction minus BTEX (F1)			---	10	10	10	10	10	---	---	---	---
>C10 - C16 Fraction			---	25	25	25	25	25	---	---	---	---
>C16 - C34 Fraction (F3)			---	130	300	220	50	50	---	---	---	---
>C34 - C40 Fraction (F4)			---	50	130	50	50	50	---	---	---	---
>C10 - C40 Fraction (sum)			---	130	430	220	50	50	---	---	---	---
>C10 - C16 Fraction minus Naphthalene (F2)			---	25	25	25	25	25	---	---	---	---
EP080: BTEXN												
Benzene	10	40	---	0.05	0.05	0.05	0.05	0.05	---	---	---	---
Toluene	288	1152	---	0.05	0.05	0.05	0.05	0.05	---	---	---	---
Ethylbenzene	600	2400	---	0.05	0.05	0.05	0.05	0.05	---	---	---	---
meta- & para-Xylene			---	0.1	0.1	0.1	0.1	0.1	---	---	---	---
ortho-Xylene			---	0.05	0.05	0.05	0.05	0.05	---	---	---	---
Total Xylenes	1000	4000	---	0.15	0.15	0.15	0.15	0.15	---	---	---	---
Naphthalene			---	0.25	0.25	0.25	0.25	0.25	---	---	---	---

2019 - 2020 analytical data sourced from *Tarago Rail Corridor and Tarago Area Detailed Site Investigation (Ramboll 2020a)* and the *Tarago Rail Corridor and Tarago Area Detailed Site Investigation Addendum* (Ramboll 2020e). 2021 data sourced by sub-sampling bulk samples collected in 2020 and held by Ramboll.

[1] Maximum values of specific contaminant concentration (SCC) for classific

[2] Assumed chromium VI

LOR = Limit of Reporting

Concentrations below the LOR noted as <value

Concentrations in a grey box exceed CT1 screening criteria

Concentrations in **red font** exceed CT2 screening

Underlined values were reported <LOR and have been halved to allow for c

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Job No: 318000780
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Table 8:
Waste Classification Total Contaminant Concentrations

	CT1 - General Solid Waste[1]	CT2 - Restricted Solid Waste[1]	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			S20-Au35784	S20-Au35785	S20-Au35786	S20-Au35787	S20-Au35788	S20-Au35789	S20-Au35790	S20-Au35791	S20-Au35792	S20-Au35793
			19-08-2020	19-08-2020	19-08-2020	19-08-2020	19-08-2020	19-08-2020	19-08-2020	19-08-2020	19-08-2020	19-08-2020
			RRE_SP05	RRE_SP06	RRE_SP07	RRE_SP08	RRE_SP09	RRE_SP10	RRE_TP01	RRE_TP02	RRE_TP03	RRE_TP04
			Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management
			DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum
			Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample
Analyte grouping/Analyte												
EA055: Moisture Content												
Moisture Content (dried @ 103°C)			5.3	6.3	8.1	9	7.9	9.5	4.3	6.1	14	7.6
Conductivity (1:5 aqueous extract at 25°C as rec.)			620	1100	970	1100	410	730	33	53	220	250
pH (1:5 Aqueous extract at 25°C as rec.)			4.4	4.4	5.3	4	4.4	4.2	6.7	6.1	4.9	5.2
Sulphur			3900	11000	8600	16000	5900	4100	79	260	2200	1700
Total Organic Carbon			1.5	0.5	2.3	0.7	0.05	0.5	0.3	0.3	1.4	1.5
EA200: AS 4964 - 2004 Identification of Asbestos in Soils												
Asbestos Detected			---	---	---	---	---	---	---	---	---	---
Asbestos Type			---	---	---	---	---	---	---	---	---	---
Sample weight (dry)			---	---	---	---	---	---	---	---	---	---
Description			---	---	---	---	---	---	---	---	---	---
EG005T: Total Metals by ICP-AES												
Antimony			31	23	25	39	10	32	5	5	18	5
Arsenic	100	400	190	150	130	190	49	170	15	14	130	25
Beryllium			1	1	1	1	1	1	1	1	1	1
Boron			5	5	5	5	5	5	5	5	5	5
Cadmium	20	80	8.2	25	10	6	3.3	4.6	5.5	7.3	9.6	5.5
Chromium	100	400	58	130	79	*81*	37	71	31	12	24	15
Cobalt			11	14	12	*12*	8.4	11	7.5	2.5	2.5	2.5
Copper			1700	2200	1900	1600	700	1200	490	280	1200	670
Lead	100	400	**7000**	**5200**	**6800**	**19000**	**4100**	**7300**	**570**	**820**	**8700**	**1600**
Manganese			630	970	680	710	540	1100	420	530	150	150
Mercury	4	16	1.2	1.2	1.1	1.6	0.4	0.6	0.2	0.1	2.9	0.5
Molybdenum	100	400	8.5	5.8	6.4	7.3	5.4	2.5	2.5	5.3	12	10
Nickel	40	160	22	45	75	40	18	28	12	22	85	11
Selenium	20	80	23	18	17	27	8.1	15	1	1	23	3.9
Tin			190	140	120	80	28	47	5	11	400	24
Vanadium			78	77	69	89	34	93	76	30	58	43
Zinc			1500	2800	1500	*1400*	1100	1300	810	770	1500	1100
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons												
Naphthalene			---	---	---	---	---	---	---	---	---	---
Acenaphthylene			---	---	---	---	---	---	---	---	---	---
Acenaphthene			---	---	---	---	---	---	---	---	---	---
Fluorene			---	---	---	---	---	---	---	---	---	---
Phenanthrene			---	---	---	---	---	---	---	---	---	---
Anthracene			---	---	---	---	---	---	---	---	---	---
Fluoranthene			---	---	---	---	---	---	---	---	---	---
Pyrene			---	---	---	---	---	---	---	---	---	---
Benz(a)anthracene			---	---	---	---	---	---	---	---	---	---
Chrysene			---	---	---	---	---	---	---	---	---	---
Benzo(b+j)fluoranthene			---	---	---	---	---	---	---	---	---	---
Benzo(k)fluoranthene			---	---	---	---	---	---	---	---	---	---
Benzo(a)pyrene	0.8	3.2	---	---	---	---	---	---	---	---	---	---

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Job No: 318000780
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Table 8:
Waste Classification Total Contaminant Concentrations

	CT1 - General Solid Waste[1]	CT2 - Restricted Solid Waste[1]	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			S20-Au35784	S20-Au35785	S20-Au35786	S20-Au35787	S20-Au35788	S20-Au35789	S20-Au35790	S20-Au35791	S20-Au35792	S20-Au35793
			19-08-2020	19-08-2020	19-08-2020	19-08-2020	19-08-2020	19-08-2020	19-08-2020	19-08-2020	19-08-2020	19-08-2020
			RRE_SP05	RRE_SP06	RRE_SP07	RRE_SP08	RRE_SP09	RRE_SP10	RRE_TP01	RRE_TP02	RRE_TP03	RRE_TP04
			Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management
			DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum
			Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample
Indeno(1.2.3.cd)pyrene			---	---	---	---	---	---	---	---	---	---
Dibenz(a.h)anthracene			---	---	---	---	---	---	---	---	---	---
Benzo(g.h.i)perylene			---	---	---	---	---	---	---	---	---	---
Sum of polycyclic aromatic hydrocarbons	200	800	---	---	---	---	---	---	---	---	---	---
Benzo(a)pyrene TEQ (zero)			---	---	---	---	---	---	---	---	---	---
Benzo(a)pyrene TEQ (half LOR)			---	---	---	---	---	---	---	---	---	---
Benzo(a)pyrene TEQ (LOR)			---	---	---	---	---	---	---	---	---	---
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 F												
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)			---	---	---	---	---	---	---	---	---	---
EP080: BTEXN												
Benzene	10	40	---	---	---	---	---	---	---	---	---	---
Toluene	288	1152	---	---	---	---	---	---	---	---	---	---
Ethylbenzene	600	2400	---	---	---	---	---	---	---	---	---	---
meta- & para-Xylene			---	---	---	---	---	---	---	---	---	---
ortho-Xylene			---	---	---	---	---	---	---	---	---	---
Total Xylenes	1000	4000	---	---	---	---	---	---	---	---	---	---
Naphthalene			---	---	---	---	---	---	---	---	---	---

2019 - 2020 analytical data sourced from *Tarago Rail Corridor and Tarago Area Detailed Site Investigation (Ramboll 2020a)* and the *Tarago Rail Corridor and Tarago Area Detailed Site Investigation Addendum* (Ramboll 2020e). 2021 data sourced by sub-sampling bulk samples collected in 2020 and held by Ramboll.

[1] Maximum values of specific contaminant concentration (SCC) for classific

[2] Assumed chromium VI

LOR = Limit of Reporting

Concentrations below the LOR noted as <value

Concentrations in a grey box exceed CT1 screening criteria

Concentrations in **red font** exceed CT2 screening

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Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 8:
Waste Classification Total Contaminant Concentrations

	CT1 - General Solid Waste[1]	CT2 - Restricted Solid Waste[1]	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			S20-Au35794	S20-Au35795	S20-Au35796	S20-Au35797	S20-Au35798	S20-Au35799	S20-Au35801	S20-Au35802	N21-Jn00912	N21-Jn00913
			19-08-2020	19-08-2020	19-08-2020	19-08-2020	19-08-2020	19-08-2020	19-08-20	19-08-20	01-06-21	01-06-21
			RRE_TP05	RRE_TP06	RRE_TP07	RRE_TP08	RRE_TP09	RRE_TP10	RRE_DUP1	RRE_DUP2	TP3a_01	TP3a_02
			Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management
			DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum			Sub-sampling from bulk sample	Sub-sampling from bulk sample
			Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample				
Analyte grouping/Analyte												
EA055: Moisture Content												
Moisture Content (dried @ 103°C)			10	9.3	11	14	13	9.3	10	18	---	---
Conductivity (1:5 aqueous extract at 25°C as rec.)			620	300	74	1000	29	38	1000	1200	---	---
pH (1:5 Aqueous extract at 25°C as rec.)			4.2	6.5	5.7	5.1	5	5	4	5.1	---	---
Sulphur			3600	450	2900	12000	3400	2000	12000	4200	---	---
Total Organic Carbon			2.2	0.4	2.7	6.5	1.9	2	0.5	3.2	---	---
EA200: AS 4964 - 2004 Identification of Asbestos in Soils												
Asbestos Detected			---	---	---	---	---	---	---	---	---	---
Asbestos Type			---	---	---	---	---	---	---	---	---	---
Sample weight (dry)			---	---	---	---	---	---	---	---	---	---
Description			---	---	---	---	---	---	---	---	---	---
EG005T: Total Metals by ICP-AES												
Antimony			11	5	5	55	14	18	28	29	---	---
Arsenic	100	400	77	31	40	79	52	66	130	60	---	---
Beryllium			1	1	1	1	1	1	1	1	---	---
Boron			5	5	5	5	5	5	5	5	---	---
Cadmium	20	80	3.5	8	4	**170**	2.4	2.5	5.6	**140**	51	30
Chromium	100	400	34	12	52	130	19	19	81	120	---	---
Cobalt			2.5	2.5	8.2	18	2.5	2.5	12	9.6	---	---
Copper			830	240	580	4100	1200	1300	1300	3400	---	---
Lead	100	400	**4000**	**230**	**1600**	**9200**	**4400**	**5300**	**9100**	9000	---	---
Manganese			230	70	690	720	170	220	660	520	---	---
Mercury	4	16	0.3	0.05	0.2	0.9	0.4	0.4	1	0.9	---	---
Molybdenum	100	400	12	20	2.5	5.6	9.5	11	5.2	5.6	---	---
Nickel	40	160	11	2.5	19	79	8.9	8.1	37	61	---	---
Selenium	20	80	7.7	2.9	2.8	16	12	14	18	16	---	---
Tin			13	5	10	54	34	38	62	53	---	---
Vanadium			69	53	45	67	50	72	76	48	---	---
Zinc			600	1100	1300	12000	570	580	1400	8600	---	---
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons												
Naphthalene			---	---	---	---	---	---	---	---		
Acenaphthylene			---	---	---	---	---	---	---	---	---	---
Acenaphthene			---	---	---	---	---	---	---	---	---	---
Fluorene			---	---	---	---	---	---	---	---	---	---
Phenanthrene			---	---	---	---	---	---	---	---	---	---
Anthracene			---	---	---	---	---	---	---	---	---	---
Fluoranthene			---	---	---	---	---	---	---	---	---	---
Pyrene			---	---	---	---	---	---	---	---	---	---
Benz(a)anthracene			---	---	---	---	---	---	---	---	---	---
Chrysene			---	---	---	---	---	---	---	---	---	---
Benzo(b+j)fluoranthene			---	---	---	---	---	---	---	---	---	---
Benzo(k)fluoranthene			---	---	---	---	---	---	---	---	---	---
Benzo(a)pyrene	0.8	3.2	---	---	---	---	---	---	---	---	---	---

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 8:
Waste Classification Total Contaminant Concentrations

	CT1 - General Solid Waste[1]	CT2 - Restricted Solid Waste[1]	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			S20-Au35794	S20-Au35795	S20-Au35796	S20-Au35797	S20-Au35798	S20-Au35799	S20-Au35801	S20-Au35802	N21-Jn00912	N21-Jn00913
			19-08-2020	19-08-2020	19-08-2020	19-08-2020	19-08-2020	19-08-2020	19-08-20	19-08-20	01-06-21	01-06-21
			RRE_TP05	RRE_TP06	RRE_TP07	RRE_TP08	RRE_TP09	RRE_TP10	RRE_DUP1	RRE_DUP2	TP3a_01	TP3a_02
			Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management
			DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum	DSI Addendum			Sub-sampling from bulk sample	Sub-sampling from bulk sample
			Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample	Composite Sample				
Indeno(1.2.3.cd)pyrene			---	---	---	---	---	---	---	---	---	---
Dibenz(a.h)anthracene			---	---	---	---	---	---	---	---	---	---
Benzo(g.h.i)perylene			---	---	---	---	---	---	---	---	---	---
Sum of polycyclic aromatic hydrocarbons	200	800	---	---	---	---	---	---	---	---	---	---
Benzo(a)pyrene TEQ (zero)			---	---	---	---	---	---	---	---	---	---
Benzo(a)pyrene TEQ (half LOR)			---	---	---	---	---	---	---	---	---	---
Benzo(a)pyrene TEQ (LOR)			---	---	---	---	---	---	---	---	---	---
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 F												
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)			---	---	---	---	---	---	---	---	---	---
EP080: BTEXN												
Benzene	10	40	---	---	---	---	---	---	---	---	---	---
Toluene	288	1152	---	---	---	---	---	---	---	---	---	---
Ethylbenzene	600	2400	---	---	---	---	---	---	---	---	---	---
meta- & para-Xylene			---	---	---	---	---	---	---	---	---	---
ortho-Xylene			---	---	---	---	---	---	---	---	---	---
Total Xylenes	1000	4000	---	---	---	---	---	---	---	---	---	---
Naphthalene			---	---	---	---	---	---	---	---	---	---

2019 - 2020 analytical data sourced from *Tarago Rail Corridor and Tarago Area Detailed Site Investigation (Ramboll 2020a)* and the *Tarago Rail Corridor and Tarago Area Detailed Site Investigation Addendum* (Ramboll 2020e). 2021 data sourced by sub-sampling bulk samples collected in 2020 and held by Ramboll.

[1] Maximum values of specific contaminant concentration (SCC) for classific

[2] Assumed chromium VI

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Concentrations in a grey box exceed CT1 screening criteria

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Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 8:
Waste Classification Total Contaminant Concentrations

	CT1 - General Solid Waste[1]	CT2 - Restricted Solid Waste[1]	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			N21-Jn00914	N21-Jn00915	N21-Jn00916	N21-Jn00917	N21-Jn00918	N21-Jn00919	N21-Jn00920	N21-Jn00921	N21-Jn00922	N21-Jn00923
			01-06-21	01-06-21	01-06-21	01-06-21	01-06-21	01-06-21	01-06-21	01-06-21	01-06-21	01-06-21
			TP3a_03	TP4a_01	TP4a_02	TP4a_03	TP5a_01	TP5a_02	TP5a_03	TP6a_01	TP6a_02	TP6a_03
			Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management
			Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample
Analyte grouping/Analyte												
EA055: Moisture Content												
Moisture Content (dried @ 103°C)			---	---	---	---	---	---	---	---	---	---
Conductivity (1:5 aqueous extract at 25°C as rec.)			---	---	---	---	---	---	---	---	---	---
pH (1:5 Aqueous extract at 25°C as rec.)			---	---	---	---	---	---	---	---	---	---
Sulphur			---	---	---	---	---	---	---	---	---	---
Total Organic Carbon			---	---	---	---	---	---	---	---	---	---
EA200: AS 4964 - 2004 Identification of Asbestos in Soils												
Asbestos Detected			---	---	---	---	---	---	---	---	---	---
Asbestos Type			---	---	---	---	---	---	---	---	---	---
Sample weight (dry)			---	---	---	---	---	---	---	---	---	---
Description			---	---	---	---	---	---	---	---	---	---
EG005T: Total Metals by ICP-AES												
Antimony			---	---	---	---	---	---	---	---	---	---
Arsenic	100	400	---	---	---	---	---	---	---	---	---	---
Beryllium			---	---	---	---	---	---	---	---	---	---
Boron			---	---	---	---	---	---	---	---	---	---
Cadmium	20	80	27	190	130	170	430	270	440	12	9.6	7.1
Chromium	100	400	---	---	---	---	---	---	---	---	---	---
Cobalt			---	---	---	---	---	---	---	---	---	---
Copper			---	---	---	---	---	---	---	---	---	---
Lead	100	400	---	---	---	---	---	---	---	---	---	---
Manganese			---	---	---	---	---	---	---	---	---	---
Mercury	4	16	---	---	---	---	---	---	---	---	---	---
Molybdenum	100	400	---	---	---	---	---	---	---	---	---	---
Nickel	40	160	---	---	---	---	---	---	---	---	---	---
Selenium	20	80	---	---	---	---	---	---	---	---	---	---
Tin			---	---	---	---	---	---	---	---	---	---
Vanadium			---	---	---	---	---	---	---	---	---	---
Zinc			---	---	---	---	---	---	---	---	---	---
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons												
Naphthalene												
Acenaphthylene			---	---	---	---	---	---	---	---	---	---
Acenaphthene			---	---	---	---	---	---	---	---	---	---
Fluorene			---	---	---	---	---	---	---	---	---	---
Phenanthrene			---	---	---	---	---	---	---	---	---	---
Anthracene			---	---	---	---	---	---	---	---	---	---
Fluoranthene			---	---	---	---	---	---	---	---	---	---
Pyrene			---	---	---	---	---	---	---	---	---	---
Benz(a)anthracene			---	---	---	---	---	---	---	---	---	---
Chrysene			---	---	---	---	---	---	---	---	---	---
Benzo(b+j)fluoranthene			---	---	---	---	---	---	---	---	---	---
Benzo(k)fluoranthene			---	---	---	---	---	---	---	---	---	---
Benzo(a)pyrene	0.8	3.2	---	---	---	---	---	---	---	---	---	---

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Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 8:
Waste Classification Total Contaminant Concentrations

	CT1 - General Solid Waste[1]	CT2 - Restricted Solid Waste[1]	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			N21-Jn00914	N21-Jn00915	N21-Jn00916	N21-Jn00917	N21-Jn00918	N21-Jn00919	N21-Jn00920	N21-Jn00921	N21-Jn00922	N21-Jn00923
			01-06-21	01-06-21	01-06-21	01-06-21	01-06-21	01-06-21	01-06-21	01-06-21	01-06-21	01-06-21
			TP3a_03	TP4a_01	TP4a_02	TP4a_03	TP5a_01	TP5a_02	TP5a_03	TP6a_01	TP6a_02	TP6a_03
			Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management
			Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample
Indeno(1.2.3.cd)pyrene			---	---	---	---	---	---	---	---	---	---
Dibenz(a.h)anthracene			---	---	---	---	---	---	---	---	---	---
Benzo(g.h.i)perylene			---	---	---	---	---	---	---	---	---	---
Sum of polycyclic aromatic hydrocarbons	200	800	---	---	---	---	---	---	---	---	---	---
Benzo(a)pyrene TEQ (zero)			---	---	---	---	---	---	---	---	---	---
Benzo(a)pyrene TEQ (half LOR)			---	---	---	---	---	---	---	---	---	---
Benzo(a)pyrene TEQ (LOR)			---	---	---	---	---	---	---	---	---	---
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 F												
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)			---	---	---	---	---	---	---	---	---	---
EP080: BTEXN												
Benzene	10	40	---	---	---	---	---	---	---	---	---	---
Toluene	288	1152	---	---	---	---	---	---	---	---	---	---
Ethylbenzene	600	2400	---	---	---	---	---	---	---	---	---	---
meta- & para-Xylene			---	---	---	---	---	---	---	---	---	---
ortho-Xylene			---	---	---	---	---	---	---	---	---	---
Total Xylenes	1000	4000	---	---	---	---	---	---	---	---	---	---
Naphthalene			---	---	---	---	---	---	---	---	---	---

2019 - 2020 analytical data sourced from *Tarago Rail Corridor and Tarago Area Detailed Site Investigation (Ramboll 2020a)* and the *Tarago Rail Corridor and Tarago Area Detailed Site Investigation Addendum* (Ramboll 2020e). 2021 data sourced by sub-sampling bulk samples collected in 2020 and held by Ramboll.

[1] Maximum values of specific contaminant concentration (SCC) for classific

[2] Assumed chromium VI

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Concentrations in **red font** exceed CT2 screening

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Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 9:
Cadmium Leachate

	TCLP1 - General Solid Waste[1]	Sample Type:		Soil Leachate	Soil Leachate	Soil Leachate	Soil Leachate	Soil Leachate	Soil Leachate
		Lab Sample number:		N21-Jn00956	N21-Jn00957	N21-Jn00958	N21-Jn00959	N21-Jn00960	N21-Jn00961
		Sample date:		01-06-21	01-06-21	01-06-21	01-06-21	01-06-21	01-06-21
		Sample ID:		TP3a_01	TP3a_02	TP3a_03	TP4a_01	TP4a_02	TP4a_03
		Project Name:		Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management
		Sampling Method:		Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample
		Sample Description							
Analyte grouping/Analyte		**Units**	**LOR**						
EG005T: Total Metals by ICP-AES									
Cadmium	20	mg/kg	0.4	0.63	0.58	0.44	1.2	0.92	0.91

2021 data sourced by sub-sampling bulk samples collected in 2020 and held by Ramboll.
[1] Maximum TCLP contaminant concentration for GSW
LOR = Limit of Reporting
Concentrations below the LOR noted as <value
Concentrations in a grey box

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 9:
Cadmium Leachate

	TCLP1 - General Solid Waste[1]	Sample Type:		Soil Leachate	Soil Leachate	Soil Leachate	Soil Leachate	Soil Leachate	Soil Leachate
		Lab Sample number:		N21-Jn00962	N21-Jn00963	N21-Jn00964	N21-Jn00965	N21-Jn00966	N21-Jn00967
		Sample date:		01-06-21	01-06-21	01-06-21	01-06-21	01-06-21	01-06-21
		Sample ID:		TP5a_01	TP5a_02	TP5a_03	TP6a_01	TP6a_02	TP6a_03
		Project Name:		Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management	Tarago Lead Management
		Sampling Method:		Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample	Sub-sampling from bulk sample
		Sample Description							
Analyte grouping/Analyte		**Units**	**LOR**						
EG005T: Total Metals by ICP-AES									
Cadmium	20	mg/kg	0.4	0.33	0.35	0.36	0.22	0.19	0.19

2021 data sourced by sub-sampling bulk samples collected ir

[1] Maximum TCLP contaminant concentration for GSW

LOR = Limit of Reporting

Concentrations below the LOR noted as <value

Concentrations in a grey box

Table 10: Rail Sleeper Results

	NEPM 2013 HIL D Commercial / Industrial	Sample Type:	Primary	Primary	Primary	Primary	Duplicate
		Sample number:	S20-Ma28575	S20-Ma28576	S20-Ma28577	S20-Ma28578	S20-Ma28579
		Sample date:	18-Mar-20	18-Mar-20	18-Mar-20	18-Mar-20	18-Mar-20
		Sample ID:	SLE01	SLE02	SLE03	SLE04	D01_180320
		Project Name:	John Holland	John Holland	John Holland	John Holland	John Holland
		Compound:					
		Site:	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop
		Sampling Method:	NA	NA	NA	NA	NA
		Sample Description	Woodchips	Woodchips	Woodchips	Woodchips	Woodchips

Analyte grouping/Analyte		Units	LOR					
Total Metals								
Arsenic	**3000**	mg/kg	5	< 2	6.9	6.5	< 2	4.6
Cadmium	**900**	mg/kg	1	15	11	7.6	11	11
Chromium (VI)	**3600**	mg/kg	2	< 5	11	14	< 5	< 5
Copper	**240000**	mg/kg	5	140	430	1700	230	590
Lead	**2200**[a]	mg/kg	5	240	1300	1300	560	**2700**
Mercury	**6000**	mg/kg	0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1
Nickel	**400000**	mg/kg	2	< 5	11	11	5.7	< 5
Zinc		mg/kg	5	2800	1200	1300	1100	1300
Organophosphorus Pesticides (OP)								
Azinphos-methyl		mg/kg	< 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
Chlorfenvinphos		mg/kg	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	**2000**	mg/kg	< 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
Coumaphos		mg/kg	< 2	< 2	< 2	< 2	< 2	< 2
Demeton-O		mg/kg	< 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
Diazinon		mg/kg	< 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
Dimethoate		mg/kg	< 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
EPN		mg/kg	< 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
Ethoprop		mg/kg	< 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
Fenitrothion		mg/kg	< 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
Fenthion		mg/kg	< 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
Merphos		mg/kg	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Methyl parathion		mg/kg	< 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
Monocrotophos		mg/kg	< 2	< 2	< 2	< 2	< 2	< 2
Naled		mg/kg	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Omethoate		mg/kg	< 2	< 2	< 2	< 2	< 2	< 2
Phorate		mg/kg	< 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
Pyrazophos		mg/kg	< 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
Terbufos		mg/kg	< 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
Tokuthion		mg/kg	< 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
Polynuclear Aromatic Hydrocarbons								
Acenaphthene		mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene		mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene		mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene		mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene		mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (lower bound) *	**40**	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *		mg/kg	< 0.6	0.6	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *		mg/kg	< 0.7	1.2	1.2	1.2	1.2	1.2
Benzo(b&j)fluoranthene		mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene		mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene		mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene		mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene		mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene		mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene		mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene		mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene		mg/kg	< 0.6	1.7	1.1	0.5	< 0.5	< 0.5
Phenanthrene		mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene		mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	**4000**	mg/kg	< 0.6	1.7	1.1	0.5	< 0.5	< 0.5
TRH - 1999 NEPM Fractions (after silica gel clean-up)								
TRH C10-C14 (after silica gel clean-up)		mg/kg	< 100	< 100	< 100	< 100	220	< 100
TRH C10-C36 (Total) (after silica gel clean-up)	**10000**	mg/kg	< 250	1200	< 250	750	< 250	2110
TRH C15-C28 (after silica gel clean-up)		mg/kg	< 250	300	< 250	320	< 250	510
TRH C29-C36 (after silica gel clean-up)		mg/kg	< 250	900	< 250	430	< 250	1600
Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
TRH >C10-C16 (after silica gel clean-up)		mg/kg	< 250	< 250	< 250	< 250	< 250	< 250
TRH >C16-C34 (after silica gel clean-up)		mg/kg	< 500	1100	< 500	650	< 500	1700
TRH >C34-C40 (after silica gel clean-up)		mg/kg	< 500	< 500	< 500	< 500	< 500	840

Blank Cell indicates no criterion available

LOR = Limit of Reporting

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

CRC Care Technical Report no.10, *Health Screening Levels for petroleum hydrocarbons in soil and groundwater* September 2011

[a] Human Health Guideline for Lead adopted from the Human Health Risk Assessment (Ramboll 2019d)

Health Investigation Levels for chromium based on chromium (VI)

Chromium (III) EIL, based on a low clay content (% clay) of 1%

Client: John Holland Rail
Job No: 318000780
Project Name: Targo Lead Management Plan
22-06-21

Table 11:
Groundwater Monitoring Well Soil Results

	NEPM 2013 HIL D Commercial / Industrial	NEPM EIL Commercial / Industrial (site specific)	NEPM 2013 HIL C Open Space	NEPM 2013 EIL Residential / public Open Space	Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil	Soil
					Site:		Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor
					Lab Sample number:		M20-Ma43430	M20-Ma43431	M20-Ma43432	M20-Ma43433	M20-Ma43434	M20-Ma43435	M20-Ma43436
					Sample date:		18-03-20	18-03-20	18-03-20	18-03-20	18-03-20	18-03-20	18-03-20
					Sample ID:		MW01_0.5	MW01_1.5	MW01_2.5	MW01_3.5	MW01_4.5	MW2_0-0.05	MW2_1.0
					Project Name:		Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI
					Sampling Method:		Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig
Analyte grouping/Analyte					**Units**	**LOR**							
LTM-GEN-7080 Moisture													
Moisture Content (dried @ 103°C)					%	--	14	12	8.7	7.8	14	< 1	5.5
LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS													
Lead	2200[e]	1800	600	1100	mg/kg	5	13	16	15	26	24	51	**3600**

LOR = Limit of Reporting

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

Concentration in **red** font and grey box exceed the adopted HIL/HSL 'D' for Commercial/Industrial use (Applicable for MW01, MW02, MW03 and MW04)
Concentration in **orange** font and grey box exceed the adopted EIL/ESL 'D' for Commercial/Industrial use (Applicable for MW01, MW02, MW03 and MW04)
Concentration in **blue** font and grey box exceed the adopted HIL/HSL 'C' for Open Space and Recreational Land Use (Applicable for MW5, MW6 and MW7)
Concentration in **green** font and grey box exceed the adopted EIL/ESL 'C' for Residential and Open Space and Recreational Land Use (Applicable for MW5, MW6 and MW7)

Concentrations in box exceed the screening value >2.5 times

Where one or more guideline value is exceeded, the highest guideline exceeded will be highlighted

Underlined values were reported <LOR and have been halved to allow for comparison of data.

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management Plan
22-06-21

Table 11:
Groundwater Monitoring Well Soil Results

Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
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**	**Rail Corridor**
M20-Ma43437	M20-Ma43438	M20-Ma43439	M20-Ma43440	M20-Ma43441	M20-Ma43442	M20-Ma43443	M20-Ma43444	M20-Ma43445	M20-Ma43583	M20-Ma43584	M20-Ma43446	M20-Ma43447	M20-Ma43448
18-03-20	18-03-20	18-03-20	18-03-20	18-03-20	18-03-20	18-03-20	18-03-20	18-03-20	18-03-20	18-03-20	19-03-20	19-03-20	19-03-20
MW2_1.5	MW2_2.5	MW2_3.5	MW2_4.5	MW3_0.5	MW3_1.0	MW3_1.5	MW3_2.5	MW3_3.5	MW3_4.5	MW2_0.5	MW4_0-0.05	MW4_0.5	MW4_1.0
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
Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig
4.9	4.4	7	7.9	9.3	8.4	10	9.1	12	15	5.5	3.1	6.5	3.6
540	200	140	42	25	18	16	15	15	22	27	1200	390	31

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management Plan
22-06-21

Table 11:
Groundwater Monitoring Well Soil Results

Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
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**	**Rail Corridor**
M20-Ma43449	M20-Ma43450	M20-Ma43451	M20-Ma43452	M20-Ma43453	M20-Ma43454	M20-Ma43455	M20-Ma43456	M20-Ma43457	M20-Ma43458	M20-Ma43459	M20-Ma43460	M20-Ma43461	M20-Ma43462
19-03-20	19-03-20	19-03-20	19-03-20	19-03-20	19-03-20	19-03-20	19-03-20	19-03-20	19-03-20	19-03-20	19-03-20	19-03-20	19-03-20
MW4_1.5	MW4_2.5	MW4_3.5	MW4_4.5	MW5_0.05	MW5_0.5	MW5_1.0	MW5_1.5	MW5_3.5	MW5_4.5	MW6_0.05	MW6_0.5	MW6_1.0	MW6_1.5
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
Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig
8.3	14	6.6	12	5.1	8.1	3.2	4.4	6.2	5.3	14	9	2.9	6.6
19	21	30	27	120	190	13	20	22	28	57	25	21	18

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management Plan
22-06-21

Table 11:
Groundwater Monitoring Well Soil Results

Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Rail Corridor	**Rail Corridor**	**Rail Corridor**	**Rail Corridor**	**Rail Corridor**	**Rail Corridor**	**Rail Corridor**	**Rail Corridor**	**Rail Corridor**	**Rail Corridor**	**Rail Corridor**
M20-Ma43463	M20-Ma43464	M20-Ma43465	M20-Ma43585	M20-Ma43466	M20-Ma43467	M20-Ma43468	M20-Ma43469	M20-Ma43470	M20-Ma43471	M20-Ma43472
19-03-20	19-03-20	19-03-20	19-03-20	20-03-20	20-03-20	20-03-20	20-03-20	20-03-20	20-03-20	20-03-20
MW6_2.5	MW6_3.5	MW6_4.5	MW5_2.5	MW7_0.05	MW7_0.5	MW7_1.0	MW7_1.5	MW7_2.5	MW7_3.5	MW7_4.5
Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI
Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig	Drill Rig
4.1	7.5	5.8	5.5	7.6	8.9	7.2	9.9	17	13	< 1
14	19	28	21	210	43	52	18	43	44	20

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
22-06-21

Table 12:
Groundwater Monitoring Well Results

	NHMRC Australian Drinking Water Guidelines[A]	ANZECC Fresh Water Guidelines - 95% Species Protection[B]	ANZECC Fresh Water Guidelines - Irrigation[B]	ANZECC Fresh Water Guidelines - Stock Water[B]	Sample Type:		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
					Site:		Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Rail Corridor	Goulburn Street	Wallace Street	Wallace Street
					Lab Sample number:		S20-Ap16796	S20-Ap16797	S20-Ap16798	S20-Ap16799	S20-Ap16800	S20-Ma43288	S20-Ma43289	S20-Ma43290
					Sample date:		02-04-20	02-04-20	02-04-20	02-04-20	02-04-20	27-03-20	27-03-20	27-03-20
					Sample ID:		MW1	MW2	MW3	MW4	GW053976	MW05	MW06	MW07
					Project Name:		Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI	Community DSI
					Sampling Method:		Peristaltic	Peristaltic	Peristaltic	Peristaltic	Peristaltic	Peristaltic	Peristaltic	Peristaltic
Analyte grouping/Analyte					**Units**	**LOR**								
LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS														
Aluminium (filtered)	0.01	0.055	20	5	mg/L	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	--	--	--
Arsenic (filtered)	0.01	0.024	2	0.5	mg/L	0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.005	< 0.001	< 0.001	0.003
Barium (filtered)	2				mg/L	0.02	0.14	0.16	0.08	0.11	0.05	--	--	--
Beryllium (filtered)	0.06		0.5		mg/L	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Boron (filtered)	4				mg/L	0.05	--	--	--	--	--	< 0.05	< 0.05	< 0.05
Cadmium (filtered)	0.002	0.0002	0.002	0.01	mg/L	0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0002	**0.0003**	< 0.0002	< 0.0002
Chromium (filtered)	0.05	0.001	0.05	1	mg/L	0.001	< 0.001	< 0.001	< 0.001	**0.002**	< 0.001	< 0.001	< 0.001	< 0.001
Cobalt (filtered)		0.0014	0.1	1	mg/L	0.001	**0.004**	**0.006**	**0.029**	**0.006**	< 0.001	0.001	< 0.001	**0.006**
Copper (filtered)	2	0.0014	5	0.4	mg/L	0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.003**	0.001	< 0.001	< 0.001
Lead (filtered)	0.01	0.0034	5	0.1	mg/L	0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.005**	0.002	< 0.001	< 0.001
Manganese (filtered)	0.5	1.9	10		mg/L	0.005	0.77	0.6	**2**	0.71	0.02	0.085	0.026	1.4
Mercury (filtered)	0.001	0.00006	0.002	0.002	mg/L	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Nickel (filtered)	0.02	0.011	2	1	mg/L	0.001	0.003	0.003	0.003	0.004	< 0.001	0.001	< 0.001	0.002
Selenium (filtered)	0.01				mg/L	0.001	--	--	--	--	--	< 0.001	< 0.001	< 0.001
Zinc (filtered)		0.008	5	20	mg/L	0.005	**0.01**	**0.011**	**0.022**	**0.011**	**0.27**	**0.044**	0.007	< 0.005

LOR = Limit of Reporting

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

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

[A]NRMMC (2011 updated 2018) Australian Drinking Water Guidelines (ADWG) Paper 6 National Water Quality Management Strategy.
National Health and Medical Research Council.

Concentration in **green bold** font exceed the ANZG 2018 95% Species Protection

Where one or more guideline value is exceeded, the highest guideline exceeded will be highlighted

APPENDIX 3
LABORATORY REPORT FOR ADDITIONAL DELINEATION SAMPLING

eurofins | Environment Testing

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Site # 1254 & 14271

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NATA # 1261 Site # 18217

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NATA # 1261 Site # 20794

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IANZ # 1327

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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

Project Name: SOIL
Project ID: 318000780-A

Order No.:
Report #: 778274
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Mar 4, 2021 12:18 PM
Due: Mar 11, 2021
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							
Mayfield Laboratory							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	SS202	Mar 02, 2021		Soil	S21-Ma10625	X	X
2	SS203	Mar 02, 2021		Soil	S21-Ma10626	X	X
Test Counts						2	2

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

NATA Accredited
Accreditation Number 1261
Site Number 18217

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

Attention: **Stephen Maxwell**

Report **778274-S**
Project name SOIL
Project ID 318000780-A
Received Date Mar 04, 2021

Client Sample ID			**SS202**	**SS203**
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**S21-Ma10625**	**S21-Ma10626**
Date Sampled			**Mar 02, 2021**	**Mar 02, 2021**
Test/Reference	LOR	Unit		
Heavy Metals				
Lead	5	mg/kg	350	28
% Moisture	1	%	5.9	< 1

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	Mar 07, 2021	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Mar 04, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			

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: SOIL
Project ID: 318000780-A

Order No.:
Report #: 778274
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Mar 4, 2021 12:18 PM
Due: Mar 11, 2021
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							
Mayfield Laboratory							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	SS202	Mar 02, 2021		Soil	S21-Ma10625	X	X
2	SS203	Mar 02, 2021		Soil	S21-Ma10626	X	X
Test Counts						2	2

eurofins | 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	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Lead			mg/kg	< 5			5	Pass	
LCS - % Recovery									
Heavy Metals									
Lead			%	102			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	S21-Ma07313	NCP	%	105			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	S21-Ma10593	NCP	%	15	14	9.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S21-Ma10626	CP	mg/kg	28	37	29	30%	Pass	

Comments

Sample Integrity

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

Authorised by:

Andrew Black	Analytical Services Manager
John Nguyen	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 4
PSD ANALYSES OF WOODLAWN SIDING BALLAST

SESL AUSTRALIA
Environment & Soil Sciences

Particle Size Distribution

- Australian Standard sieves

Sample Drop Off: 16 Chilvers Road, Thornleigh NSW 2120
Mailing Address: PO Box 357, Pennant Hills NSW 1715
Tel: 1300 30 40 80
Fax: 1300 64 46 89
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 59642	Sample N°: 1	Date Received: 10/3/21	Report Status: Final

Client Name:	**Eurofins Environment Testing Australia Pty Ltd - VIC**	Project Name:	**Ref: 778817**
		SESL Quote N°:	
Client Contact:	**Harry Bacalis**	Sample Name:	**BAL_01 / 21-Ma15043**
Client Order N°:	**21-434-1176-778817**	Description:	**Soil**
Address:	6 Monterey Road Dandenong South **VIC 3175**	Test Type:	**SIEVE_AS_Dry**

SUMMARY

Analysed by SESL Australia Pty Ltd, NATA # 15633.

Results only requested.

Recommendations by SESL Australia not requested.

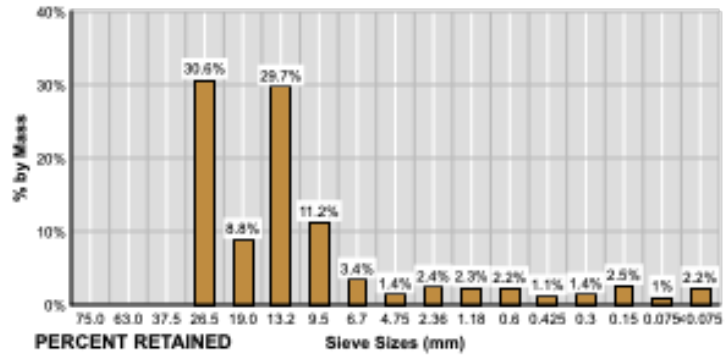
D VALUES

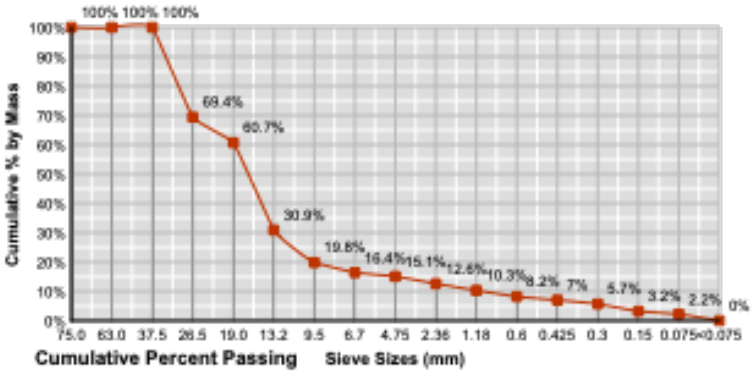
D_{95}:	35.7
D_{90}:	33.9
D_{85}:	32.1
D_{60}:	18.9
D_{50}:	16.9
D_{15}:	4.7
D_{10}:	1.09
D_5:	0.259

PERFORMANCE FACTORS

Gradation Index (D_{90}/D_{10}):	31.00
Coefficient of Uniformity: (D_{60}/D_{10})	17.00

PARTICLE SIZE DISTRIBUTION GRAPH





PARTICLE SIZE ANALYSIS

Sieve (mm)	Fraction	% Retained by mass	% Passing by mass
75.0	Cobbles	0	100
63.0	Very Coarse Gravel	0	100
37.5	Coarse Gravel	0	100
26.5	Coarse Gravel	30.57	69.43
19.0	Medium Gravel	8.77	60.65
13.2	Medium Gravel	29.71	30.94
9.5	Medium Gravel	11.15	19.79
6.7	Fine Gravel	3.35	16.43
4.75	Fine Gravel	1.38	15.05
2.36	Fine Gravel	2.44	12.61
1.18	Very Coarse Sand	2.29	10.32
0.6	Medium Sand	2.16	8.16
0.425	Medium Sand	1.13	7.03
0.3	Medium Sand	1.35	5.68
0.15	Fine Sand	2.47	3.21
0.075	Fine Sand	1.04	2.17
<0.075	Fine Particles	2.17	N/A

Consultant: Neena Goundar

Authorised Signatory: Simon Leake

Date Report Generated 17/03/2021

Method Reference: SESL PM 0001 : Particle Size Analysis

SESL AUSTRALIA
Environment & Soil Sciences

Particle Size Distribution

- Australian Standard sieves

Sample Drop Off: 16 Chilvers Road, Thornleigh NSW 2120
Mailing Address: PO Box 357, Pennant Hills NSW 1715
Tel: 1300 30 40 80
Fax: 1300 64 46 89
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 59642	Sample N°: 2	Date Received: 10/3/21	Report Status: Final

Client Name:	**Eurofins Environment Testing Australia Pty Ltd - VIC**	Project Name:	**Ref: 778817**
		SESL Quote N°:	
Client Contact:	**Harry Bacalis**	Sample Name:	**BAL_02 / 21-Ma15044**
Client Order N°:	**21-434-1176-778817**	Description:	**Soil**
Address:	6 Monterey Road Dandenong South **VIC 3175**	Test Type:	**SIEVE_AS_Dry**

SUMMARY

Analysed by SESL Australia Pty Ltd, NATA # 15633.

Results only requested.

Recommendations by SESL Australia not requested.

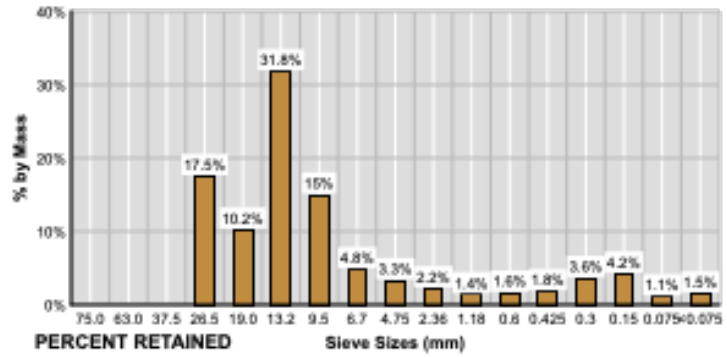
D VALUES

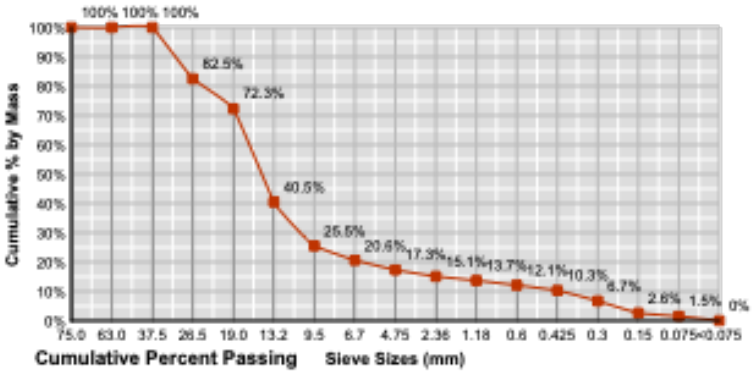
D_{95}:	34.4
D_{90}:	31.2
D_{85}:	28.1
D_{60}:	16.8
D_{50}:	14.9
D_{15}:	2.25
D_{10}:	0.415
D_5:	0.238

PERFORMANCE FACTORS

Gradation Index (D_{90}/D_{10}):	75.00
Coefficient of Uniformity: (D_{60}/D_{10})	40.00

PARTICLE SIZE DISTRIBUTION GRAPH





PARTICLE SIZE ANALYSIS

Sieve (mm)	Fraction	% Retained by mass	% Passing by mass
75.0	Cobbles	0	100
63.0	Very Coarse Gravel	0	100
37.5	Coarse Gravel	0	100
26.5	Coarse Gravel	17.54	82.46
19.0	Medium Gravel	10.2	72.26
13.2	Medium Gravel	31.78	40.48
9.5	Medium Gravel	15.03	25.45
6.7	Fine Gravel	4.84	20.61
4.75	Fine Gravel	3.3	17.31
2.36	Fine Gravel	2.18	15.13
1.18	Very Coarse Sand	1.4	13.73
0.6	Medium Sand	1.63	12.1
0.425	Medium Sand	1.83	10.28
0.3	Medium Sand	3.56	6.72
0.15	Fine Sand	4.16	2.56
0.075	Fine Sand	1.07	1.48
<0.075	Fine Particles	1.48	N/A

Consultant: Neena Goundar

Authorised Signatory: Simon Leake

Date Report Generated 17/03/2021

Method Reference: SESL PM 0001 : Particle Size Analysis

SESL AUSTRALIA
Environment & Soil Sciences

Particle Size Distribution

- Australian Standard sieves

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120
Tel: 1300 30 40 80
Fax: 1300 64 46 89

Mailing Address: PO Box 357
Pennant Hills NSW 1715
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 59642	**Sample N°: 3**	**Date Received: 10/3/21**	**Report Status: Final**

Client Name: **Eurofins Environment Testing Australia Pty Ltd - VIC**
Client Contact: **Harry Bacalis**
Client Order N°: **21-434-1176-778817**
Address: 6 Monterey Road Dandenong South **VIC 3175**

Project Name: **Ref: 778817**
SESL Quote N°:
Sample Name: **BAL_03 / 21-Ma15045**
Description: **Soil**
Test Type: **SIEVE_AS_Dry**

SUMMARY

Analysed by SESL Australia Pty Ltd, NATA # 15633.

Results only requested.

Recommendations by SESL Australia not requested.

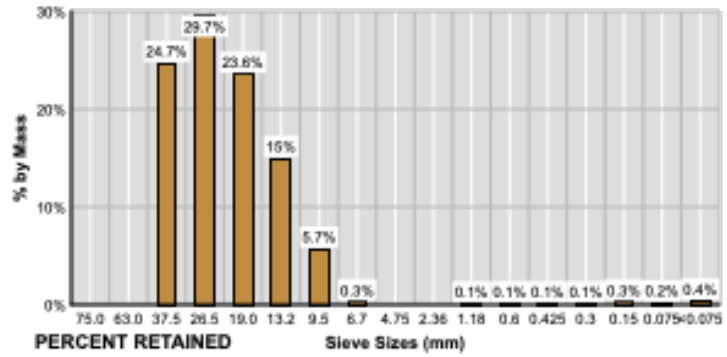
D VALUES

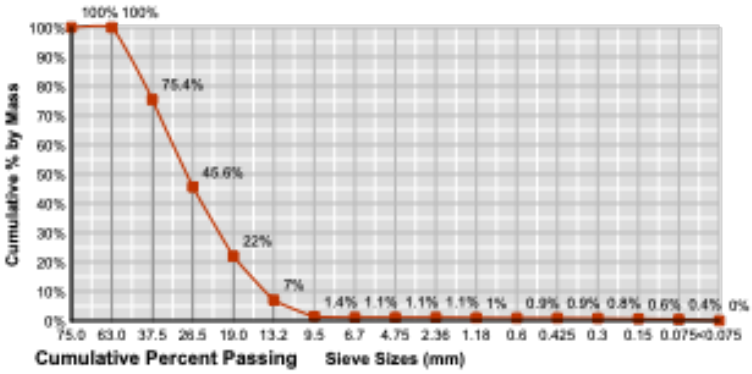
D_{95}:	57.8
D_{90}:	52.7
D_{85}:	47.5
D_{60}:	31.8
D_{50}:	28.1
D_{15}:	16.3
D_{10}:	14.4
D_5:	11.9

PERFORMANCE FACTORS

Gradation Index (D_{90}/D_{10}):	3.70
Coefficient of Uniformity: (D_{60}/D_{10})	2.20

PARTICLE SIZE DISTRIBUTION GRAPH





PARTICLE SIZE ANALYSIS

Sieve (mm)	Fraction	% Retained by mass	% Passing by mass
75.0	Cobbles	0	100
63.0	Very Coarse Gravel	0	100
37.5	Coarse Gravel	24.65	75.35
26.5	Coarse Gravel	29.74	45.62
19.0	Medium Gravel	23.61	22.01
13.2	Medium Gravel	14.99	7.02
9.5	Medium Gravel	5.65	1.36
6.7	Fine Gravel	0.25	1.11
4.75	Fine Gravel	0.03	1.09
2.36	Fine Gravel	0.02	1.07
1.18	Very Coarse Sand	0.07	1
0.6	Medium Sand	0.06	0.94
0.425	Medium Sand	0.05	0.89
0.3	Medium Sand	0.08	0.81
0.15	Fine Sand	0.26	0.55
0.075	Fine Sand	0.16	0.39
<0.075	Fine Particles	0.39	N/A

Consultant:
Neena Goundar

Authorised Signatory:
Simon Leake

Date Report Generated
17/03/2021

Method Reference: SESL PM 0001 : Particle Size Analysis

SESL AUSTRALIA
Environment & Soil Sciences

Particle Size Distribution

- Australian Standard sieves

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120
Tel: 1300 30 40 80
Fax: 1300 64 46 89

Mailing Address: PO Box 357
Pennant Hills NSW 1715
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 59642	**Sample N°: 4**	**Date Received: 10/3/21**	**Report Status: Final**

Client Name: **Eurofins Environment Testing Australia Pty Ltd - VIC**
Client Contact: **Harry Bacalis**
Client Order N°: **21-434-1176-778817**
Address: 6 Monterey Road Dandenong South **VIC 3175**

Project Name: **Ref: 778817**
SESL Quote N°:
Sample Name: **BAL_04 / 21-Ma15046**
Description: **Soil**
Test Type: **SIEVE_AS_Dry**

SUMMARY

Analysed by SESL Australia Pty Ltd, NATA # 15633.

Results only requested.

Recommendations by SESL Australia not requested.

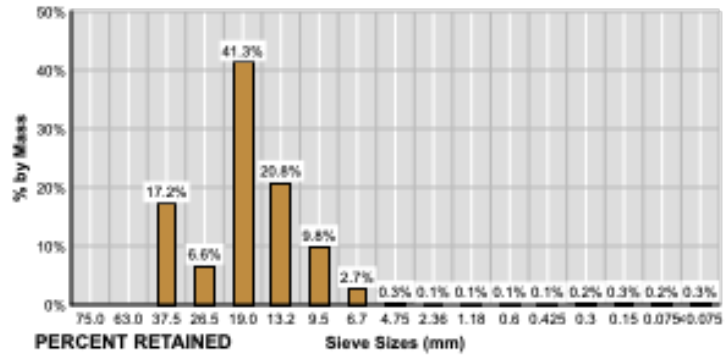
D VALUES

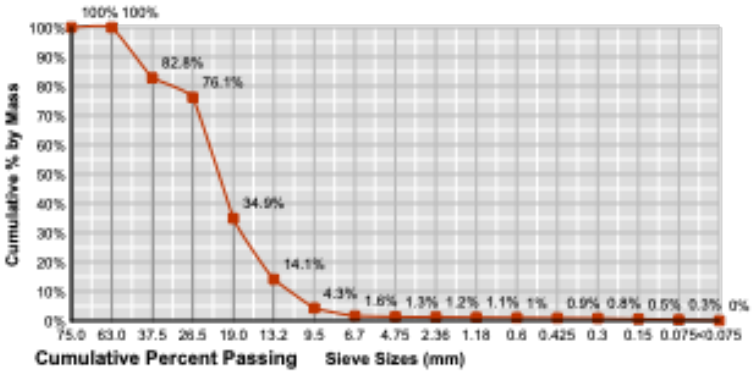
D_{95}:	55.6
D_{90}:	48.2
D_{85}:	40.8
D_{60}:	23.6
D_{50}:	21.8
D_{15}:	13.5
D_{10}:	11.7
D_5:	9.78

PERFORMANCE FACTORS

Gradation Index (D_{90}/D_{10}):	4.10
Coefficient of Uniformity: (D_{60}/D_{10})	2.00

PARTICLE SIZE DISTRIBUTION GRAPH





PARTICLE SIZE ANALYSIS

Sieve (mm)	Fraction	% Retained by mass	% Passing by mass
75.0	Cobbles	0	100
63.0	Very Coarse Gravel	0	100
37.5	Coarse Gravel	17.23	82.77
26.5	Coarse Gravel	6.64	76.13
19.0	Medium Gravel	41.27	34.86
13.2	Medium Gravel	20.81	14.05
9.5	Medium Gravel	9.78	4.27
6.7	Fine Gravel	2.69	1.58
4.75	Fine Gravel	0.28	1.29
2.36	Fine Gravel	0.1	1.19
1.18	Very Coarse Sand	0.12	1.07
0.6	Medium Sand	0.09	0.98
0.425	Medium Sand	0.07	0.9
0.3	Medium Sand	0.15	0.75
0.15	Fine Sand	0.26	0.49
0.075	Fine Sand	0.15	0.34
<0.075	Fine Particles	0.34	N/A

Consultant: Neena Goundar

Authorised Signatory: Simon Leake

Date Report Generated 17/03/2021

Method Reference: SESL PM 0001 : Particle Size Analysis

SESL AUSTRALIA
Environment & Soil Sciences

Particle Size Distribution

- Australian Standard sieves

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120
Tel: 1300 30 40 80
Fax: 1300 64 46 89

Mailing Address: PO Box 357
Pennant Hills NSW 1715
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 59642	**Sample N°: 5**	**Date Received: 10/3/21**	**Report Status: Final**

Client Name: **Eurofins Environment Testing Australia Pty Ltd - VIC**
Client Contact: **Harry Bacalis**
Client Order N°: **21-434-1176-778817**
Address: 6 Monterey Road Dandenong South **VIC 3175**

Project Name: **Ref: 778817**
SESL Quote N°:
Sample Name: **BAL_05 / 21-Ma15047**
Description: **Soil**
Test Type: **SIEVE_AS_Dry**

SUMMARY

Analysed by SESL Australia Pty Ltd, NATA # 15633.

Results only requested.

Recommendations by SESL Australia not requested.

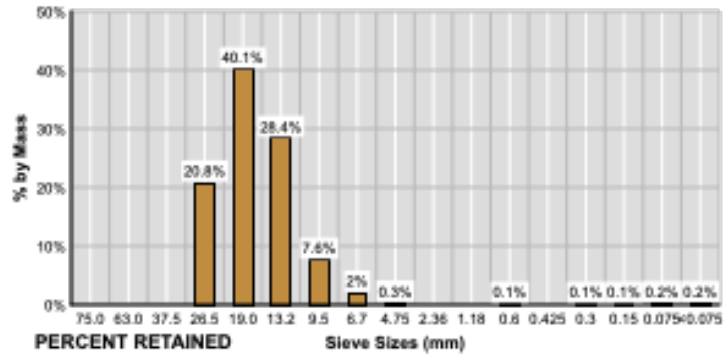
D VALUES

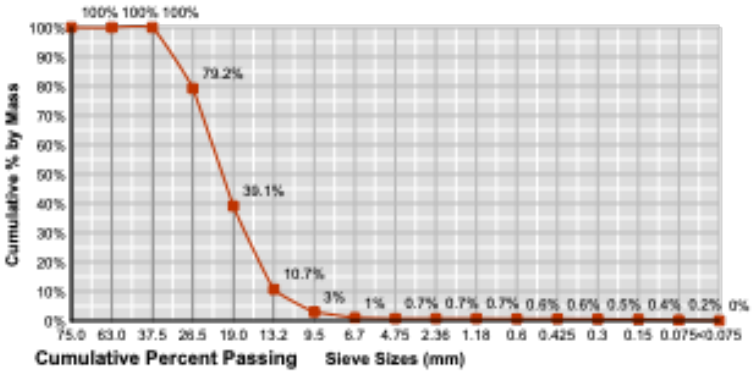
D_{95}:	34.9
D_{90}:	32.2
D_{85}:	29.6
D_{60}:	22.9
D_{50}:	21
D_{15}:	14.1
D_{10}:	12.9
D_5:	10.5

PERFORMANCE FACTORS

Gradation Index (D_{90}/D_{10}):	2.50
Coefficient of Uniformity: (D_{60}/D_{10})	1.80

PARTICLE SIZE DISTRIBUTION GRAPH





PARTICLE SIZE ANALYSIS

Sieve (mm)	Fraction	% Retained by mass	% Passing by mass
75.0	Cobbles	0	100
63.0	Very Coarse Gravel	0	100
37.5	Coarse Gravel	0	100
26.5	Coarse Gravel	20.81	79.19
19.0	Medium Gravel	40.08	39.11
13.2	Medium Gravel	28.43	10.68
9.5	Medium Gravel	7.64	3.03
6.7	Fine Gravel	2.01	1.02
4.75	Fine Gravel	0.32	0.7
2.36	Fine Gravel	0	0.7
1.18	Very Coarse Sand	0.04	0.65
0.6	Medium Sand	0.05	0.6
0.425	Medium Sand	0.03	0.57
0.3	Medium Sand	0.05	0.52
0.15	Fine Sand	0.13	0.39
0.075	Fine Sand	0.15	0.24
<0.075	Fine Particles	0.24	N/A

Consultant:
Neena Goundar

Authorised Signatory:
Simon Leake

Date Report Generated
17/03/2021

Method Reference: SESL PM 0001 : Particle Size Analysis

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

Attention: **Stephen Maxwell**

Report **778817-S**
Project name TARAGO BALLAST SAMPLING
Project ID 31800780
Received Date Mar 05, 2021

Client Sample ID			**BAL_01**	**BAL_02**	**BAL_03**	**BAL_04**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S21-Ma15043**	**S21-Ma15044**	**S21-Ma15045**	**S21-Ma15046**
Date Sampled			**Mar 02, 2021**	**Mar 02, 2021**	**Mar 02, 2021**	**Mar 02, 2021**
Test/Reference	LOR	Unit				
Particle Size Distribution by Sieve and Hydrometer			See attached	See attached	See attached	See attached

Client Sample ID			**BAL_05**
Sample Matrix			**Soil**
Eurofins Sample No.			**S21-Ma15047**
Date Sampled			**Mar 02, 2021**
Test/Reference	LOR	Unit	
Particle Size Distribution by Sieve and Hydrometer			See attached

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

eurofins | Environment Testing

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

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
4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
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

Project Name: TARAGO BALLAST SAMPLING
Project ID: 31800780

Order No.: 31800780
Report #: 778817
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Mar 5, 2021 1:35 PM
Due: Mar 12, 2021
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Particle Size Distribution by Sieve and Hydrometer
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						
Mayfield Laboratory						
External Laboratory						X
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	BAL_01	Mar 02, 2021		Soil	S21-Ma15043	X
2	BAL_02	Mar 02, 2021		Soil	S21-Ma15044	X
3	BAL_03	Mar 02, 2021		Soil	S21-Ma15045	X
4	BAL_04	Mar 02, 2021		Soil	S21-Ma15046	X
5	BAL_05	Mar 02, 2021		Soil	S21-Ma15047	X
Test Counts						5

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.

Comments

Particle Size Distribution analysed by SESL, report reference 59642.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	N/A
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	Yes

Authorised by:

Ursula Long — Analytical Services Manager

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 5
ADDITIONAL LABORATORY ANALYSES: LEAD CONCENTRATION BY PARTICLE SIZE, CADMIUM AND CADMIUM LEACHATE

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Rail Corridor RAP
06-05-21

Table A5:
Lead in Woodlawn Siding Ballast (excluding fines)

	HHRA (Ramboll 2019d)		**Sample Type:**		**Soil**	**Soil**	**Soil**	**Soil**	**Soil**
			Lab Sample number:		S21-Fe16479	S21-Fe16480	S21-Fe16481	S21-Fe16482	S21-Fe16483
			Sample date:		16-09-19	16-09-19	16-09-19	16-09-19	16-09-19
			Sample ID:		TP3A_BALA	TP3A_BALB	TP3A_BALC	TP5A_BALA	TP5A_BALB
			Site:		Woodawn Siding	Woodawn Siding	Woodawn Siding	Woodawn Siding	Woodawn Siding
			Sampling Method:		Shovel	Shovel	Shovel	Shovel	Shovel
Analyte grouping/Analyte			**Units**	**LOR**					
EG005T: Total Metals by ICP-AES									
Lead	2,200		mg/kg	5	550	**2,800**	2,100	560	420

Blank Cell indicates no criterion available

LOR = Limit of Reporting

Concentration in **red** font and grey box exceed the adopted Human Health Guideline for Commercial/Industrial (Ramboll 2019d)

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Rail Corridor RAP
06-05-21

Table A5:
Lead in Woodlawn Siding Ballast (excluding fines)

	HHRA (Ramboll 2019d)		**Sample Type:**		**Soil**	**Soil**	**Soil**	**Soil**	**Soil**
			Lab Sample number:		S21-Fe16484	S21-Fe16485	S21-Fe16486	S21-Ma53832	S21-Ma53833
			Sample date:		16-09-19	16-09-19	16-09-19	02-03-21	02-03-21
			Sample ID:		TP5A_BALC	TP6A_BALA	TP6A_BALB	BAL_01 >26.5MM - 1	BAL_01 >26.5MM - 2
			Site:		Woodawn Siding	Woodawn Siding	Woodawn Siding	Woodawn Siding	Woodawn Siding
			Sampling Method:		Shovel	Shovel	Shovel	Shovel	Shovel
Analyte grouping/Analyte			**Units**	**LOR**					
EG005T: Total Metals by ICP-AES									
Lead	2,200		mg/kg	5	390	1,100	360	620	130

Blank Cell indicates no criterion available

LOR = Limit of Reporting

Concentration in **red** font and grey box exceed the adopted Human Health Guideline for Commercial/Industrial (Ramboll 2019d)

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Rail Corridor RAP
06-05-21

Table A5:
Lead in Woodlawn Siding Ballast (excluding fines)

	HHRA (Ramboll 2019d)		**Sample Type:**		**Soil**	**Soil**	**Soil**	**Soil**	**Soil**
			Lab Sample number:		S21-Ma53834	S21-Ma53835	S21-Ma53838	S21-Ma53839	S21-Ma53842
			Sample date:		02-03-21	02-03-21	02-03-21	02-03-21	02-03-21
			Sample ID:		BAL_02 >26.5MM - 1	BAL_02 >26.5MM - 2	BAL_03 >26.5MM - 1	BAL_03 >26.5MM - 2	BAL_04 >26.5MM - 1
			Site:		Woodawn Siding	Woodawn Siding	Woodawn Siding	Woodawn Siding	Woodawn Siding
			Sampling Method:		Shovel	Shovel	Shovel	Shovel	Shovel
Analyte grouping/Analyte			**Units**	**LOR**					
EG005T: Total Metals by ICP-AES									
Lead	2,200		mg/kg	5	18	42	250	100	150

Blank Cell indicates no criterion available

LOR = Limit of Reporting

Concentration in **red** font and grey box exceed the adopted Human Health Guideline for Commercial/Industrial (Ramboll 2019d)

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Rail Corridor RAP
06-05-21

Table A5:
Lead in Woodlawn Siding Ballast (excluding fines)

	HHRA (Ramboll 2019d)		**Sample Type:**		**Soil**	**Soil**	**Soil**
			Lab Sample number:		S21-Ma53843	S21-Ma53844	S21-Ma53845
			Sample date:		02-03-21	02-03-21	02-03-21
			Sample ID:		BAL_04 >26.5MM - 2	BAL_05 >26.5MM - 1	BAL_05 >26.5MM - 2
			Site:		Woodawn Siding	Woodawn Siding	Woodawn Siding
			Sampling Method:		Shovel	Shovel	Shovel
Analyte grouping/Analyte			**Units**	**LOR**			
EG005T: Total Metals by ICP-AES							
Lead	2,200		mg/kg	5	210	13	22

Blank Cell indicates no criterion available

LOR = Limit of Reporting

Concentration in **red** font and grey box exceed the adopted Human Health Guideline for Commercial/Industrial (Ramboll 2019d)

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.104-May-21 10:21:34 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Lead in Woodlawn Siding Ballast

General Statistics

Total Number of Observations	18	Number of Distinct Observations	18
		Number of Missing Observations	0
Minimum	13	Mean	546.4
Maximum	2800	Median	305
SD	755.5	Std. Error of Mean	178.1
Coefficient of Variation	1.383	Skewness	2.224

Normal GOF Test

Shapiro Wilk Test Statistic	0.69	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.897	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.295	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.202	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	856.2	95% Adjusted-CLT UCL (Chen-1995)	939
		95% Modified-t UCL (Johnson-1978)	871.7

Gamma GOF Test

A-D Test Statistic	0.292	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.785	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.137	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.213	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.672	k star (bias corrected MLE)	0.597
Theta hat (MLE)	812.8	Theta star (bias corrected MLE)	914.8
nu hat (MLE)	24.2	nu star (bias corrected)	21.5
MLE Mean (bias corrected)	546.4	MLE Sd (bias corrected)	707
		Approximate Chi Square Value (0.05)	11.97
Adjusted Level of Significance	0.0357	Adjusted Chi Square Value	11.29

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	981.9	95% Adjusted Gamma UCL (use when n<50)	1041

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.897	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.123	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.202	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.565	Mean of logged Data	5.399
Maximum of Logged Data	7.937	SD of logged Data	1.559

Assuming Lognormal Distribution

95% H-UCL	2835	90% Chebyshev (MVUE) UCL	1510
95% Chebyshev (MVUE) UCL	1897	97.5% Chebyshev (MVUE) UCL	2434
99% Chebyshev (MVUE) UCL	3488		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	839.3	95% Jackknife UCL	856.2
95% Standard Bootstrap UCL	822.1	95% Bootstrap-t UCL	1290
95% Hall's Bootstrap UCL	2256	95% Percentile Bootstrap UCL	830.8
95% BCA Bootstrap UCL	944.3		
90% Chebyshev(Mean, Sd) UCL	1081	95% Chebyshev(Mean, Sd) UCL	1323
97.5% Chebyshev(Mean, Sd) UCL	1658	99% Chebyshev(Mean, Sd) UCL	2318

Suggested UCL to Use

95% Adjusted Gamma UCL	1041		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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

Attention: **Stephen Maxwell**

Report **772644-S**
Project name LEAD TRIAL
Project ID 318000780
Received Date Feb 08, 2021

Client Sample ID			**TP3A_BALA**	**TP3A_BALB**	**TP3A_BALC**	**TP5A_BALA**
Sample Matrix			**Rock**	**Rock**	**Rock**	**Rock**
Eurofins Sample No.			**S21-Fe16479**	**S21-Fe16480**	**S21-Fe16481**	**S21-Fe16482**
Date Sampled			**Feb 08, 2021**	**Feb 08, 2021**	**Feb 08, 2021**	**Feb 08, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	550	2800	2100	560
% Moisture	1	%	< 1	< 1	< 1	1.1

Client Sample ID			**TP5A_BALB**	**TP5A_BALC**	**TP6A_BALA**	**TP6A_BALB**
Sample Matrix			**Rock**	**Rock**	**Rock**	**Rock**
Eurofins Sample No.			**S21-Fe16483**	**S21-Fe16484**	**S21-Fe16485**	**S21-Fe16486**
Date Sampled			**Feb 08, 2021**	**Feb 08, 2021**	**Feb 08, 2021**	**Feb 08, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	420	390	1100	360
% Moisture	1	%	1.2	1.2	1.2	< 1

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	Feb 18, 2021	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Feb 09, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			

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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

Project Name: LEAD TRIAL
Project ID: 318000780

Order No.:
Report #: 772644
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Feb 8, 2021 2:15 PM
Due: Feb 15, 2021
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						HOLD	Lead	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						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	TP3A_BALA	Feb 08, 2021		Rock	S21-Fe16479		X	X
2	TP3A_BALB	Feb 08, 2021		Rock	S21-Fe16480		X	X
3	TP3A_BALC	Feb 08, 2021		Rock	S21-Fe16481		X	X
4	TP5A_BALA	Feb 08, 2021		Rock	S21-Fe16482		X	X
5	TP5A_BALB	Feb 08, 2021		Rock	S21-Fe16483		X	X
6	TP5A_BALC	Feb 08, 2021		Rock	S21-Fe16484		X	X
7	TP6A_BALA	Feb 08, 2021		Rock	S21-Fe16485		X	X
8	TP6A_BALB	Feb 08, 2021		Rock	S21-Fe16486		X	X
9	TP6A_BALC	Feb 08, 2021		Rock	S21-Fe16487	X		

eurofins | Environment Testing

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

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Rolleston, Christchurch 7675
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Company Name: Ramboll Australia Pty Ltd
Address: Level 3/100 Pacific Highway
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NSW 2060

Project Name: LEAD TRIAL
Project ID: 318000780

Order No.:
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Phone: 02 9954 8118
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Received: Feb 8, 2021 2:15 PM
Due: Feb 15, 2021
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail	HOLD	Lead	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271			
Sydney Laboratory - NATA Site # 18217	X	X	X
Brisbane Laboratory - NATA Site # 20794			
Perth Laboratory - NATA Site # 23736			
Mayfield Laboratory			
External Laboratory			
Test Counts	2	8	8

Internal Quality Control Review and Glossary

General

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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	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Lead			mg/kg	< 5			5	Pass	
LCS - % Recovery									
Heavy Metals									
Lead			%	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					
Lead	S21-Fe35255	NCP	%	97			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	S21-Fe31701	NCP	mg/kg	23	20	15	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S21-Fe16479	CP	%	< 1	< 1	<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
John Nguyen	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.

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 **778274-S**
Project name SOIL
Project ID 318000780-A
Received Date Mar 04, 2021

Client Sample ID			**SS202**	**SS203**
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**S21-Ma10625**	**S21-Ma10626**
Date Sampled			**Mar 02, 2021**	**Mar 02, 2021**
Test/Reference	LOR	Unit		
Heavy Metals				
Lead	5	mg/kg	350	28
% Moisture	1	%	5.9	< 1

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	Mar 07, 2021	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Mar 04, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			

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IANZ # 1290

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

Project Name: SOIL
Project ID: 318000780-A

Order No.:
Report #: 778274
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Mar 4, 2021 12:18 PM
Due: Mar 11, 2021
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							
Mayfield Laboratory							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	SS202	Mar 02, 2021		Soil	S21-Ma10625	X	X
2	SS203	Mar 02, 2021		Soil	S21-Ma10626	X	X
Test Counts						2	2

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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
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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	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Lead			mg/kg	< 5			5	Pass	
LCS - % Recovery									
Heavy Metals									
Lead			%	102			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	S21-Ma07313	NCP	%	105			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	S21-Ma10593	NCP	%	15	14	9.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S21-Ma10626	CP	mg/kg	28	37	29	30%	Pass	

Comments

Sample Integrity

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

Authorised by:

Andrew Black	Analytical Services Manager
John Nguyen	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.

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

Attention: **Stephen Maxwell**

Report **783811-L-V2**
Project name ADDITIONAL - TARAGO BALLAST SAMPLING
Project ID 31800780
Received Date Mar 29, 2021

Client Sample ID			**BAL_01 >26.5MM - 1**	**BAL_01 >26.5MM - 2**	**BAL_02 >26.5MM - 1**	**BAL_02 >26.5MM - 2**
Sample Matrix			**US Leachate**	**US Leachate**	**US Leachate**	**US Leachate**
Eurofins Sample No.			**S21-Ma53846**	**S21-Ma53847**	**S21-Ma53848**	**S21-Ma53849**
Date Sampled			**Mar 02, 2021**	**Mar 02, 2021**	**Mar 02, 2021**	**Mar 02, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.01	mg/L	0.68	1.4	0.36	0.45
USA Leaching Procedure						
Leachate Fluid[C01]		comment	1.0	1.0	1.0	1.0
pH (initial)	0.1	pH Units	4.5	4.6	5.2	5.3
pH (off)	0.1	pH Units	5.1	5.1	5.2	5.1
pH (USA HCl addition)	0.1	pH Units	1.7	1.7	1.7	1.7

Client Sample ID			**BAL_03 >26.5MM - 1**	**BAL_03 >26.5MM - 2**	**BAL_04 >26.5MM - 1**	**BAL_04 >26.5MM - 2**
Sample Matrix			**US Leachate**	**US Leachate**	**US Leachate**	**US Leachate**
Eurofins Sample No.			**S21-Ma53852**	**S21-Ma53853**	**S21-Ma53856**	**S21-Ma53857**
Date Sampled			**Mar 02, 2021**	**Mar 02, 2021**	**Mar 02, 2021**	**Mar 02, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.01	mg/L	4.7	2.6	2.6	1.8
USA Leaching Procedure						
Leachate Fluid[C01]		comment	1.0	1.0	1.0	1.0
pH (initial)	0.1	pH Units	5.3	5.1	5.2	5.2
pH (off)	0.1	pH Units	5.2	5.2	5.1	5.2
pH (USA HCl addition)	0.1	pH Units	1.7	1.6	1.7	1.6

Client Sample ID			**BAL_05 >26.5MM - 1**	**BAL_05 >26.5MM - 2**
Sample Matrix			**US Leachate**	**US Leachate**
Eurofins Sample No.			**S21-Ma53858**	**S21-Ma53859**
Date Sampled			**Mar 02, 2021**	**Mar 02, 2021**
Test/Reference	LOR	Unit		
Heavy Metals				
Lead	0.01	mg/L	0.17	0.20
USA Leaching Procedure				
Leachate Fluid[C01]		comment	1.0	1.0
pH (initial)	0.1	pH Units	5.6	5.5
pH (off)	0.1	pH Units	5.2	5.1
pH (USA HCl addition)	0.1	pH Units	1.7	1.7

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Sydney	Apr 01, 2021	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
USA Leaching Procedure	Sydney	Mar 31, 2021	14 Days
- Method: LTM-GEN-7010 Leaching Procedure for Soils & Solid Wastes			

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Company Name:	Ramboll Australia Pty Ltd	**Order No.:**	
Address:	Level 3/100 Pacific Highway North Sydney NSW 2060	**Report #:**	783811
		Phone:	02 9954 8118
		Fax:	02 9954 8150
Project Name:	ADDITIONAL - TARAGO BALLAST SAMPLING		
Project ID:	31800780		

Received:	Mar 29, 2021 1:38 PM
Due:	Apr 1, 2021
Priority:	3 Day
Contact Name:	Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						CANCELLED	Lead	USA Leaching Procedure	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217						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	BAL_01 >26.5MM - 1	Mar 02, 2021		Soil	S21-Ma53832		X		X
2	BAL_01 >26.5MM - 2	Mar 02, 2021		Soil	S21-Ma53833		X		X
3	BAL_02 >26.5MM - 1	Mar 02, 2021		Soil	S21-Ma53834		X		X
4	BAL_02 >26.5MM - 2	Mar 02, 2021		Soil	S21-Ma53835		X		X
5	BAL_03 >37.5MM - 1	Mar 02, 2021		Soil	S21-Ma53836	X			
6	BAL_03	Mar 02, 2021		Soil	S21-Ma53837	X			

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Company Name: Ramboll Australia Pty Ltd
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Project Name: ADDITIONAL - TARAGO BALLAST SAMPLING
Project ID: 31800780

Order No.:
Report #: 783811
Phone: 02 9954 8118
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Received: Mar 29, 2021 1:38 PM
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Contact Name: Stephen Maxwell

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Sample Detail						CANCELLED	Lead	USA Leaching Procedure	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217						X	X	X	X
Brisbane Laboratory - NATA Site # 20794									
Perth Laboratory - NATA Site # 23736									
Mayfield Laboratory									
External Laboratory									
	>37.5MM - 2								
7	BAL_03 >26.5MM - 1	Mar 02, 2021		Soil	S21-Ma53838		X		X
8	BAL_03 >26.5MM - 2	Mar 02, 2021		Soil	S21-Ma53839		X		X
9	BAL_04 >37.5MM - 1	Mar 02, 2021		Soil	S21-Ma53840	X			
10	BAL_04 >37.5MM - 2	Mar 02, 2021		Soil	S21-Ma53841	X			
11	BAL_04 >26.5MM - 1	Mar 02, 2021		Soil	S21-Ma53842		X		X
12	BAL_04 >26.5MM - 2	Mar 02, 2021		Soil	S21-Ma53843		X		X

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Sydney Laboratory - NATA Site # 18217						X	X	X	X
Brisbane Laboratory - NATA Site # 20794									
Perth Laboratory - NATA Site # 23736									
Mayfield Laboratory									
External Laboratory									
13	BAL_05 >26.5MM - 1	Mar 02, 2021		Soil	S21-Ma53844		X		X
14	BAL_05 >26.5MM - 2	Mar 02, 2021		Soil	S21-Ma53845		X		X
15	BAL_01 >26.5MM - 1	Mar 02, 2021		US Leachate	S21-Ma53846		X	X	
16	BAL_01 >26.5MM - 2	Mar 02, 2021		US Leachate	S21-Ma53847		X	X	
17	BAL_02 >26.5MM - 1	Mar 02, 2021		US Leachate	S21-Ma53848		X	X	
18	BAL_02 >26.5MM - 2	Mar 02, 2021		US Leachate	S21-Ma53849		X	X	
19	BAL_03	Mar 02, 2021		US Leachate	S21-Ma53850	X			

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

Project Name: ADDITIONAL - TARAGO BALLAST SAMPLING
Project ID: 31800780

Order No.:
Report #: 783811
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Mar 29, 2021 1:38 PM
Due: Apr 1, 2021
Priority: 3 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						CANCELLED	Lead	USA Leaching Procedure	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217						X	X	X	X
Brisbane Laboratory - NATA Site # 20794									
Perth Laboratory - NATA Site # 23736									
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External Laboratory									
	>37.5MM - 1								
20	BAL_03 >37.5MM - 2	Mar 02, 2021		US Leachate	S21-Ma53851	X			
21	BAL_03 >26.5MM - 1	Mar 02, 2021		US Leachate	S21-Ma53852		X	X	
22	BAL_03 >26.5MM - 2	Mar 02, 2021		US Leachate	S21-Ma53853		X	X	
23	BAL_04 >37.5MM - 1	Mar 02, 2021		US Leachate	S21-Ma53854	X			
24	BAL_04 >37.5MM - 2	Mar 02, 2021		US Leachate	S21-Ma53855	X			
25	BAL_04 >26.5MM - 1	Mar 02, 2021		US Leachate	S21-Ma53856		X	X	

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Mayfield Laboratory									
External Laboratory									
26	BAL_04 >26.5MM - 2	Mar 02, 2021		US Leachate	S21-Ma53857		X	X	
27	BAL_05 >26.5MM - 1	Mar 02, 2021		US Leachate	S21-Ma53858		X	X	
28	BAL_05 >26.5MM - 2	Mar 02, 2021		US Leachate	S21-Ma53859		X	X	
Test Counts						8	30	10	10

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	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Lead			mg/L	< 0.01			0.01	Pass	
LCS - % Recovery									
Heavy Metals									
Lead			%	88			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	S21-Ma54310	NCP	%	79			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	S21-Ma53846	CP	mg/L	0.68	0.89	27	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S21-Ma53859	CP	mg/L	0.20	0.19	6.0	30%	Pass	

Comments

V2- new version with all samples re-sieved and repeated as per client and internal request.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	N/A
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
C01	Leachate Fluid Key: 1 - pH 5.0; 2 - pH 2.9; 3 - pH 9.2; 4 - Reagent (DI) water; 5 - Client sample, 6 - other

Authorised by:

Andrew Black	Analytical Services Manager
John Nguyen	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.

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

Attention: **Stephen Maxwell**

Report **783811-S-V2**
Project name ADDITIONAL - TARAGO BALLAST SAMPLING
Project ID 31800780
Received Date Mar 29, 2021

Client Sample ID			**BAL_01 >26.5MM - 1**	**BAL_01 >26.5MM - 2**	**BAL_02 >26.5MM - 1**	**BAL_02 >26.5MM - 2**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S21-Ma53832**	**S21-Ma53833**	**S21-Ma53834**	**S21-Ma53835**
Date Sampled			**Mar 02, 2021**	**Mar 02, 2021**	**Mar 02, 2021**	**Mar 02, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	620	130	18	42
% Moisture	1	%	2.5	1.8	3.5	4.1

Client Sample ID			**BAL_03 >26.5MM - 1**	**BAL_03 >26.5MM - 2**	**BAL_04 >26.5MM - 1**	**BAL_04 >26.5MM - 2**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S21-Ma53838**	**S21-Ma53839**	**S21-Ma53842**	**S21-Ma53843**
Date Sampled			**Mar 02, 2021**	**Mar 02, 2021**	**Mar 02, 2021**	**Mar 02, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	250	100	150	210
% Moisture	1	%	3.0	3.4	1.3	1.1

Client Sample ID			**BAL_05 >26.5MM - 1**	**BAL_05 >26.5MM - 2**
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**S21-Ma53844**	**S21-Ma53845**
Date Sampled			**Mar 02, 2021**	**Mar 02, 2021**
Test/Reference	LOR	Unit		
Heavy Metals				
Lead	5	mg/kg	13	22
% Moisture	1	%	< 1	< 1

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	Mar 31, 2021	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Mar 30, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			

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Company Name:	Ramboll Australia Pty Ltd	**Order No.:**	
Address:	Level 3/100 Pacific Highway North Sydney NSW 2060	**Report #:**	783811
		Phone:	02 9954 8118
		Fax:	02 9954 8150
Project Name:	ADDITIONAL - TARAGO BALLAST SAMPLING		
Project ID:	31800780		

Received:	Mar 29, 2021 1:38 PM
Due:	Apr 1, 2021
Priority:	3 Day
Contact Name:	Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						CANCELLED	Lead	USA Leaching Procedure	Moisture Set
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Sydney Laboratory - NATA Site # 18217						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	BAL_01 >26.5MM - 1	Mar 02, 2021		Soil	S21-Ma53832		X		X
2	BAL_01 >26.5MM - 2	Mar 02, 2021		Soil	S21-Ma53833		X		X
3	BAL_02 >26.5MM - 1	Mar 02, 2021		Soil	S21-Ma53834		X		X
4	BAL_02 >26.5MM - 2	Mar 02, 2021		Soil	S21-Ma53835		X		X
5	BAL_03 >37.5MM - 1	Mar 02, 2021		Soil	S21-Ma53836	X			
6	BAL_03	Mar 02, 2021		Soil	S21-Ma53837	X			

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8	BAL_03 >26.5MM - 2	Mar 02, 2021		Soil	S21-Ma53839		X		X
9	BAL_04 >37.5MM - 1	Mar 02, 2021		Soil	S21-Ma53840	X			
10	BAL_04 >37.5MM - 2	Mar 02, 2021		Soil	S21-Ma53841	X			
11	BAL_04 >26.5MM - 1	Mar 02, 2021		Soil	S21-Ma53842		X		X
12	BAL_04 >26.5MM - 2	Mar 02, 2021		Soil	S21-Ma53843		X		X

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15	BAL_01 >26.5MM - 1	Mar 02, 2021		US Leachate	S21-Ma53846		X	X	
16	BAL_01 >26.5MM - 2	Mar 02, 2021		US Leachate	S21-Ma53847		X	X	
17	BAL_02 >26.5MM - 1	Mar 02, 2021		US Leachate	S21-Ma53848		X	X	
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22	BAL_03 >26.5MM - 2	Mar 02, 2021		US Leachate	S21-Ma53853		X	X	
23	BAL_04 >37.5MM - 1	Mar 02, 2021		US Leachate	S21-Ma53854	X			
24	BAL_04 >37.5MM - 2	Mar 02, 2021		US Leachate	S21-Ma53855	X			
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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

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

Project Name: ADDITIONAL - TARAGO BALLAST SAMPLING
Project ID: 31800780

Order No.:
Report #: 783811
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Mar 29, 2021 1:38 PM
Due: Apr 1, 2021
Priority: 3 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						CANCELLED	Lead	USA Leaching Procedure	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217						X	X	X	X
Brisbane Laboratory - NATA Site # 20794									
Perth Laboratory - NATA Site # 23736									
Mayfield Laboratory									
External Laboratory									
26	BAL_04 >26.5MM - 2	Mar 02, 2021		US Leachate	S21-Ma53857		X	X	
27	BAL_05 >26.5MM - 1	Mar 02, 2021		US Leachate	S21-Ma53858		X	X	
28	BAL_05 >26.5MM - 2	Mar 02, 2021		US Leachate	S21-Ma53859		X	X	
Test Counts						8	30	10	10

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	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Lead			mg/kg	< 5			5	Pass	
LCS - % Recovery									
Heavy Metals									
Lead			%	114			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	S21-Ma57786	NCP	%	100			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	S21-Ma53832	CP	mg/kg	620	670	9.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S21-Ma53843	CP	%	1.1	1.2	6.0	30%	Pass	

Comments

V2- new version with all samples re-sieved and repeated as per client and internal request.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	N/A
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
John Nguyen	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
95% UCL CALCULATIONS

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.104-May-21 10:21:34 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Lead in Woodlawn Siding Ballast

General Statistics

Total Number of Observations	18	Number of Distinct Observations	18
		Number of Missing Observations	0
Minimum	13	Mean	546.4
Maximum	2800	Median	305
SD	755.5	Std. Error of Mean	178.1
Coefficient of Variation	1.383	Skewness	2.224

Normal GOF Test

Shapiro Wilk Test Statistic	0.69	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.897	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.295	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.202	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	856.2	95% Adjusted-CLT UCL (Chen-1995)	939
		95% Modified-t UCL (Johnson-1978)	871.7

Gamma GOF Test

A-D Test Statistic	0.292	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.785	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.137	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.213	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.672	k star (bias corrected MLE)	0.597
Theta hat (MLE)	812.8	Theta star (bias corrected MLE)	914.8
nu hat (MLE)	24.2	nu star (bias corrected)	21.5
MLE Mean (bias corrected)	546.4	MLE Sd (bias corrected)	707
		Approximate Chi Square Value (0.05)	11.97
Adjusted Level of Significance	0.0357	Adjusted Chi Square Value	11.29

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	981.9	95% Adjusted Gamma UCL (use when n<50)	1041

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.897	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.123	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.202	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.565	Mean of logged Data	5.399
Maximum of Logged Data	7.937	SD of logged Data	1.559

Assuming Lognormal Distribution

95% H-UCL	2835	90% Chebyshev (MVUE) UCL	1510
95% Chebyshev (MVUE) UCL	1897	97.5% Chebyshev (MVUE) UCL	2434
99% Chebyshev (MVUE) UCL	3488		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	839.3	95% Jackknife UCL	856.2
95% Standard Bootstrap UCL	822.1	95% Bootstrap-t UCL	1290
95% Hall's Bootstrap UCL	2256	95% Percentile Bootstrap UCL	830.8
95% BCA Bootstrap UCL	944.3		
90% Chebyshev(Mean, Sd) UCL	1081	95% Chebyshev(Mean, Sd) UCL	1323
97.5% Chebyshev(Mean, Sd) UCL	1658	99% Chebyshev(Mean, Sd) UCL	2318

Suggested UCL to Use

95% Adjusted Gamma UCL	1041		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

APPENDIX 7
REMEDIAL COST CALCULATIONS

Remedial Option Cost Estimates for Onsite Contamination

Option 1 - Return of ore impacted materials from the site to Woodlawn Mine

Description	Unit	Budget Rate	Estimated Qty	Estimated Total
Preliminaries and Management Plans	Item	$5,000	1	$5,000
Mobilisation and site establishment	Item	$10,000	1	$10,000
Project Management	Week	$6,500	6	$39,000
Excavation of impacted material to loading area	M3	$25	4,100	$102,500
Loading impacted material into truck and dogs and transport to mine (assumes tip only, handling of material at mine site excluded)	Tonne	$25	7,380	$184,500
Demobilisation	Item	$5,000	1	$5,000
Estimated Total				**$346,000**

Option 2 - Onsite containment

Description	Unit	Budget Rate	Estimated Qty	Estimated Total
Preliminaries and Management Plans	Item	$7,500	1	$7,500
Mobilisation and site establishment	Item	$20,000	1	$20,000
Project Management	Week	$6,500	10	$65,000
Excavate capping layer to stockpile (assume 6,000m2 x 0.5m thick)	M3	$25	3,000	$75,000
Excavate containment cell – spoil cart to stockpile within 100m – unsure of final destination of this	M3	$25	4,100	$102,500
Install HDPE and geofabric liner to containment cell	M2	$25	4,100	$102,500
Excavate impacted material, transport to containment cell, place and compact in cell	M3	$35	4,100	$143,500
Place capping layer from stockpile to cap containment cell	M3	$20	3,000	$60,000
Demobilisation	Item	$15,000	1	$15,000
Estimated Total				**$591,000**

Table 1: Remedial Option Cost Estimates for Onsite Contamination

Option 3 - Offsite treatment and disposal of ore impacted materials onsite

Description	Unit	Budget Rate	Estimated Qty	Estimated Total
Preliminaries and Management Plans	Item	$10,000	1	$10,000
Mobilisation and site establishment	Item	$25,000	1	$25,000
Project Management	Week	$6,500	12	$78,000
Bench-scale trial and obtain SIA	Item	$20,000	1	$20,000
Excavation of impacted material to loading area	M3	$25	4,100	$102,500
Loading impacted material into truck and dogs and transport to Local Landfill	Tonne	$25	7,380	$184,500
Screen material to remove ballast	Tonne	$15	7,380	$110,700
Return of ballast to site	M3	$25	2,050	$51,250
Immobilisation of impacted material following ballast removal	Tonne	$100	2,050	$205,000
Disposal of immobilised material as GSW at Hi Quality Minda Landfill	Tonne	$115	9,225	$1,060,875
Disposal of immobilised material as GSW at Veolia Woodlawn Landfill	Tonne	$225	9,225	$2,075,625
Demobilisation	Item	$20,000	1	$20,000
Estimated Total for disposal at Minda Landfill				**$1,867,825**
Estimated Total for disposal at Veolia Woodlawn				**$2,882,575**

APPENDIX 8
FINANCIAL ASSURANCE CALCULATIONS

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
20-08-20

Table 1: Financial Assurance Assumptions

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
q-factor	100.0%	97.1%	94.3%	91.5%	88.8%	86.3%	83.7%	81.3%	78.9%	76.6%	74.4%	72.2%	70.1%	68.1%	66.1%	64.2%	62.3%
Price escalation	100.0%	102.0%	104.0%	106.1%	108.2%	110.4%	112.6%	114.9%	117.2%	119.5%	121.9%	124.3%	126.8%	129.4%	131.9%	134.6%	137.3%
Investment	-1,233,000																
Ongoing Maintenance and Monitoring Requirements																	
Environmental Monitoring																	
Inspection and reporting		-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000
Periodic topsoil replacement											-40,000						
Recontainment																	
Security checks by third party																	
Maintenance																	
Administrator																	
Total (without price escalation)	**-1,233,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-45,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**
Total (with price escalation)	-1,233,000	-5,100	-5,202	-5,306	-5,412	-5,520	-5,631	-5,743	-5,858	-5,975	-54,855	-6,217	-6,341	-6,468	-6,597	-6,729	-6,864
NPV	**-1,233,000**	**-4,951**	**-4,903**	**-4,856**	**-4,809**	**-4,762**	**-4,716**	**-4,670**	**-4,625**	**-4,580**	**-40,817**	**-4,491**	**-4,448**	**-4,404**	**-4,362**	**-4,319**	**-4,277**
	-1,253,000																
Total NPV	**-1,793,937**																
NPV Risk realistic	-376,792																
NPV Risk worst	-305,589																
NPV Captial	-1,233,000																
NPV Monitoring and management	-541,418																

Note: the q-factor quantifies the effect of interest and inflation on future costs of long term environmental management and informs calculation of net present value required for financial assuranc

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
20-08-20

Table 1: Financial Assurance Assumptions

17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
60.5%	58.7%	57.0%	55.4%	53.8%	52.2%	50.7%	49.2%	47.8%	46.4%	45.0%	43.7%	42.4%	41.2%	40.0%	38.8%	37.7%	36.6%	35.5%	34.5%	33.5%	32.5%
140.0%	142.8%	145.7%	148.6%	151.6%	154.6%	157.7%	160.8%	164.1%	167.3%	170.7%	174.1%	177.6%	181.1%	184.8%	188.5%	192.2%	196.1%	200.0%	204.0%	208.1%	212.2%
-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000
			-40,000										-40,000								
-5,000	**-5,000**	**-5,000**	**-45,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-45,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**
-7,001	-7,141	-7,284	-66,868	-7,578	-7,730	-7,884	-8,042	-8,203	-8,367	-8,534	-8,705	-8,879	-81,511	-9,238	-9,423	-9,611	-9,803	-9,999	-10,199	-10,403	-10,611
-4,236	**-4,195**	**-4,154**	**-37,023**	**-4,074**	**-4,034**	**-3,995**	**-3,956**	**-3,918**	**-3,880**	**-3,842**	**-3,805**	**-3,768**	**-33,582**	**-3,695**	**-3,659**	**-3,624**	**-3,588**	**-3,554**	**-3,519**	**-3,485**	**-3,451**

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
20-08-20

Table 1: Financial Assurance Assumptions

39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
31.6%	30.7%	29.8%	28.9%	28.1%	27.2%	26.4%	25.7%	24.9%	24.2%	23.5%	22.8%	22.1%	21.5%	20.9%	20.3%	19.7%	19.1%	18.5%	18.0%	17.5%	17.0%
216.5%	220.8%	225.2%	229.7%	234.3%	239.0%	243.8%	248.7%	253.6%	258.7%	263.9%	269.2%	274.5%	280.0%	285.6%	291.3%	297.2%	303.1%	309.2%	315.4%	321.7%	328.1%
-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000
	-40,000										-40,000										-40,000
-5,000	**-45,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-45,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-45,000**
-10,824	-99,362	-11,261	-11,486	-11,716	-11,950	-12,189	-12,433	-12,682	-12,935	-13,194	-121,121	-13,727	-14,002	-14,282	-14,567	-14,859	-15,156	-15,459	-15,768	-16,083	-147,646
-3,418	**-30,460**	**-3,352**	**-3,319**	**-3,287**	**-3,255**	**-3,223**	**-3,192**	**-3,161**	**-3,130**	**-3,100**	**-27,629**	**-3,040**	**-3,011**	**-2,981**	**-2,952**	**-2,924**	**-2,895**	**-2,867**	**-2,839**	**-2,812**	**-25,060**

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
20-08-20

Table 1: Financial Assurance Assumptions

RAMBOLL

61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82
16.5%	16.0%	15.5%	15.1%	14.6%	14.2%	13.8%	13.4%	13.0%	12.6%	12.3%	11.9%	11.6%	11.2%	10.9%	10.6%	10.3%	10.0%	9.7%	9.4%	9.1%	8.9%
334.7%	341.4%	348.2%	355.1%	362.3%	369.5%	376.9%	384.4%	392.1%	400.0%	408.0%	416.1%	424.4%	432.9%	441.6%	450.4%	459.4%	468.6%	478.0%	487.5%	497.3%	507.2%
-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000
									-40,000										-40,000		
-5,000	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-45,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-45,000**	**-5,000**	**-5,000**
-16,733	-17,068	-17,409	-17,757	-18,113	-18,475	-18,844	-19,221	-19,606	-179,980	-20,398	-20,806	-21,222	-21,646	-22,079	-22,521	-22,971	-23,431	-23,899	-219,395	-24,865	-25,362
-2,757	**-2,731**	**-2,704**	**-2,678**	**-2,652**	**-2,626**	**-2,601**	**-2,575**	**-2,550**	**-22,731**	**-2,501**	**-2,477**	**-2,453**	**-2,429**	**-2,405**	**-2,382**	**-2,359**	**-2,336**	**-2,313**	**-20,618**	**-2,269**	**-2,247**

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Lead Management
20-08-20

Table 1: Financial Assurance Assumptions

83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
8.6%	8.3%	8.1%	7.9%	7.6%	7.4%	7.2%	7.0%	6.8%	6.6%	6.4%	6.2%	6.0%	5.9%	5.7%	5.5%	5.4%	5.2%
517.4%	527.7%	538.3%	549.1%	560.0%	571.2%	582.7%	594.3%	606.2%	618.3%	630.7%	643.3%	656.2%	669.3%	682.7%	696.3%	710.3%	724.5%
-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000	-5000
							-40,000										-40,000
-5,000	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-45,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-5,000**	**-45,000**
-25,869	-26,387	-26,914	-27,453	-28,002	-28,562	-29,133	-267,441	-30,310	-30,916	-31,535	-32,165	-32,808	-33,465	-34,134	-34,817	-35,513	-326,009
-2,225	**-2,203**	**-2,182**	**-2,161**	**-2,140**	**-2,119**	**-2,098**	**-18,702**	**-2,058**	**-2,038**	**-2,018**	**-1,998**	**-1,979**	**-1,960**	**-1,941**	**-1,922**	**-1,903**	**-16,963**

APPENDIX 9
NOTIFICATION OF CATEGORY 2 REMEDIATION

ENVIRONMENT
& HEALTH

Goulburn-Mulwaree Council
Locked Bag 22
Goulburn NSW 2580
Attention: The General Manager

Date 6/05/2020

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Ref 318000780

TARAGO TRACK WORKS
NOTIFICATION OF CATEGORY 2 REMEDIATION WORKS

INTRODUCTION

Ramboll Australia Pty Ltd (Ramboll) was retained by John Holland Rail (JHR) on behalf of Transport for NSW (TfNSW) to prepare a Remedial Action Plan (RAP) for contamination identified along approximately one kilometre of the Goulburn – Bombala rail corridor at Tarago, NSW. This area is presented on **Figure 1**, **Appendix 1** and is here-in referred to as the site.

John Holland Rail (JHR) respectfully notify Goulburn Mulwaree Council of planned Category 2 remediation works, as defined by *State Environmental Planning Policy 55 – Remediation of Land* (SEPP 55) that will occur at the site.

REMEDIATION WORK

The preferred remedial strategy comprises offsite disposal of ballast fines from the Woodlawn Siding and adjacent surface soils. Offsite disposal will include excavation and transport of soils to a compound established at a licensed waste facility. Ballast will be mechanically screened for reuse onsite following successful validation. Ballast fines will be chemically immobilised for disposal as General Solid Waste in accordance with a NSW EPA Specific Immobilisation Approval.

Contaminated ballast will remain within operational rail formations and at depth around the footprint of the former Ore Concentrate Loadout Complex buildings. Remnant contamination will be managed under a long term environmental management plan (LTEMP).

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

CATEGORY 2 REMEDIATION WORKS

This project is deemed to be Category 2 remediation work in accordance with SEPP 55. Category 2 remediation work is deemed remediation work that is not Category 1 remediation as described in Clause 9 of SEPP 55. The triggers for Category 1 remediation work are evaluated in **Table 1**.

Table 1: Evaluation of Category 1 Triggers

SEPP 55, Clause 9 Trigger	Evaluation
a) Designated development	The project is not designated development. Schedule 3 Clause 15 of the *Environmental Planning and Assessment Regulation 2000* describes conditions under which contaminated soil treatment works are deemed designated development. Of specific relevance to this project: • The volume of contaminated material falls below 30,000m3 (estimated at < 1000m3) The area of contaminated soil to be disturbed is less than 3 hectares (estimated at 2 hectares).
b) carried out or to be carried out on land declared to be a critical habitat, or	The project would not be carried out on land declared to be a critical habitat.
c) likely to have a significant effect on a critical habitat or a threatened species, population or ecological community, or	The site has been significantly disturbed by historical and ongoing rail related activities. It will not require disturbance of critical habitat or a threatened species, population or ecological community.
d) development for which another State environmental planning policy or a regional environmental plan requires development consent, or	No State Environmental Planning Policy or Regional Environmental Plan identifies the proposed remediation as an activity requiring development consent.
e) carried out or to be carried out in an area or zone to which any classifications to the following effect apply under an environmental planning instrument: (i) coastal protection, (ii) conservation or heritage conservation, (iii) habitat area, habitat protection area, habitat or wildlife corridor, (iv) environment protection, (v) escarpment, escarpment protection or escarpment preservation, (vi) floodway, (vii) littoral rainforest, (viii) nature reserve, (ix) scenic area or scenic protection, (x) wetland, or	The project is located on land zoned RU2 Rural Landscape under the *Goulburn Mulwaree Local Environmental Plan 2009*. No other environmental planning instrument prescribes the project site as one of the areas listed in point (e).

SEPP 55, Clause 9 Trigger	Evaluation
f) carried out or to be carried out on any land in a manner that does not comply with a policy made under the contaminated land planning guidelines by the council for any local government area in which the land is situated (or if the land is within the unincorporated area, the Western Lands Commissioner).	The *Goulburn Mulwaree Development Control Plan 2009* includes guidance that applies to Contaminated Land. The proposed remediation complies with the guidance.

The proposed remediation works do not trigger the criteria in clause 9 (a) – (f) as outlined in **Table 1**, and the proposed remediation works are not ancillary to any other current development requiring Development Consent. Based upon the above information and criteria the remediation works are deemed to be Category 2 works under SEPP 55.

It is anticipated that remediation of the activities associated the Tarago Siding Project would commence in late September/ early October 2019 and be completed XXX.

Yours sincerely

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APPENDIX 10
RAIL SLEEPER WASTE CLASSIFICATION

Intended for
John Holland Rail

Document type
Waste Classification Report

Date
26 March 2020

RAIL SLEEPER WASTE CLASSIFICATION TARAGO LOOP EXTENSION

RAMBOLL Bright ideas. Sustainable change.

RAIL SLEEPER WASTE CLASSIFICATION
TARAGO LOOP EXTENSION

Project name	**Tarago Loop Rail Sleeper Waste Classification**
Project no.	**318000780**
Recipient	**Wayne D'Souza**
Document type	**Report**
Version	**Draft**
Date	**26/03/2030**
Prepared by	**Lyon McLeod**
Checked by	**Fiona Robinson**
Approved by	**Stephen Maxwell**
Description	**The report presents a waste classification assessment for rail sleepers at the site of Tarago Loop Extension**
Ref	**318000780-T15-001**

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CONTENTS

APPENDICES

1. INTRODUCTION

Ramboll Australia Pty Ltd (Ramboll) was commissioned by John Holland Rail to complete a waste classification in accordance with the *NSW EPA Waste Classification Guidelines (2014).* The classification was required for railway sleepers removed as part of the Tarago Loop Extension. The objective of the waste classification was to classify the railway sleepers for off-site disposal from the site.

1.1 Scope of Works

The scope of works included the following tasks:

- Preparation of a site-specific Health and Safety Plan for the site works
- Collection of four samples from the rail sleepers by hand
- Laboratory analysis of four samples (including QA/QC) for potential contaminants of concern
- Evaluated quality control and quality assurance for the sampling program
- Comparison of laboratory results to relevant site and waste classification guidelines
- Preparation of this report.

2. FIELD INVESTIGATIONS AND OBSERVATIONS

2.1 Sample Collection

Field sampling of the railway sleepers was completed 18 March 2020 by an environmental engineer suitably experienced as a contaminated land consultant. At the time of fieldwork sleepers were stockpiled within the corridor and occupied approximately 50 m^3 as shown in **Photo 1**.

Sleepers were observed to be aged, moderately degraded and laden with dust that was stained green at some locations.

Photo 1 – Location of sleeper within the rail corridor

Four samples were selected for laboratory analysis to exceed the minimum sampling density for stockpiles of 3 per 75m^3 prescribed in the *National Environment Protection Measure (NEPC 2013)*. Samples from the railway sleepers were selected for testing based on visual assessment for staining or other signs of contamination and targeted areas with the potential for contamination.

Samples for laboratory testing were recovered from the rail sleepers using a hand held drill and a hand saw create drill shavings and saw dust. Samples comprised materials recovered from the surface of the sleeper and at depths of up to 2 cm below the surface of the sleeper.

A total of four primary samples were recovered, SLE01, SLE02, SLE03 and SLE04.

2.2 Quality Assurance/ Quality Control

Quality assurance and quality control completed for the project is included in **Table 1**.

Table 1 QA/QC Review

Element	Field and Laboratory QA/QC
Sampling	Samples were collected 18 March 2020 by an experienced Environmental Engineer from Ramboll using a cordless drill and hand saw. Samples were placed directly into laboratory-supplied soil jars using single use gloved hands.
Decontamination	All reusable sampling equipment was cleaned thoroughly between sampling points.
Sample Handling	Samples were collected into laboratory-supplied soil jars and stored in a cooler box chilled with ice.
Chain of Custody	Samples were sent to the laboratory under chain of custody conditions.
Field Quality Control Samples	One duplicate sample pair (SLE02/ D01_180320) was sent to the laboratory for analysis. Relative percentage differences (RPDs) were calculated. RPDs for Lead (70%), Copper (31.4%) and TCLP lead (129%) exceed the adopted RPD (30%) and is likely attributed to heterogeneity in the distribution of contaminants within the sampled material. For the waste classification assessment, the maximum recorded concentration of lead and TCLP lead was adopted to provide a conservative assessment. The NSW Waste Guidelines (EPA, 2014) do not provide a criterion for Copper.
Laboratories Used	The primary laboratory was Eurofins and laboratory reports are NATA stamped.
Laboratory Quality Control Samples	Eurofins completed quality control sampling, including analysis of method blanks, laboratory duplicates, laboratory control samples and matrix spikes. Results were within required parameters aside from an elevated relative percent difference (RPD) for duplicate results for moisture content, which is not considered to affect the usability of the data.
Laboratory Reports	Laboratory reports relevant to this waste classification are attached in **Appendix 2.**

Based on the field and laboratory quality assurance completed the data is considered to be reliable for the purpose of determining a waste classification.

3. WASTE CLASSIFICATION

Waste is classified in the *NSW EPA Waste Classification Guidelines (2014)* following a five step process which assess pre-classification followed by chemical classification of the waste. A review against each of the waste classification steps for the railway sleeper waste is outlined in **Table 2**. Once a waste's classification has been established under a particular pre-classification below, there is no need to go to the next classification. The waste has that classification and must be managed accordingly.

Table 2 Waste Classification

Waste Classification Steps	Assessment
Step 1: Is the waste special waste?	No, the waste does not meet the criteria of special waste.
Step 2: Is the waste liquid waste?	No, the waste comprises timber sleepers.
Step 3: Is the waste pre-classified?	Yes, the waste is preclassified as construction and demolition waste as being waste derived from 'the construction, replacement, repair or alteration of infrastructure development such as roads, tunnels, sewage, water, electricity, telecommunications and airports'. However, as the waste was suspected to be impacted by lead ore concentrate additional chemical waste classification was considered warranted.
Step 4: Does the waste possess hazardous characteristics?	No, the waste does not meet the characteristics of pre-classified hazardous waste.
Step 5: Determining a waste's classification using chemical assessment.	Chemical classification of the four timber samples is presented in the attached **Table A1** provided in **Appendix 1**. Based on the mean[1] total and leachable chemical concentrations present, the waste is classified as General Solid Waste.
Waste Classification	**General Solid Waste**

1. A mean rather than 95%UCLaverage sample concentration was adopted as n=4.

Based on the pre-classification and the supplementary sampling completed the railway sleepers are classified as general solid waste and can be disposed of to an off-site facility licenced to receive this waste type.

This assessment has not considered the suitability of the sleepers for reuse on the site. The railway sleepers are considered to be a waste material and cannot legally be reused off the site.

4. LIMITATIONS

This document is issued in confidence to John Holland Rail for the purposes of waste classification in accordance with NSW Waste Guidelines (EPA, 2014).

Whilst reasonable attempts have been made to ensure that the contents of this report are accurate and complete at the time of writing, Ramboll Australia Pty Ltd disclaims any responsibility for loss or damage that may be occasioned directly or indirectly through the use of, or reliance on, the contents of this report.

5. REFERENCES

NEPC 2013 *National Environment Protection (Assessment of Site Contamination) Measure 1999 amended 2013*

NSW Environment Protection Authority (EPA) 2014 *Waste Classification Guidelines, Part 1: Classifying waste*

APPENDIX 1
RESULTS SUMMARY TABLE

Table A1: Waste Classification Results

	CT1 - General Solid Waste[1]	CT2 - Restricted Solid Waste[1]	SCC1 - General Solid Waste[2]	SCC2 - Restricted Solid Waste[2]	TCLP1 - General Solid Waste[2]	TCLP2 - Restricted Solid Waste[2]							
Sample Type:									Primary	Primary	Primary	Primary	Duplicate
Sample number:									S20-Ma28575	S20-Ma28576	S20-Ma28577	S20-Ma28578	S20-Ma28579
Sample date:									18-Mar-20	18-Mar-20	18-Mar-20	18-Mar-20	18-Mar-20
Sample ID:									SLE01	SLE02	SLE03	SLE04	D01_180320
Project Name:									John Holland	John Holland	John Holland	John Holland	John Holland
Compound:													
Site:									Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop
Sampling Method:									NA	NA	NA	NA	NA
Sample Description									Woodchips	Woodchips	Woodchips	Woodchips	Woodchips
Analyte grouping/Analyte							**Units**	**LOR**					
Total Metals													
Arsenic	**100**	**400**	**500**	**2000**			mg/kg	5	< 2	6.9	6.5	< 2	4.6
Cadmium	**20**	**80**	**100**	**400**			mg/kg	1	15	11	7.6	11	11
Chromium (VI)	**100**	**400**	**1900**	**7600**			mg/kg	2	< 5	11	14	< 5	< 5
Copper							mg/kg	5	140	430	1700	230	590
Lead	**100**	**400**	**1500**	**6000**			mg/kg	5	**240**	**1300**	**1300**	**560**	**2700**
Mercury	**4**	**16**	**50**	**200**			mg/kg	0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1
Nickel	**40**	**160**	**1050**	**4200**			mg/kg	2	< 5	11	11	5.7	< 5
Zinc							mg/kg	5	2800	1200	1300	1100	1300
Organophosphorus Pesticides (OP)													
Azinphos-methyl							mg/kg	< 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
Chlorfenvinphos							mg/kg	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	**4**	**16**	**7.5**	**30**			mg/kg	< 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
Coumaphos							mg/kg	< 2	< 2	< 2	< 2	< 2	< 2
Demeton-O							mg/kg	< 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
Diazinon							mg/kg	< 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
Dimethoate							mg/kg	< 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
EPN							mg/kg	< 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
Ethoprop							mg/kg	< 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
Fenitrothion							mg/kg	< 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
Fenthion							mg/kg	< 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
Merphos							mg/kg	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Methyl parathion							mg/kg	< 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
Monocrotophos							mg/kg	< 2	< 2	< 2	< 2	< 2	< 2
Naled							mg/kg	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Omethoate							mg/kg	< 2	< 2	< 2	< 2	< 2	< 2
Phorate							mg/kg	< 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
Pyrazophos							mg/kg	< 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
Terbufos							mg/kg	< 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
Tokuthion							mg/kg	< 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
Polynuclear Aromatic Hydrocarbons													
Acenaphthene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	**0.8**	**3.2**	**10**	**23**			mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (lower bound) *							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *							mg/kg	< 0.6	0.6	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *							mg/kg	< 0.7	1.2	1.2	1.2	1.2	1.2
Benzo(b&j)fluoranthene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene							mg/kg	< 0.6	1.7	1.1	0.5	< 0.5	< 0.5
Phenanthrene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	**200**	**800**	**200**	**800**			mg/kg	< 0.6	1.7	1.1	0.5	< 0.5	< 0.5
TRH - 1999 NEPM Fractions (after silica gel clean-up)													
TRH C10-C14 (after silica gel clean-up)							mg/kg	< 100	< 100	< 100	< 100	220	< 100
TRH C10-C36 (Total) (after silica gel clean-up)	**10000**	**40000**	**10000**	**40000**			mg/kg	< 250	1200	< 250	750	< 250	2110
TRH C15-C28 (after silica gel clean-up)							mg/kg	< 250	300	< 250	320	< 250	510
TRH C29-C36 (after silica gel clean-up)							mg/kg	< 250	900	< 250	430	< 250	1600
Total Recoverable Hydrocarbons - NEPM 2013 Fractions													
TRH >C10-C16 (after silica gel clean-up)							mg/kg	< 250	< 250	< 250	< 250	< 250	< 250
TRH >C16-C34 (after silica gel clean-up)							mg/kg	< 500	1100	< 500	650	< 500	1700
TRH >C34-C40 (after silica gel clean-up)							mg/kg	< 500	< 500	< 500	< 500	< 500	840
Metals TCLP													
Arsenic					**5**	**20**	mg/L	0.1	--	--	--	--	--
Cadmium					**1**	**4**	mg/L	0.05	--	--	--	--	--
Chromium (VI)					**5**	**20**	mg/L	0.1	--	--	--	--	--
Copper							mg/L	0.1	--	--	--	--	--
Lead					**5**	**20**	mg/L	0.1	0.14	0.9	0.97	0.79	4.2
Nickel					**2**	**8**	mg/L	0.1	--	--	--	--	--
Zinc							mg/L	0.1	--	--	--	--	--
Mercury							mg/L	0.001	--	--	--	--	--

Blank Cell indicates no criterion available
LOR = Limit of Reporting
NSW EPA Waste Classification Guidelines - Part 1: Classification of Waste
[1] Maximum values of specific contaminant concentration (SCC) for classification without TCLP
[2] Maximum values for leachable concentration and specific contaminant concentration when used together
[3] PFOS and PFHxS are to be summed for comparison against the TCLP and SCC values.
[4] Values are the same for general solid waste (putrescible) and general solid waste (non-putrescible).
PFOS/PFOA values adopted from Addendum to the Waste Classification Guidelines (2014) – Part 1: classifying waste, October 2016 (NSW EPA). Noting these values have been based on the enHealth TDI values
Blank cell indicates no screening criterion available
For Limit of Reporting (LOR) refer to laboratory certificates of analysis
--- Indicates sample not analysed
Concentration in **red** font and grey box exceed CT1 screening value
Concentration in **blue** font and grey box exceed CT2 screening value
Concentration in **orange** font and grey box exceed SCC1 or TCLP1 screening value
Concentration in **green** font and grey box exceed SCC2 or TCLP 2 screening value
Concentrations below the LOR noted as <value

Table A2: QA/QC Results

	Sample Type:	Primary	Duplicate	RPD
	Sample number:	S20-Ma28576	S20-Ma28579	
	Sample date:	18-Mar-20	18-Mar-20	
	Sample ID:	SLE02	D01_180320	
	Project Name:	John Holland	John Holland	
	Compound:			
	Site:	Tarago Rail Loop	Tarago Rail Loop	
	Sampling Method:	NA	NA	
	Sample Description	Woodchips	Woodchips	

Analyte grouping/Analyte	Units	LOR			
Total Metals					
Arsenic	mg/kg	5	6.9	4.6	40.0
Cadmium	mg/kg	1	11	11	0.0
Chromium (VI)	mg/kg	2	11	< 5	nc
Copper	mg/kg	5	430	590	**31.4**
Lead	mg/kg	5	1300	2700	**70.0**
Mercury	mg/kg	0.1	< 0.1	< 0.1	nc
Nickel	mg/kg	2	11	< 5	nc
Zinc	mg/kg	5	1200	1300	8.0
Organophosphorus Pesticides (OP)					
Azinphos-methyl	mg/kg	< 0.2	< 0.2	< 0.2	nc
Bolstar	mg/kg	< 0.2	< 0.2	< 0.2	nc
Chlorfenvinphos	mg/kg	< 0.2	< 0.2	< 0.2	nc
Chlorpyrifos	mg/kg	< 0.2	< 0.2	< 0.2	nc
Chlorpyrifos-methyl	mg/kg	< 0.2	< 0.2	< 0.2	nc
Coumaphos	mg/kg	< 2	< 2	< 2	nc
Demeton-O	mg/kg	< 0.2	< 0.2	< 0.2	nc
Demeton-S	mg/kg	< 0.2	< 0.2	< 0.2	nc
Diazinon	mg/kg	< 0.2	< 0.2	< 0.2	nc
Dichlorvos	mg/kg	< 0.2	< 0.2	< 0.2	nc
Dimethoate	mg/kg	< 0.2	< 0.2	< 0.2	nc
Disulfoton	mg/kg	< 0.2	< 0.2	< 0.2	nc
EPN	mg/kg	< 0.2	< 0.2	< 0.2	nc
Ethion	mg/kg	< 0.2	< 0.2	< 0.2	nc
Ethoprop	mg/kg	< 0.2	< 0.2	< 0.2	nc
Ethyl parathion	mg/kg	< 0.2	< 0.2	< 0.2	nc
Fenitrothion	mg/kg	< 0.2	< 0.2	< 0.2	nc
Fensulfothion	mg/kg	< 0.2	< 0.2	< 0.2	nc
Fenthion	mg/kg	< 0.2	< 0.2	< 0.2	nc
Malathion	mg/kg	< 0.2	< 0.2	< 0.2	nc
Merphos	mg/kg	< 0.2	< 0.2	< 0.2	nc
Methyl parathion	mg/kg	< 0.2	< 0.2	< 0.2	nc
Mevinphos	mg/kg	< 0.2	< 0.2	< 0.2	nc
Monocrotophos	mg/kg	< 2	< 2	< 2	nc
Naled	mg/kg	< 0.2	< 0.2	< 0.2	nc
Omethoate	mg/kg	< 2	< 2	< 2	nc
Phorate	mg/kg	< 0.2	< 0.2	< 0.2	nc
Pirimiphos-methyl	mg/kg	< 0.2	< 0.2	< 0.2	nc
Pyrazophos	mg/kg	< 0.2	< 0.2	< 0.2	nc
Ronnel	mg/kg	< 0.2	< 0.2	< 0.2	nc
Terbufos	mg/kg	< 0.2	< 0.2	< 0.2	nc
Tetrachlorvinphos	mg/kg	< 0.2	< 0.2	< 0.2	nc
Tokuthion	mg/kg	< 0.2	< 0.2	< 0.2	nc
Trichloronate	mg/kg	< 0.2	< 0.2	< 0.2	nc
Polynuclear Aromatic Hydrocarbons					
Acenaphthene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Acenaphthylene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Anthracene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Benz(a)anthracene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Benzo(a)pyrene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Benzo(a)pyrene TEQ (lower bound) *	mg/kg	< 0.5	< 0.5	< 0.5	nc
Benzo(a)pyrene TEQ (medium bound) *	mg/kg	< 0.6	0.6	0.6	0.0
Benzo(a)pyrene TEQ (upper bound) *	mg/kg	< 0.7	1.2	1.2	0.0
Benzo(b&j)fluoranthene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Benzo(g.h.i)perylene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Benzo(k)fluoranthene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Chrysene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Dibenz(a.h)anthracene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Fluoranthene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Fluorene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Naphthalene	mg/kg	< 0.6	1.1	< 0.5	nc
Phenanthrene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Pyrene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Total PAH*	mg/kg	< 0.6	1.1	< 0.5	nc
TRH - 1999 NEPM Fractions (after silica gel clean-up)					
TRH C10-C14 (after silica gel clean-up)	mg/kg	< 100	< 100	< 100	nc
TRH C10-C36 (Total) (after silica gel clean-up)	mg/kg	< 250	< 250	2110	nc
TRH C15-C28 (after silica gel clean-up)	mg/kg	< 250	< 250	510	nc
TRH C29-C36 (after silica gel clean-up)	mg/kg	< 250	< 250	1600	nc
Total Recoverable Hydrocarbons - NEPM 2013 Fractions					
TRH >C10-C16 (after silica gel clean-up)	mg/kg	< 250	< 250	< 250	nc
TRH >C16-C34 (after silica gel clean-up)	mg/kg	< 500	< 500	1700	nc
TRH >C34-C40 (after silica gel clean-up)	mg/kg	< 500	< 500	840	nc
Metals TCLP					
Arsenic	mg/L	0.1	--	--	--
Cadmium	mg/L	0.05	--	--	--
Chromium (VI)	mg/L	0.1	--	--	--
Copper	mg/L	0.1	--	--	--
Lead	mg/L	0.1	0.9	4.2	**129.4**
Nickel	mg/L	0.1	--	--	--
Zinc	mg/L	0.1	--	--	--
Mercury	mg/L	0.001	--	--	--

LOR = Limit of Reporting
<value = Less than the laboratory Limit of Reporting (LOR)
Bold shaded cells exceed RPD >30% and both samples have recorded concetrations >10 x LOR
Bold indicates when above the acceptance criteria for Trip Spikes/Blanks and Rinsates
nc = not calculated as one or more results are below the LOR.

APPENDIX 2
LABORATORY CERTIFICATES

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		EDD Format (ESdat, EQuIS, Custom)	Excel and PDF
Contact Name	Stephen Maxwell				
Phone №					
Special Directions					
Purchase Order					
Quote ID №	180813RAMN_1				

Sampler(s)	JB
Handed over by	JB
Email for Invoice	smaxwell@ramboll.com asiapac-accounts@ramboll.com
Email for Results	smaxwell@ramboll.com jblackwell@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
* Surcharges apply
☐ Other ( )

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))	TRH C10 - C40 (following silica gel cleanup)	PAH	M8 (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg)	OPP	TCLP BaP and Pb	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	SLE01	18/03/20	Timber	X	X	X	X	X									
2	SLE02	18/03/20	Timber	X	X	X	X	X									
3	SLE03	18/03/20	Timber	X	X	X	X	X									
4	SLE04	18/03/20	Timber	X	X	X	X	X									
5	D01_180320	18/03/20	Timber	X	X	X	X	X									
8																	
9																	
10																	
		Total Counts		5	5	5	5	5									

Method of Shipment	☐ Courier (#)	☐ Hand Delivered	☐ Postal	Name		Signature		Date	Time	Time
								___/___/___		___:___
Eurofins | mgt Laboratory Use Only	Received By	Suzanne Ford	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	19/3/2020	Time	6:45PM	Temperature
	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	___/___/___	Time	___:___	Report № 708717

Eurofins Environment Testing Australia Pty Ltd trading as Eurofins | mgt

eurofins | Environment Testing

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6 Monterey Road
Dandenong South Vic 3175
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Site # 1254 & 14271

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NATA # 1261 Site # 18217

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Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

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

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Sample Receipt Advice

Company name:	**Ramboll Australia Pty Ltd**
Contact name:	Stephen Maxwell
Project ID:	318000780
COC number:	Not provided
Turn around time:	3 Day
Date/Time received:	Mar 19, 2020 6:45 AM
Eurofins reference:	**708717**

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.

☒ Split sample sent to requested external lab.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

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

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

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

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

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 **708717-S**
Project name
Project ID 318000780
Received Date Mar 19, 2020

Client Sample ID			**SLE01**	**SLE02**	**SLE03**	**SLE04**
Sample Matrix			**Woodchips**	**Woodchips**	**Woodchips**	**Woodchips**
Eurofins Sample No.			**S20-Ma28575**	**S20-Ma28576**	**S20-Ma28577**	**S20-Ma28578**
Date Sampled			**Mar 18, 2020**	**Mar 18, 2020**	**Mar 18, 2020**	**Mar 18, 2020**
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	1.7	1.1	0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	1.7	1.1	0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	91	89	89	95
p-Terphenyl-d14 (surr.)	1	%	88	85	85	92
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorfenvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Coumaphos	2	mg/kg	< 2	< 2	< 2	< 2
Demeton-S	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dimethoate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2

Client Sample ID			SLE01	SLE02	SLE03	SLE04
Sample Matrix			Woodchips	Woodchips	Woodchips	Woodchips
Eurofins Sample No.			S20-Ma28575	S20-Ma28576	S20-Ma28577	S20-Ma28578
Date Sampled			Mar 18, 2020	Mar 18, 2020	Mar 18, 2020	Mar 18, 2020
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
EPN	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Malathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Monocrotophos	2	mg/kg	< 2	< 2	< 2	< 2
Naled	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Omethoate	2	mg/kg	< 2	< 2	< 2	< 2
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pirimiphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pyrazophos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbufos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tetrachlorvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	123	120	120	126
TRH - 2013 NEPM Fractions (after silica gel clean-up)						
TRH >C10-C16 (after silica gel clean-up)	50	mg/kg	< 250	< 250	< 250	< 250
TRH >C16-C34 (after silica gel clean-up)	100	mg/kg	1100	< 500	650	< 500
TRH >C34-C40 (after silica gel clean-up)	100	mg/kg	< 500	< 500	< 500	< 500
TRH - 1999 NEPM Fractions (after silica gel clean-up)						
TRH C10-C36 (Total) (after silica gel clean-up)	100	mg/kg	1200	< 250	750	< 250
TRH C10-C14 (after silica gel clean-up)	50	mg/kg	< 100	< 100	< 100	220
TRH C15-C28 (after silica gel clean-up)	100	mg/kg	300	< 250	320	< 250
TRH C29-C36 (after silica gel clean-up)	100	mg/kg	900	< 250	430	< 250
Heavy Metals						
Arsenic	2	mg/kg	< 2	6.9	6.5	< 2
Cadmium	0.4	mg/kg	15	11	7.6	11
Chromium	5	mg/kg	< 5	11	14	< 5
Copper	5	mg/kg	140	430	1700	230
Lead	5	mg/kg	240	1300	1300	560
Mercury	0.1	mg/kg	< 0.1	< 0.1	0.2	< 0.1
Nickel	5	mg/kg	< 5	11	11	5.7
Zinc	5	mg/kg	2800	1200	1300	1100

Client Sample ID			D01_180320
Sample Matrix			Woodchips
Eurofins Sample No.			S20-Ma28579
Date Sampled			Mar 18, 2020
Test/Reference	LOR	Unit	
Polycyclic Aromatic Hydrocarbons			
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2
Acenaphthene	0.5	mg/kg	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5
Anthracene	0.5	mg/kg	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5
Chrysene	0.5	mg/kg	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5
Fluorene	0.5	mg/kg	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5
Naphthalene	0.5	mg/kg	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5
Pyrene	0.5	mg/kg	< 0.5
Total PAH*	0.5	mg/kg	< 0.5
2-Fluorobiphenyl (surr.)	1	%	95
p-Terphenyl-d14 (surr.)	1	%	91
Organophosphorus Pesticides			
Azinphos-methyl	0.2	mg/kg	< 0.2
Bolstar	0.2	mg/kg	< 0.2
Chlorfenvinphos	0.2	mg/kg	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2
Coumaphos	2	mg/kg	< 2
Demeton-S	0.2	mg/kg	< 0.2
Demeton-O	0.2	mg/kg	< 0.2
Diazinon	0.2	mg/kg	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2
Dimethoate	0.2	mg/kg	< 0.2
Disulfoton	0.2	mg/kg	< 0.2
EPN	0.2	mg/kg	< 0.2
Ethion	0.2	mg/kg	< 0.2
Ethoprop	0.2	mg/kg	< 0.2
Ethyl parathion	0.2	mg/kg	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2
Fenthion	0.2	mg/kg	< 0.2
Malathion	0.2	mg/kg	< 0.2
Merphos	0.2	mg/kg	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2
Mevinphos	0.2	mg/kg	< 0.2
Monocrotophos	2	mg/kg	< 2
Naled	0.2	mg/kg	< 0.2
Omethoate	2	mg/kg	< 2

Client Sample ID			D01_180320
Sample Matrix			**Woodchips**
Eurofins Sample No.			**S20-Ma28579**
Date Sampled			**Mar 18, 2020**
Test/Reference	LOR	Unit	
Organophosphorus Pesticides			
Phorate	0.2	mg/kg	< 0.2
Pirimiphos-methyl	0.2	mg/kg	< 0.2
Pyrazophos	0.2	mg/kg	< 0.2
Ronnel	0.2	mg/kg	< 0.2
Terbufos	0.2	mg/kg	< 0.2
Tetrachlorvinphos	0.2	mg/kg	< 0.2
Tokuthion	0.2	mg/kg	< 0.2
Trichloronate	0.2	mg/kg	< 0.2
Triphenylphosphate (surr.)	1	%	131
TRH - 2013 NEPM Fractions (after silica gel clean-up)			
TRH >C10-C16 (after silica gel clean-up)	50	mg/kg	< 250
TRH >C16-C34 (after silica gel clean-up)	100	mg/kg	1700
TRH >C34-C40 (after silica gel clean-up)	100	mg/kg	840
TRH - 1999 NEPM Fractions (after silica gel clean-up)			
TRH C10-C36 (Total) (after silica gel clean-up)	100	mg/kg	2110
TRH C10-C14 (after silica gel clean-up)	50	mg/kg	< 100
TRH C15-C28 (after silica gel clean-up)	100	mg/kg	510
TRH C29-C36 (after silica gel clean-up)	100	mg/kg	1600
Heavy Metals			
Arsenic	2	mg/kg	4.6
Cadmium	0.4	mg/kg	11
Chromium	5	mg/kg	< 5
Copper	5	mg/kg	590
Lead	5	mg/kg	2700
Mercury	0.1	mg/kg	< 0.1
Nickel	5	mg/kg	< 5
Zinc	5	mg/kg	1300

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
Polycyclic Aromatic Hydrocarbons	Sydney	Mar 20, 2020	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Organophosphorus Pesticides	Sydney	Mar 20, 2020	14 Days
- Method: LTM-ORG-2200 Organophosphorus Pesticides by GC-MS			
Metals M8	Sydney	Mar 20, 2020	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
TRH - 2013 NEPM Fractions (after silica gel clean-up)	Sydney	Mar 20, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
TRH - 1999 NEPM Fractions (after silica gel clean-up)	Sydney	Mar 20, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			

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

Project Name:
Project ID: 318000780

Order No.:
Report #: 708717
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Mar 19, 2020 6:45 AM
Due: Mar 24, 2020
Priority: 3 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Benzo(a)pyrene	Lead	Polycyclic Aromatic Hydrocarbons	Organophosphorus Pesticides	USA Leaching Procedure	Metals M8	TRH (after Silica Gel cleanup)
Melbourne Laboratory - NATA Site # 1254 & 14271												
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794												
Perth Laboratory - NATA Site # 23736												
External Laboratory												
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**							
1	SLE01	Mar 18, 2020		Woodchips	S20-Ma28575			X	X		X	X
2	SLE02	Mar 18, 2020		Woodchips	S20-Ma28576			X	X		X	X
3	SLE03	Mar 18, 2020		Woodchips	S20-Ma28577			X	X		X	X
4	SLE04	Mar 18, 2020		Woodchips	S20-Ma28578			X	X		X	X
5	D01_180320	Mar 18, 2020		Woodchips	S20-Ma28579			X	X		X	X
6	SLE01	Mar 18, 2020		US Leachate	S20-Ma28580	X	X			X		
7	SLE02	Mar 18, 2020		US Leachate	S20-Ma28581	X	X			X		
8	SLE03	Mar 18, 2020		US Leachate	S20-Ma28582	X	X			X		
9	SLE04	Mar 18, 2020		US Leachate	S20-Ma28583	X	X			X		
10	DO1_180320	Mar 18, 2020		US Leachate	S20-Ma28584	X	X			X		

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Sample Detail	Benzo(a)pyrene	Lead	Polycyclic Aromatic Hydrocarbons	Organophosphorus Pesticides	USA Leaching Procedure	Metals M8	TRH (after Silica Gel cleanup)
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
Test Counts	5	5	5	5	5	5	5

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							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Organophosphorus Pesticides							
Azinphos-methyl	mg/kg	< 0.2			0.2	Pass	
Bolstar	mg/kg	< 0.2			0.2	Pass	
Chlorfenvinphos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos-methyl	mg/kg	< 0.2			0.2	Pass	
Coumaphos	mg/kg	< 2			2	Pass	
Demeton-S	mg/kg	< 0.2			0.2	Pass	
Demeton-O	mg/kg	< 0.2			0.2	Pass	
Diazinon	mg/kg	< 0.2			0.2	Pass	
Dichlorvos	mg/kg	< 0.2			0.2	Pass	
Dimethoate	mg/kg	< 0.2			0.2	Pass	
Disulfoton	mg/kg	< 0.2			0.2	Pass	
EPN	mg/kg	< 0.2			0.2	Pass	
Ethion	mg/kg	< 0.2			0.2	Pass	
Ethoprop	mg/kg	< 0.2			0.2	Pass	
Ethyl parathion	mg/kg	< 0.2			0.2	Pass	
Fenitrothion	mg/kg	< 0.2			0.2	Pass	
Fensulfothion	mg/kg	< 0.2			0.2	Pass	
Fenthion	mg/kg	< 0.2			0.2	Pass	
Malathion	mg/kg	< 0.2			0.2	Pass	
Merphos	mg/kg	< 0.2			0.2	Pass	
Methyl parathion	mg/kg	< 0.2			0.2	Pass	
Mevinphos	mg/kg	< 0.2			0.2	Pass	
Monocrotophos	mg/kg	< 2			2	Pass	
Naled	mg/kg	< 0.2			0.2	Pass	
Omethoate	mg/kg	< 2			2	Pass	
Phorate	mg/kg	< 0.2			0.2	Pass	
Pirimiphos-methyl	mg/kg	< 0.2			0.2	Pass	
Pyrazophos	mg/kg	< 0.2			0.2	Pass	
Ronnel	mg/kg	< 0.2			0.2	Pass	
Terbufos	mg/kg	< 0.2			0.2	Pass	
Tetrachlorvinphos	mg/kg	< 0.2			0.2	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Tokuthion	mg/kg	< 0.2			0.2	Pass	
Trichloronate	mg/kg	< 0.2			0.2	Pass	
Method Blank							
TRH - 2013 NEPM Fractions (after silica gel clean-up)							
TRH >C10-C16 (after silica gel clean-up)	mg/kg	< 50			50	Pass	
TRH >C16-C34 (after silica gel clean-up)	mg/kg	< 100			100	Pass	
TRH >C34-C40 (after silica gel clean-up)	mg/kg	< 100			100	Pass	
Method Blank							
TRH - 1999 NEPM Fractions (after silica gel clean-up)							
TRH C10-C14 (after silica gel clean-up)	mg/kg	< 50			50	Pass	
TRH C15-C28 (after silica gel clean-up)	mg/kg	< 100			100	Pass	
TRH C29-C36 (after silica gel clean-up)	mg/kg	< 100			100	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	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							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	104			70-130	Pass	
Acenaphthylene	%	113			70-130	Pass	
Anthracene	%	107			70-130	Pass	
Benz(a)anthracene	%	108			70-130	Pass	
Benzo(a)pyrene	%	102			70-130	Pass	
Benzo(b&j)fluoranthene	%	98			70-130	Pass	
Benzo(g.h.i)perylene	%	101			70-130	Pass	
Benzo(k)fluoranthene	%	118			70-130	Pass	
Chrysene	%	103			70-130	Pass	
Dibenz(a.h)anthracene	%	95			70-130	Pass	
Fluoranthene	%	110			70-130	Pass	
Fluorene	%	102			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	92			70-130	Pass	
Naphthalene	%	109			70-130	Pass	
Phenanthrene	%	108			70-130	Pass	
Pyrene	%	110			70-130	Pass	
LCS - % Recovery							
Organophosphorus Pesticides							
Diazinon	%	104			70-130	Pass	
Dimethoate	%	101			70-130	Pass	
Ethion	%	109			70-130	Pass	
Fenitrothion	%	105			70-130	Pass	
Methyl parathion	%	97			70-130	Pass	
Mevinphos	%	116			70-130	Pass	
LCS - % Recovery							
TRH - 1999 NEPM Fractions (after silica gel clean-up)							
TRH C10-C14 (after silica gel clean-up)	%	126			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	96			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Cadmium	%	99			70-130	Pass	
Chromium	%	96			70-130	Pass	
Copper	%	99			70-130	Pass	
Lead	%	100			70-130	Pass	
Mercury	%	93			70-130	Pass	
Nickel	%	99			70-130	Pass	
Zinc	%	96			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	S20-Ma24218	NCP	%	99			70-130	Pass	
Acenaphthylene	S20-Ma24218	NCP	%	121			70-130	Pass	
Anthracene	S20-Ma24218	NCP	%	109			70-130	Pass	
Benz(a)anthracene	S20-Ma24218	NCP	%	123			70-130	Pass	
Benzo(a)pyrene	S20-Ma24218	NCP	%	105			70-130	Pass	
Benzo(b&j)fluoranthene	S20-Ma24218	NCP	%	115			70-130	Pass	
Benzo(g.h.i)perylene	S20-Ma24218	NCP	%	109			70-130	Pass	
Benzo(k)fluoranthene	S20-Ma24218	NCP	%	107			70-130	Pass	
Chrysene	S20-Ma24218	NCP	%	107			70-130	Pass	
Dibenz(a.h)anthracene	S20-Ma24218	NCP	%	109			70-130	Pass	
Fluoranthene	S20-Ma24218	NCP	%	119			70-130	Pass	
Fluorene	S20-Ma24218	NCP	%	107			70-130	Pass	
Indeno(1.2.3-cd)pyrene	S20-Ma24218	NCP	%	104			70-130	Pass	
Naphthalene	S20-Ma24218	NCP	%	111			70-130	Pass	
Phenanthrene	S20-Ma24218	NCP	%	113			70-130	Pass	
Pyrene	S20-Ma24218	NCP	%	117			70-130	Pass	
Spike - % Recovery									
Organophosphorus Pesticides				Result 1					
Diazinon	S20-Ma24218	NCP	%	100			70-130	Pass	
Ethion	S20-Ma24218	NCP	%	128			70-130	Pass	
Fenitrothion	S20-Ma24218	NCP	%	127			70-130	Pass	
Methyl parathion	S20-Ma24218	NCP	%	114			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S20-Ma25156	NCP	%	86			70-130	Pass	
Cadmium	S20-Ma25156	NCP	%	95			70-130	Pass	
Chromium	S20-Ma25156	NCP	%	87			70-130	Pass	
Copper	S20-Ma25156	NCP	%	90			70-130	Pass	
Lead	S20-Ma25156	NCP	%	95			70-130	Pass	
Mercury	S20-Ma25156	NCP	%	97			70-130	Pass	
Nickel	S20-Ma25156	NCP	%	85			70-130	Pass	
Zinc	S20-Ma25156	NCP	%	92			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Chrysene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Azinphos-methyl	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bolstar	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorfenvinphos	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos-methyl	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Coumaphos	S20-Ma24217	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Demeton-S	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Demeton-O	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Diazinon	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dichlorvos	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dimethoate	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Disulfoton	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
EPN	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethoprop	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethyl parathion	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenitrothion	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fensulfothion	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenthion	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Malathion	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Merphos	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl parathion	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Mevinphos	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Monocrotophos	S20-Ma24217	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Naled	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Omethoate	S20-Ma24217	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Phorate	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pirimiphos-methyl	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pyrazophos	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ronnel	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbufos	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tetrachlorvinphos	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tokuthion	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Trichloronate	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S20-Ma25147	NCP	mg/kg	4.3	4.7	9.0	30%	Pass	
Cadmium	S20-Ma25147	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S20-Ma25147	NCP	mg/kg	12	11	8.0	30%	Pass	
Copper	S20-Ma25147	NCP	mg/kg	20	18	11	30%	Pass	
Lead	S20-Ma25147	NCP	mg/kg	64	42	40	30%	Fail	Q15
Mercury	S20-Ma25147	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Nickel	S20-Ma25147	NCP	mg/kg	11	11	1.0	30%	Pass	
Zinc	S20-Ma25147	NCP	mg/kg	140	120	17	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
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
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
Andrew Sullivan	Senior Analyst-Organic (NSW)
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.

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

Attention: **Stephen Maxwell**

Report **708717-L**
Project name
Project ID 318000780
Received Date Mar 19, 2020

Client Sample ID			**SLE01**	**SLE02**	**SLE03**	**SLE04**
Sample Matrix			**US Leachate**	**US Leachate**	**US Leachate**	**US Leachate**
Eurofins Sample No.			**S20-Ma28580**	**S20-Ma28581**	**S20-Ma28582**	**S20-Ma28583**
Date Sampled			**Mar 18, 2020**	**Mar 18, 2020**	**Mar 18, 2020**	**Mar 18, 2020**
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Heavy Metals						
Lead	0.01	mg/L	0.14	0.90	0.97	0.79
USA Leaching Procedure						
Leachate Fluid[C01]		comment	1.0	1.0	1.0	1.0
pH (initial)	0.1	pH Units	4.0	4.2	3.9	4.2
pH (off)	0.1	pH Units	4.8	4.9	4.8	4.9
pH (USA HCl addition)	0.1	pH Units	2.0	2.0	1.7	1.8

Client Sample ID			**DO1_180320**
Sample Matrix			**US Leachate**
Eurofins Sample No.			**S20-Ma28584**
Date Sampled			**Mar 18, 2020**
Test/Reference	LOR	Unit	
Polycyclic Aromatic Hydrocarbons			
Benzo(a)pyrene	0.001	mg/L	< 0.001
Heavy Metals			
Lead	0.01	mg/L	4.2
USA Leaching Procedure			
Leachate Fluid[C01]		comment	1.0
pH (initial)	0.1	pH Units	4.0
pH (off)	0.1	pH Units	4.9
pH (USA HCl addition)	0.1	pH Units	2.0

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
Polycyclic Aromatic Hydrocarbons	Sydney	Mar 20, 2020	7 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Heavy Metals	Sydney	Mar 23, 2020	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
USA Leaching Procedure	Sydney	Mar 20, 2020	14 Days
- Method: LTM-GEN-7010 Leaching Procedure for Soils & Solid Wastes			

eurofins | Environment Testing

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NATA # 1261 Site # 20794

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Phone : 0800 856 450
IANZ # 1290

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

Project Name:
Project ID: 318000780

Order No.:
Report #: 708717
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Mar 19, 2020 6:45 AM
Due: Mar 24, 2020
Priority: 3 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Benzo(a)pyrene	Lead	Polycyclic Aromatic Hydrocarbons	Organophosphorus Pesticides	USA Leaching Procedure	Metals M8	TRH (after Silica Gel cleanup)
Melbourne Laboratory - NATA Site # 1254 & 14271												
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794												
Perth Laboratory - NATA Site # 23736												
External Laboratory												
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**							
1	SLE01	Mar 18, 2020		Woodchips	S20-Ma28575			X	X		X	X
2	SLE02	Mar 18, 2020		Woodchips	S20-Ma28576			X	X		X	X
3	SLE03	Mar 18, 2020		Woodchips	S20-Ma28577			X	X		X	X
4	SLE04	Mar 18, 2020		Woodchips	S20-Ma28578			X	X		X	X
5	D01_180320	Mar 18, 2020		Woodchips	S20-Ma28579			X	X		X	X
6	SLE01	Mar 18, 2020		US Leachate	S20-Ma28580	X	X			X		
7	SLE02	Mar 18, 2020		US Leachate	S20-Ma28581	X	X			X		
8	SLE03	Mar 18, 2020		US Leachate	S20-Ma28582	X	X			X		
9	SLE04	Mar 18, 2020		US Leachate	S20-Ma28583	X	X			X		
10	DO1_180320	Mar 18, 2020		US Leachate	S20-Ma28584	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:
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Received: Mar 19, 2020 6:45 AM
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Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail	Benzo(a)pyrene	Lead	Polycyclic Aromatic Hydrocarbons	Organophosphorus Pesticides	USA Leaching Procedure	Metals M8	TRH (after Silica Gel cleanup)
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
Test Counts	5	5	5	5	5	5	5

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							
Polycyclic Aromatic Hydrocarbons							
Benzo(a)pyrene	mg/L	< 0.001			0.001	Pass	
Method Blank							
Heavy Metals							
Lead	mg/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Benzo(a)pyrene	%	86			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Lead	%	99			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Lead	S20-Ma32658	NCP	%	94			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Benzo(a)pyrene	S20-Ma31473	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S20-Ma32654	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
C01	Leachate Fluid Key: 1 - pH 5.0; 2 - pH 2.9; 3 - pH 9.2; 4 - Reagent (DI) water; 5 - Client sample, 6 - other

Authorised By

Andrew Black	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
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 11
MATERIAL TRACKING TEMPLATE

Client: John Holland Rail

Project Name: Tarago Rail Corridor Lead Management

31-07-20

Material Tracking Summary

Material Source	Vehicle Registration	Tranpsort Company	Waste Type	Waste Classification	Time Excavated	Date Excavated	Destination	Weighbridge Time	Weighbridge Date	Docket #	Net Weight (t)

Notes

Material source and destination (if onsite) should be defined with reference to a 10 x 10m site grid refernce such that the insitu contaminant characterisation can inform waste management.

This material tracking summary will be miantained digitally.

APPENDIX 12
TREATABILITY TRIAL AND SPECIFIC IMMOBILISATION APPLICATION

RAMBOLL

ENVIRONMENT
& HEALTH

17 August 2021

Waste Operations NSW EPA

NSW EPA

PO Box A290

SYDNEY SOUTH NSW 1232

via email: envsolclr.requests@epa.nsw.gov.au

Dear EPA

RE: Specific Immobilisation Approval Application - Lead Impacted Material

Ramboll
Level 3, 100 Pacific Highway
PO Box 560
North Sydney NSW 2060

T +61 2 9954 8100

www.ramboll.com

Ref 318000780

Waste ~~Generator/~~Owner: Transport for NSW

Applicant: Ramboll Australia Pty Ltd

Site Location: Tarago Rail Yard, Tarago NSW

Contaminants of Concern: Lead

INTRODUCTION

John Holland Rail Pty Ltd engaged Ramboll to undertake lead stabilisation trials on lead impacted material located at the Tarago Rail Yard, Tarago NSW. Ramboll has provided assessment and management advice for contamination relating to the former Woodlawn Ore Concentrate Loadout Complex that operated at the Tarago Rail Yard. Ramboll provided advice before, during and after extension of an operational rail loop over a portion of the non-operational Woodlawn rail siding. Assessment advice is consolidated in the Targao Rail Corridor and Tarago Area Detailed Site Investigation (Ramboll 2020) and an addendum to the DSI (Ramboll 2021). This application should be read in conjunction the cited reports where further information is required.

A broad range of contaminants of potential concern were assessed including TRH, BTEXN, PAH, metals, OCP, OPP, PCB and asbestos. Lead was identified as the primary contaminant of concern and was observed to be limited in distribution to fouled ballast within the rail formation and in adjacent soils.

[1] The generator will be the custodian of the Country Regional Network; scheduled to transition from John Holland Rail to UGL.

Extension of the rail loop included excavation and stockpiling of approximately 750m^3 of contaminated ballast from the Woodlawn Siding.

Figures presented as **Appendix 1** describe the site locality, site boundaries, lead concentrations at sampling locations onsite, area excavated during loop extension, areas proposed to be excavated during remediation and the footprint of the historic ore concentrate loadout complex.

This letter provides supporting information required for an Application for Specific Immobilisation Approval (SIA). **Sections 1** - **11** are numbered according to sections set out in Section B (Waste and Proposed Treatment/Immobilisation Mechanism) of an Application for a SIA. Contingency and validation plans to ensure immobilisation occurs are presented as **Sections 12** and **13**.

Abbreviations

Abbreviation	Description
CoC	Chain of Custody
CoPC	Contaminant of Potential Concern
CT	Contaminant Threshold
GSW	General Solid Waste
ha	hectare
km	kilometre
L	litre
LOR	limit of reporting
m	metre
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
MAP	Monoammonium phosphate (reagent)
MEP	Multiple Extraction Procedure (in accordance with US EPA Method 1320, 1986)
MgO	Magnesium oxide (reagent)
NATA	National Association of Testing Authorities
NEPM	National Environment Protection (Assessment of Contamination) Measure (amended 2013)
Pb	Chemical symbol for lead
pH	measure of acidity, hydrogen ion activity
QA/QC	Quality Assurance and Quality Control
RPD	Relative Percentage Difference
RSW	Restricted Solid Waste
SCC	Specific Contaminant Concentration
t	tonne
TCLP	Toxicity Characteristic Leaching Procedure (in accordance with US EPA Method 1311, 1992)
UCL	Upper Confidence Limit
XRF	X-ray fluorescence spectrometer

1. AVOIDANCE, REUSE, RECYCLING OR REPROCESSING

Avoidance: The impacted material cannot be avoided as contamination of the affected area has already occurred and the Site is required to be suitable for the proposed continued use.

Reuse: The material is impacted with total lead levels that exceed the site-specific criterion for lead (2200 mg/kg) and criteria relevant to potential offsite reuse as defined under general Resource Recovery Exemptions prepared by the NSW EPA. Therefore, no reuse applications of the impacted material have been identified.

Recycling: The material contains limited calorific value, which precludes its recycling. No recycling options for material containing elevated lead concentrations can be identified.

Reprocessing: The material is co-contaminated with soil, and no technology or market exists for its incorporation into an alternative process or as a product.

2. QUANTITY OF WASTE REQUIRING TREATMENT AND/OR DISPOSAL & ESTIMATED TIME TO COMPLETE TREATMENT AND/OR DISPOSAL

Based on assessment of the horizontal and vertical distribution of contamination at the site the volume of material requiring remediation has been estimated at 4950 m^3. This includes an estimated 100 m^3 of railway sleepers, 2100 m^3 of soil adjacent the rail formation, 2000 m^3 of fouled ballast in the Woodlawn Siding (historically used to load ore concentrates for rail transport) and approximately 750m^3 of foulled ballast already excavated to stockpile. Assessment of ballast pieces identified concentrations of lead below site criteria and so mechanical screening to remove the ballast for onsite reuse is proposed as a precursor to chemical immobilisation. The total volume of material for chemical immobilisation is estimated at 3400 m^3 (refer to **Table 1**). Applying a volume to weight ratio of 1:1.8 this equates to an estimated 6120 t.

The time estimated for treatment works of the excavated and stockpiled waste is approximately 6 weeks, which includes allowance for receipt of conformance results and off-site disposal of the treated waste.

3. FORM OF THE WASTE

The waste material, comprising a combination of railway sleepers, soil and fouled ballast, currently sits onsite, partly in stockpile and partly in situ. This material will be excavated, stockpiled and screened (<20 mm) prior to treatment.

4. BACKGROUND INFORMATION ABOUT THE WASTE

The waste material comprises a combination of railway sleepers, soil adjacent the rail formation and fouled ballast in the Woodlawn Siding, which was historically used to load ore concentrates for rail transport. Contamination of these materials has occurred from this ore loading activity. Assessment of ballast pieces identified concentrations of lead below the site-specific criterion, therefore mechanical screening to remove the ballast for onsite reuse is proposed as a precursor to chemical immobilisation.

Estimated volumes of materials requiring remediation are shown in Error! Reference source not found.**Table 1.** Waste classifications for the > 20mm and < 20mm fractions are presented in **Section 5**.

Table 1: Volume projections for remediation materials

Material Type	Volume (m^3)	Mass (t)[1]
>20 mm fraction – onsite reuse	1,450	2,610
<20 mm fraction – ballast fines requiring immobilisation	1,300	2,340
Soil adjacent the rail formation – requiring immobilisation	2,100	3,780
Railway sleepers – GSW[2]	100	180
Total	4,950	8,910

[1]Masses have been calculated based on an assumed volume to mass ratio of $1m^3$: 1.8t
[2]Lead concentrations in rail sleepers do not consistently exceed site assessment criteria, however offsite disposal was adopted during previous works and aesthetics may drive offsite disposal again.

A waste classification for the rail sleepers is presented as **Appendix 3**.

5. CHEMICAL COMPOSITION AND PHYSICAL/CHEMICAL NATURE OF THE UNTREATED WASTE

5.1 Assessment Before and After Excavation

Comparison of lead concentrations in fouled ballast from the Woodlawn Siding in-situ (before excavation) and ex-situ (after excavation and stockpiling) is summarised in **Table 2**.

Table 2: Summary of lead concentrations in Woodlawn Siding Ballast before and After Excavation

	No. of Samples	Minimum (mg/kg)	Maximum (mg/kg)	Average (mg/kg)	Standard Deviation (mg/kg)
In-situ[1]	10	350	29,000	9,136	9,005
Ex-situ	10	1300	19000	6450	4816

[1] In-situ samples results summarised above are from samples SS23 – SS25, SS31, SS38, SS41 and samples of fouled ballast from TP01 – TP03/TP03A.
[2] Ex-situ sample results summarised above are from samples RRE_SP01 – RRE_SP10.

Comparison of statistics for lead concentrations in contaminated Woodlawn Siding ballast before and after excavation indicates that excavation results in a less variable distribution of lead within the waste stream. This is to be expected as excavation occurred such that lead in remaining soils was less than 2,200 mg/kg. The same criteria has been adopted for the proposed remediation and so a similar effect should be expected for the projected waste stream. Additionally, mechanical screening to remove ballast is proposed before immobilisation and this could be expected to reduce variability of lead distribution within the waste stream.

5.2 Assessment of Contaminant Distribution by Particle Size

Assessment of contaminant distribution by particle size within Woodlawn Siding ballast was completed to refine consideration of remedial requirements. This included:

- Collection of five bulk samples (approx. 20 kg)
- Particle Size Distribution (PSD) analyses
- Crushing and analyses of the >19 mm fraction for lead
- Analyses of total lead in ballast (excluding fines) as described below.

Total lead was analysed in 18 sub-samples collected from eight bulk samples. Bulk samples were collected to provide targeted assessment of ballast (excluding fines) within the Woodlawn Siding around the historic loader and systematic assessment of ballast (excluding fines) within the remainder of the Woodlawn Siding. Sampling locations (TP3a, TP5a, TP6a and BAL_01 – BAL_05) are presented on **Figures 2a** – **2e**, **Appendix 1**. A summary assessment is presented as **Table 3**.

Table 3: Lead in Woodlawn Siding Ballast (excluding fines)

No. of Samples	Minimum	Maximum	No. > criteria[1]	Average	St Dev	95% UCL
18	13	2,800	0	546	756	1,041

[1]The site specific criterion for lead protective of human health (2200 mg/kg) was adopted.

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:

- The standard deviation of the results should be less than 50% of the relevant investigation or screening level, and
- No single value should exceed 250% of the relevant investigation or screening level.

The maximum lead concentration in Woodlawn Siding ballast (excluding fines) was 2,800 mg/kg (< 250% of the guideline) and the standard deviation was 756 mg/kg (< 50% of the guideline). The 95% UCL was therefore considered relevant and was calculated at 1,041 mg/kg and below the adopted guideline.

Assessment of lead in Woodlawn Siding ballast (excluding fines) indicates this material would be suitable for reuse onsite following separation of fines.

The arithmetic mean percentage of >20 mm and <20 mm fractions were calculated at 54% and 46% respectively and support volume estimates for material types projected for remediation (see waste volume projections presented in **Table 1**).[2]

5.3 Assessment of Untreated Waste < 20 mm Particle Size

The < 20 mm fraction includes silty-sandy-gravelly ballast fines from the rail formation and clayey surficial soils from the adjacent area. The chemical composition of impacted material has been assessed through sampling of a stockpile comprising foulled ballast that was excavated from the Woodlawn Siding during extension of the Tarago Loop (2019 – 2020) and assessed through sampling of remnant materials in situ Ramboll (2020). Relevant data for the waste material are summarised in **Table 4**, which shows that the concentrations reported for lead would classify the waste as hazardous. All other contaminants of potential concern (CoPCs) are below the General Solid Waste (GSW) criteria (**Table 4**). Copies of the NATA accredited Certificates of Analysis are included in **Appendix 2**.

Total lead concentrations were measured in the field using a field-portable X-ray fluorescence spectrometer (XRF). Collected samples were analysed for total and leachable (TCLP) lead concentrations. A review of the analytical data shows that the maximum total and leachable lead concentrations were 184,000 mg/kg and 32 mg/L, respectively.

Ramboll collected four bulk samples (4 x 20 kg), TP3A, TP4A, TP5A and TP6A, of the impacted material on 16 September 2019. The laboratory results for total lead in the bulk samples are summarised below. Copies of the NATA accredited Certificates of Analysis are included in **Appendix 2**.

- TP3A: 18,500 mg/kg lead (Pb)
- TP4A: 184,000 mg/kg lead (Pb)
- TP5A: 29,000 mg/kg lead (Pb)
- TP6A: 5000 mg/kg lead (Pb)

Lead reported at TP4A was not considered representative of the waste stream for two reasons:

- Excavation and mechanical screening are expected to increase the homogeneity of lead in the waste stream
- Lead concentrations reported in samples of fouled ballast within the Woodlawn Siding approximately 10 m north (SS56 – 48,000 mg/kg) and < 10 m south (SS57 – 83,000 mg/kg) and directly below TP4A (TP4_0.1-0.3 – 38,000 mg/kg) reported lead concentrations substantially lower than at TP4A (184,000 mg/kg)

[2] Projections of ballast and fines proportions are based on limited data and presented to provide an indication of potential volumes only.

Two samples (TP3A and TP5A) were selected for use as bulk samples for the treatment trials. Based on the laboratory results summarised in **Table 4** for samples (n = 48) collected from the site in 2019, with an average total lead concentration of 11,692.5 mg/kg and a standard deviation of 10,221.5 mg/kg, TP3A was considered to best represent the upper range of expected total lead concentrations in the waste (once excavated and stockpiled), and TP5A represents a more 'worst-case' scenario, included as a contingency. Bulk sample TP6A was considered to provide insufficient contingency if higher total lead concentrations are reported in the excavated material, and the total lead concentration in sample TP4A was considered to be well beyond the expected concentration range in the excavated material.

Table 4: Summary of analytical results for representative onsite soil samples

Analyte	CT1 - General Solid Waste1	CT2 - Restricted Solid Waste*	TCLP1	Count	Mean	S.D	Min	Max	95 UCL
Antimony	--	---	---	22	19.5	13.1	5	55	---
Arsenic	100	400	NA	33	68.3	57.4	4.9	190	91.87
Beryllium	---	---	---	22	1.0	0.0	1	1	---
Boron	---	---	---	22	5.0	0.0	5	5	---
Cadmium	100*	80	1	58	39.9	93.3	0.7	440	**93.33**
Chromium	100	400*	NA	33	39.7	36.4	2.5	130	53.22
Cobalt	---	---	---	22	9.1	6.6	2.5	30	---
Copper	---	400	---	33	988.6	938.1	20	4,100	---
Lead[1]	100	400	NA	48	11,692.5	10,221.5[3]	52	184,000	---
Manganese	---	---	---	22	509.5	269.9	70	1100	---
Mercury	4	16	NA	33	0.5	0.6	0.05	2.9	---
Molybdenum	100	400	NA	22	6.9	4.3	2.5	20	---
Nickel	40	160	NA	33	22.1	23.3	2.5	85	30.86
Selenium	20	80	NA	22	11.8	8.0	1	27	14.77
Tin	---	---	---	22	65.0	88.3	5	400	---
Vanadium	---	---	---	22	62.0	16.6	30	93	---
Zinc	---	---	---	33	1589.7	2,360.8	130	12,000	---

[1]Total cadmuim concentrations in three TP4A sub-samples (TP4A_01 – TP4A_03) were reported at 130 – 190 mg/kg and these results were included in calcualtion of the 95% UCL for assessment against CT1 criteria.

[2]Lead concentrations at TP4A and SS57 have been included in characterisation of lead in the waste stream however they are considerd indicative of the degree of contamination likley within the fines of only 15m^3 of fouled ballast (ie: approximately 7.4 m^3 of fines). This is based on limitations on the extent of these concentrations inferred by a large concrete footing remaining across the Woodlawn Siding adjacent (south of) SS57 and by sample results below and around TP4A. The volume of fines represented by TP4A and SS57 as a percentage of the total volume of projected fines (3,400 m^3) is calculated at 0.2 %. Within this context the lead concentrations at TP4A and SS57 are considered outliers to the dataset for representative onsite soil samples though are included for transparency.

[3]The standard deviation for total lead concentrations has been calculated excluding TP4A and SS57 as these results are considered results are considered outliers. Further, while the standard deviation presented in **Table 4** is considered representative of variability in the distribution of lead in soils in-situ, the distribution of lead in the waste stream following excavation and mechanical screening is likley to be lower.

The numbers of analyses summarised in **Table 4** represent core analyses of 22 samples across 17 metals and additional targeted analyses of select metals including cadmium and lead where concentrations were observed at or above waste classification criteria. The sampling completed is considered adequate to characterise the waste material to be immobilised.

Bulk samples were selected for the treatability trial with lead concentrations approaching or above the sum of the average and standard deviation of lead concentrations from representative onsite soil samples as presented in **Table 4**. (ie: approaching or above 21,914 mg/kg). The selected bulk samples, TP3A and TP5A, were homogenised and screened (<20 mm) and analysed for total (SCC) and leachable (TCLP) lead, which are summarised in **Table 4**. Copies of the NATA accredited laboratory Certificates of Analysis are included in **Appendix 2**.

Table 5: Total and leachable (TCLP) lead results in the untreated bulk samples used for the treatment trials

Sample ID	Total (SCC) Pb mg/kg	TCLP pH 5.0 Pb mg/L	TCLP Leachate Initial pH	TCLP Leachate Final pH
General solid criteria	**1500**	**5**	--	--
Restricted solid criteria	**6000**	**20**	--	--
TP3A_A_SCR	16,000	14	2.9	5
TP3A_B_SCR	15,000	28	3.1	5
TP3A_C_SCR	19,000	10	3.1	5
TP3A_D_SCR	10,000	35	3.3	5
Mean	**15,000**	**22**	**3.1**	**5**
TP5A_A_SCR	39,000	190	7.1	5
TP5A_B_SCR	35,000	180	4.3	5
TP5A_C_SCR	37,000	190	4.3	5
TP5A_D_SCR	19,000	140	5.3	5.1
Mean	**32,500**	**175**	**5.0**	**5**

Analytical results for bulk samples TP3A and TP5A used in the treatability trials show the mean total lead concentrations were 15,000 and 32,500 mg/kg, respectively, and the mean leachable (TCLP) lead concentrations were 22 and 175 mg/L, respectively. These lead concentrations would result in both materials being classified as Hazardous Waste in accordance with the NSW Waste Classification Guidelines (2014).

6. CHEMICAL CONTAMINANTS OF CONCERN

The contaminant for which specific immobilisation approval is sought is lead.

7. PROPOSED TREATMENT METHOD OR PROCESS

To address the lead contamination in the waste material, it is proposed to use the chemical immobilisation reagent magnesium oxide (MgO), based on the treatability trial results presented in **Section 9**. Whilst the treatability trial results indicated other reagents, such as a phosphate-based reagent (for example, monoammonium phosphate, MAP), provided no additional improvement to either the short-term (TCLP) or long-term (MEP) leachability results (**Section 9**) EPA requested a minimum application of MAP be included to ensure the best environmental outcome whilst also ensuring a level of consistent regulation of SIA within NSW.

The proposed treatment method will involve initial homogenisation of the waste with sufficient water to produce a moist, spadeable mixture that would have sufficient moisture to facilitate formation of insoluble lead phosphate compounds upon addition of MAP and MgO to ensure adequate pH adjustment (discussed further in **Section 8**). The waste will be thoroughly mixed with the appropriate amounts of reagents using a high shear mixer for waste treatment projects in accordance with NSW EPA

Immobilisation Technical Note 1 - *Process Equipment for Treatment of Contaminated Soil and Sludge Waste*. The resulting treated waste will be stockpiled in a holding bay to cure, awaiting laboratory validation before off-site disposal.

Based on stoichiometric calculations presented in **Section 9**, **2.0% MAP** and **5% MgO** have been adopted as reagent additive loadings for the proposed treatment.

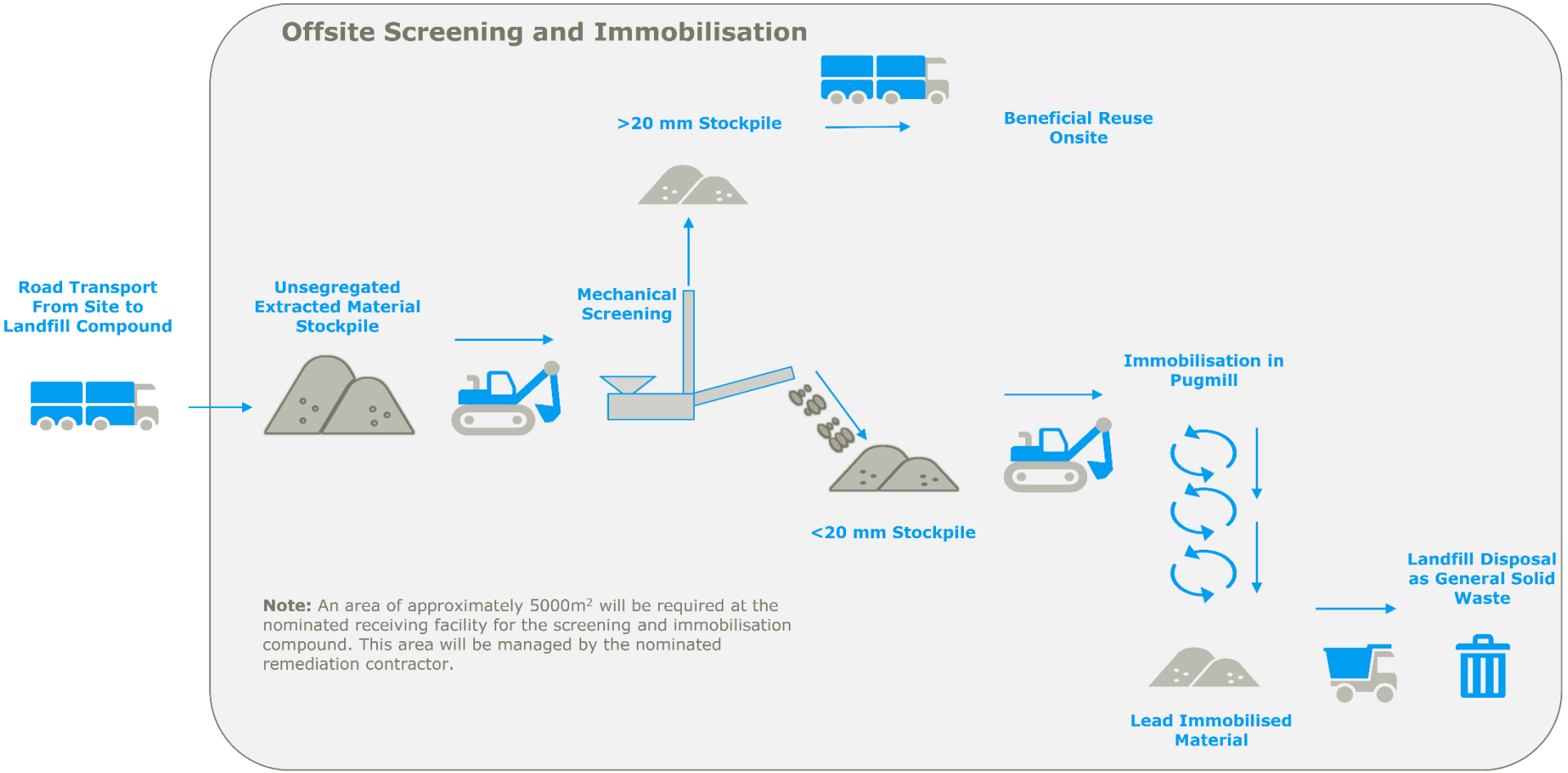
The total volume of waste following application of reagents is estimated at 3,638 m^3 (3400 * 1.07). The total mass of waste following application of reagents is estimated at 6,580 t (3,655 * 1.8).

The proposed remedial methodology comprises the following key steps:

- Acquire necessary approvals for the selected remedial option including:
    - A SIA for lead in waste streams not suitable for disposal as GSW
    - Amendment to development consent conditions and Environmental Protection Licence (EPL) for the nominated receiving facility
- Remove remnant rails for recycling and sleeper for disposal as GSW. A waste classification for sleepers is presented in the Tarago Rail Corridor Remedial Action Plan (Ramboll 2021)
- Establish a work zone at the nominated receiving facility for temporary storage, mechanical screening and immobilisation of material excavated from the Woodlawn Siding and adjacent soils
- Excavate and transport materials from the Woodlawn Siding and adjacent soils to the receiving facility at the work zone. Materials will be excavated until lead concentrations at the remnant site surface (as measured by field-portable-XRF) are lower than the site assessment criteria (2200 mg/kg) and confirmed by laboratory analysis
- Mechanically screen materials excavated from the Woodlawn Siding and adjacent soils into <20 mm and >20 mm fractions[3]
- Validate suitability of >20 mm fraction for beneficial reuse onsite through post-screening sampling
- Immobilise the <20 mm fraction in accordance with the SIA (following EPA approval of the SIA).
- Validate successful immobilisation
- Dispose of lead immobilised materials as GSW at the nominated facility.

A process diagram for screening and immobilisation is presented in **Figure 1.**

Figure 1: Screening and Immobilisation Process Diagram



8. SCIENTIFIC EVIDENCE/JUSTIFICATION

The proposed remediation methodology involves chemical immobilisation of leachable lead to form insoluble lead phosphate minerals. The process will also use MgO to buffer the soil pH. Soil pH and pH buffering capacity are important to the long term success of the stabilisation process for soils in order to prevent lead remobilising with time. Chemical immobilisation of lead is generally a preferable treatment to cement stabilisation as the latter relies on maintaining physical solidification, and the pH is unlikely to be in the optimal target range.

The aim of immobilisation treatment is to chemically convert the soluble heavy metal compounds in the waste material into thermodynamically more stable compounds with considerably less solubility. The immobilisation of heavy metals in waste materials depends on factors such as solid-solution equilibrium, or the solubility product (Ksp) of the solid phase. The leaching of metals is pH dependent, and the solubility of several heavy metal hydroxides, such as lead, is minimal within pH range 9-11, and preferably pH 9.4 to 10.2 (Smith, 1996). Figure 2 shows metal hydroxide solubility curves (theoretical), indicating the solubility of the common heavy metal ions and their respective solubility versus pH. Several metals, including lead, cadmium, copper and zinc are amphoteric, being soluble at both alkaline and acid conditions. The use of dolomitic limes containing MgO have been shown to act as a buffering agent within the pH 9-11 range, minimising heavy metal solubility and avoiding the re-dissolution that can occur by using lime reagents only, due to highly alkaline conditions (Smith, 1996; García et al., 2004, Nolan and Lunsmann, 2013).

Several metals are also known to form highly insoluble compounds with phosphate (e.g. cadmium, lead, zinc). Phosphate containing materials such as phosphorus fertilisers have been used effectively to precipitate lead as either pyromorphite, plumbogummite or other lead bearing minerals (Aide et al., 2008). Of the lead phosphate minerals, the most insoluble are the pyromorphites ($Pb_5(PO_4)_3X$ where X is either F^-, OH^-, Br^- or Cl^-). Chloropyromorphite is the most insoluble of the lead phosphate minerals and has the capability of controlling lead solubility throughout the pH range of most soils (Lindsay, 1979; Cao et al., 2003). The theoretical solubility products of the various pyromorphites are $10^{-71.6}$, $10^{-76.8}$, $10^{-78.1}$ and $10^{-84.4}$ for fluoro, hydroxyl, bromo and chloro pyromorphites, respectively (Miretzky and Fernandes-Cirelli, 2008). However, these solubilities are rarely achieved in the field due to various factors such as the degree of crystallinity, phase purity, particle size and the presence of more soluble lead minerals (Xie and Giammar, 2007). Nevertheless, phosphate treatment is widely accepted as the most appropriate means of lead immobilisation in soils (Miretzky and Fernandes-Cirelli, 2008; ITRC, 2003) and has been included by US EPA in their Best Management Practice for firing ranges as a viable lead immobilisation technology, where lead occurs in its metallic form as well as various carbonates and oxides (US EPA, 2001). Pyromorphite formation is kinetically controlled by pH, the solubility of the phosphate source and the solubility of the lead species (Chrysochoou et al., 2007). Under appropriate conditions the formation of pyromorphite is a rapid reaction (Chrysochoou et al., 2007; Miretzky and Fernandes-Cirelli, 2008).

MAP is a commercially available fertiliser with an effective solubility in water of 36 g/100 mL (at 20°C). MAP [$NH_4H_2PO_4$] will dissolve in moist soil to give $H_2PO_4^-$, which would react with soluble lead species to form insoluble compounds (Aide et al., 2008; ITRC, 2003), as shown in Reaction 1:

$(H_2PO_4^-)_3 + 5Pb^{2+} + H_2O = Pb_5(PO_4)_3OH + 7H+$.....(Reaction 1)

where:

$H_2PO_4^-$ is dihydrogen phosphate, the primary P-bearing compound in MAP

$Pb_5(PO_4)_3OH$ is hydroxypyromorphite

Potential excess acidity (H^+) produced by Reaction 1 will be neutralised by application of MgO. Notably, in the presence of calcite (calcium carbonate, $CaCO_3$), MAP can act as a weak acid and may form hydroxyapatite ($Ca_5(PO_4)_3OH$) in preference to the formation of pyromorphite. This process may significantly increase the amount of MAP required to stabilise lead impacted soils in areas with high calcite (Aide et al., 2008; Porter et al., 2004). In order to minimise the amount of MAP required for chemical stabilisation it is preferable that any proposed pH buffering source does not include calcium. Contaminants are not expected to be present in the MAP at any significant concentrations as this fertiliser is routinely used in agriculture for food crops and hence would need to be free from contaminants.

As noted, there are numerous lead phosphate species produced by the reaction of lead salts with phosphate and the exact solid phase speciation produced in the trial is difficult to determine. Results for the treatability trials conducted by Ramboll showed that the lead leachability was significantly reduced (>99.8% for pH 5 leachate) for samples treated with MAP (2-4%) and MgO (5-15%).

Results from previous studies (Ryan and Zhang, 2000) of chemical and X-ray diffraction (XRD) analysis, scanning electron microscopy (SEM) and scanning transmission electron microscopy (STEM) strongly support the mechanism of hydroxypyromorphite precipitation. However, XRD analysis of immobilised lead impacted soils are generally inconclusive based on the difficulty in identifying species at relatively low concentrations of lead (<2-3%).

Addition of water during the mixing of waste with the proposed treatment reagents, MAP and MgO, is recommended to facilitate the chemical immobilisation and minimise the generation of dust.

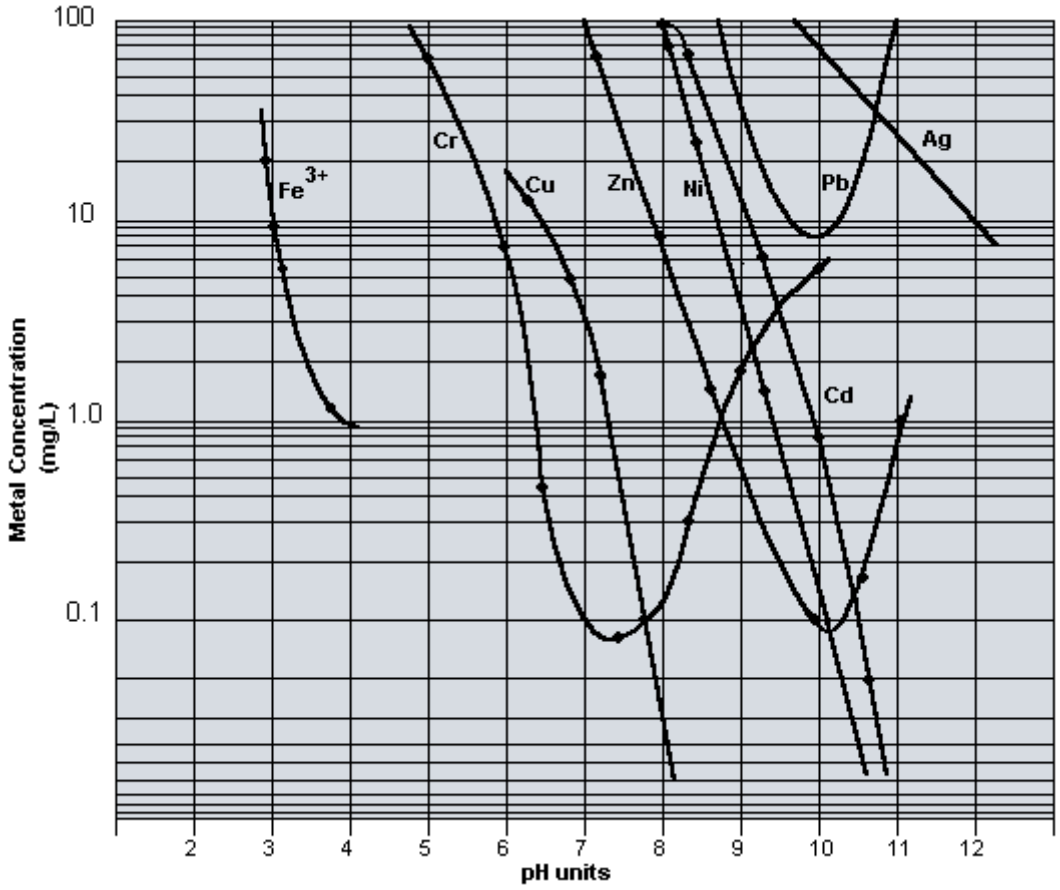


Figure 2: Metal hydroxide solubility curves (theoretical) (US EPA 1994).

9. TREATABILITY

Ramboll conducted the bench-scale treatability trial on 17 February 2021 using representative contaminated bulk samples, TP3A and TP5A, which were each pre-screened to <20 mm maximum particle size and homogenised. The soil samples were silty-sandy-gravelly soils, and were reddish brown in colour (TP3A, **Figure 3**) or light brown in colour (TP5A, **Figure 4**). The bulk samples were analysed for untreated total and leachable (TCLP) lead concentrations (**Table 4**).

For each treatment, sub-samples (600 g) of the homogenised bulk material were weighed into a mixing vessel followed by the appropriate amount(s) of reagents (**Table 5**), with sufficient water to moisten the soil, and thoroughly mixed using a hand-trowel. Hand mixing was considered the most effective method for mixing the amounts of material used for the treatments in this trial and has been previously demonstrated on a range of soil treatment projects to replicate full-scale treatment.

Figure 3. Homogenised bulk sample TP3A used in the lead immobilisation trials.

Figure 4. Homogenised bulk sample TP5A used in the lead immobilisation trials.

Treatments were conducted using MgO and/or MAP over a range of additive ratios (**Table 3**) based on Ramboll's previous experience with treatability trials for lead impacted soils. For all treated samples, the waste and reagent mixes were hydrated sufficiently (close to maximum water holding capacity) to facilitate formation of the stable lead compounds.

All treated samples were cured for at least 24 hours prior to post-treatment analysis of total (SCC) and leachable (TCLP) lead. All chemical analyses were conducted by Eurofins laboratory in Sydney, a NATA accredited laboratory and conducted the testing in accordance with quality

assurance protocols. Results for the treatment trial are summarised below in **Table 5**. Copies of the laboratory Certificates of Analysis are included in **Appendix 2**.

Table 5: Total (SCC) and leachable (TCLP) lead (Pb) concentrations in the treated waste (MAP = monoammonium phosphate; MgO = magnesium oxide).

Sample ID	Reagents		Total (SCC) Pb mg/kg	TCLP pH 5.0 Pb mg/L[1]	%Reduction	TCLP Leachate Initial pH	TCLP Leachate Final pH
	%MAP	%MgO					
General solid criteria	**--**	**--**	**1500**	**5**	--	--	--
Restricted solid criteria	**--**	**--**	**6000**	**20**	--	--	--
Untreated Samples							
TP3A_A_SCR	--	--	16,000	14	--	2.9	5
TP3A_B_SCR	--	--	15,000	28	--	3.1	5
TP3A_C_SCR	--	--	19,000	10	--	3.1	5
TP3A_D_SCR	--	--	10,000	35	--	3.3	5
Mean	--	--	**15,000**	**22**	--	**3.1**	**5**
TP5A_A_SCR	--	--	39,000	190	--	7.1	5
TP5A_B_SCR	--	--	35,000	180	--	4.3	5
TP5A_C_SCR	--	--	37,000	190	--	4.3	5
TP5A_D_SCR	--	--	19,000	140	--	5.3	5.1
Mean	--	--	**32,500**	**175**	--	**5.0**	**5**
Treated Samples							
TP3A_TR01-1	--	5%	8,200	<0.01	>99.9	9.2	9.0
TP3A_TR01-2	--	5%	--	<0.01	>99.9	9.3	9.0
Mean				**<0.01**	**>99.9**	**9.2**	**9.0**
TP3A_TR02-1	--	10%	9,600	<0.01	>99.9	9.5	9.2
TP3A_TR02-2	--	10%	--	<0.01	>99.9	9.5	9.3
Mean				**<0.01**	**>99.9**	**9.5**	**9.3**
TP3A_TR03-1	2%	5%	18,000	0.01	99.9	9.7	8.8
TP3A_TR03-2	2%	5%	--	0.03	99.9	9.7	9.2
Mean				**0.02**	**99.9**	**9.7**	**9.0**
TP3A_TR04-1	3%	5%	9,500	<0.01	>99.9	8.8	8.5
TP3A_TR04-2	3%	5%	--	0.04	99.8	8.9	8.3
Mean				**0.03**	**99.9**	**8.9**	**8.4**
TP3A_TR05-1	2%	10%	9,900	<0.01	>99.9	9.6	9.3
TP3A_TR05-2	2%	10%	--	0.04	99.8	9.6	9.3

Sample ID	Reagents		Total (SCC) Pb mg/kg	TCLP pH 5.0 Pb mg/L[1]	%Reduction	TCLP Leachate Initial pH	TCLP Leachate Final pH
	%MAP	%MgO					
Mean				**0.03**	**99.9**	**9.6**	**9.3**
TP3A_TR06-1	3%	10%	9,100	0.03	99.9	9.6	8.9
TP3A_TR06-2	3%	10%	--	0.01	99.9	9.5	9.0
Mean				**0.02**	**99.9**	**9.6**	**9.0**
TP5A_TR01-1	--	5%	17,000	0.19	99.9	9.7	9.2
TP5A_TR01-2	--	5%	--	<0.01	>99.9	9.8	9.0
Mean				**0.10**	**99.9**	**9.8**	**9.1**
TP5A_TR02-1	--	10%	15,000	0.05	>99.9	9.7	9.2
TP5A_TR02-2	--	10%	--	0.02	>99.9	9.7	9.2
Mean				**0.04**	**>99.9**	**9.7**	**9.2**
TP5A_TR03-1	2%	5%	18,000	0.03	>99.9	9.7	8.7
TP5A_TR03-2	2%	5%	--	0.03	>99.9	10	8.7
Mean				**0.03**	**>99.9**	**9.9**	**8.7**
TP5A_TR04-1	3%	5%	20,000	0.05	>99.9	9.9	9.2
TP5A_TR04-2	3%	5%	--	<0.01	>99.9	9.4	9.0
Mean				**0.03**	**>99.9**	**9.7**	**9.1**
TP5A_TR05-1	2%	10%	10,000	<0.01	>99.9	9.8	9.1
TP5A_TR05-2	2%	10%	--	0.01	>99.9	9.8	9.4
Mean				**0.01**	**>99.9**	**9.8**	**9.3**
TP5A_TR06-1	3%	10%	13,000	0.05	>99.9	9.9	9.4
TP5A_TR06-2	3%	10%	--	0.02	>99.9	9.8	9.3
Mean				**0.04**	**>99.9**	**9.9**	**9.4**
TP5A_TR07-1	4%	15%	12,000	0.08	>99.9	9.6	9.4
TP5A_TR07-2	4%	15%	--	0.05	>99.9	9.6	9.3
Mean				**0.07**	**>99.9**	**9.6**	**9.4**

[1]For calculation of mean results, the LOR was used if one of the duplicate results reported as <LOR

Results for the treated samples in **Table 5** demonstrate that each of the treatments successfully reduced the leachable lead to concentrations well below the GSW criterion of 5 mg/L lead (Pb) for both bulk samples, TP3A and TP5A, with >99.8% reduction in leachable (TCLP, pH 5) lead achieved for all treatments. Whilst bulk samples TP3A and TP5A used in the trial were pre-screened to <20 mm maximum particle size and homogenised, some variability is observed in the untreated total and leachable lead results, as well as the treated total lead results. However, this variabilty in lead concentrations is in line with previous lead immobilisation trials for soils undertaken by Ramboll and demonstrates the inherent

heterogeneity of lead contamination in the soil. However, despite this level of heterogeneity, each of the treatments consistently achieved >99.8% reduction in leachable lead concentrations, with duplicate samples included for each treatment.

The heterogeneity of total lead in soil at full-scale treatment will be addressed by ensuring the concentration of phosphate added to the soil is in excess of the **mean concentration** reported for total lead in untreated bulk sample TP5A (**Table 4**, 32,500 mg/kg), considered to represent a worst case scenario for total lead in soil (once excavated and screened) and provides an appropriately conservative approach.

The following stoichiometric calculation provides the upper limit of total lead able to be treated with the proposed 2.0% MAP:

- Molar mass of lead = 207.2 g
- Molar mass of MAP ($NH_4H_2PO_4$) = 115.3 g
- Molar mass of PO_4 = 94.7 g
- %PO_4 in MAP = 94.7/115.3 = 82.4%
- Mole ratio of PO4:Pb (assuming formation of hydroxypyromorphite, $Pb_5(PO_4)_3OH$) = 3:5 (0.6)

Mean concentration of total lead in soil (TP5A) = 32,500 mg/kg = 32.5 g/kg

Moles of mean total lead per kg of soil (TP5A) = 32.5/207.2 = 0.1569 moles

Mass of phosphate added per kg soil at 2.0% (20 g/kg) MAP additive ratio = 82.4% x 20 (g/kg MAP) = 16.48 g/kg

Moles of phosphate added per kg soil at 2.0% MAP additive ratio = 16.48/115.3 = 0.1429

Moles of PO_4 required (to be in excess of mean total lead) = 0.1568 x 0.6 = 0.0941

Upper limit of total lead able to be treated with 2.0% MAP = 0.1429 x (5/3) = 0.2381 moles = 0.2381 x 207.2 = 49.33 g/kg = 49,330 mg/kg

The stoichiometric calculation above shows that addition of 2.0% MAP to soil provides an amount of phophate in excess of the mean amount of lead in untreated sample TP5A (32,500 mg/kg), on a mole ratio basis assuming formation of hydroxypyromorphite, where sample TP5A is considered a worst case scenario from representative site sampling. Assuming 100% of total lead in soil became leachable over time (a very conservative estimate), for addition of 2.0% MAP, the upper limit of lead contamination able to be treated would be 49,330 mg/kg.

In order to provide evidence of the long term stability of the treated waste, four of the treated samples, TP3A-TR01-1 (5% MgO), TP3A-TR03-1 (2% MAP, 5% MgO), TP5A-TR01-1 (5% MgO) and TP5A-TR03-1 (2% MAP, 5% MgO), were selected for MEP analysis (lead), based on the minimum amount of reagent required to successfully treat both bulk samples, which are presented in **Table 6**. These results show:

- All four MEP results remained relatively stable over the 10 sequential extractions and were well below the GSW criterion of 5 mg/L Pb.
- The final pH of the leachate also remained relatively stable, with the leachate pH at Day 10 ranging from 9.1 to 9.8, close to the minimum point of solubility for lead.
- There appeared to be little difference in the MEP results for TR01 (5% MgO) vs TR03 (2% MAP, 5% MgO) for both bulk samples, indicating MAP is not required to achieve long term stability of the treated waste.
- Whilst there was some variability across the 10 MEP extractions for each sample, these results are similar to previous MEP results reported for lead immobilised wastes and is

likely related to the low concentrations detected and/or heterogeneity of lead in the sample, where the amount of lead exposed to leachate during each test may vary.
- There was one anomalously higher leachate result of 1 mg/L for TP5A_TR01-1 on Day 9 (however results on Day 8 and Day 10 were below the LOR of 0.01 mg/L), hence it is likely this result was an anomaly, however it is still five times below the GSW criterion for lead.

Based on the treatment trial results presented in **Table 5** and **Table 6**, the stoichiometric calculation presented above and EPA endorsement of the use of both MAP and MgO, it is proposed to use **2.0% MAP** and **5% MgO** to chemically immobilise the leachable lead in the waste material from the Site. Whilst addition of MAP did not appear to provide substantial improvement to either the short term (TCLP) or long term (MEP) treatment results, EPA endorse the immobilisation of metals such as lead through both chemical immobilisation and pH buffering to ensure the best environmental outcome whilst also ensuring a level of consistent regulation of SIA within NSW.

10. ABILITY TO REPRODUCE THE PROCESSES, AND QUALITY ASSURANCE

The remediation contractor undertaking the waste treatment shall have an Environmental Management System with third party accreditation to ISO14001 and work under the framework of an integrated Management Plan for the remediation works. As part of this plan, Work Procedures, Inspection and Test Plans and Inspection and Test Reports will be developed for specific tasks such as the proposed on-site treatment works.

The Work Procedure and Inspection and Test Plan will cover aspects such as:

- Materials tracking and batch formation
- Sampling procedures (composite sampling) and results reporting including accept/reject criteria
- Analytical testing to be undertaken by NATA accredited testing bodies.

Sampling of the treated stockpiled waste will take place at a rate of 1 sample per 25 m^3 of waste for analytical testing. Samples will be dispatched to a NATA accredited laboratory for TCLP and total lead analyses. Conformance of the waste material will be based on an accept/reject procedure determined by calculation of 95% UCL for chemical contaminants. Further details are presented in **Section 13**. Additionally a formal contingency plan has been prepared and is presented in **Section 12** to define actions if lead leachate in treated waste is reported above SCC1.

This remediation project is subject to audit, and a full Validation Sampling, Analysis and Quality Plan (VSAQP) will be developed and signed off by the auditor. The project implementation will also be overseen by the auditor.

TP3A_TR01-1	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
Leachate Fluid	4	4	4	4	4	4	4	4	4	4
pH (initial)	9.4	8.7	8.8	9.3	8.8	9	9.1	9.7	9.7	9.2
pH (Leachate fluid)	6.8	5.1	6.8	6.8	6.8	6.8	6.2	6.2	6.2	6.2
pH (off)	9.6	9.2	9.5	9.5	9.3	9.3	9.8	9.3	9.3	9.1
Lead (mg/L)	<0.001	0.001	0.003	0.002	<0.001	0.002	<0.001	<0.001	0.004	0.017
TP3A_TR03-1	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**	**Day 6**	**Day 7**	**Day 8**	**Day 9**	**Day 10**
Leachate Fluid	4	4	4	4	4	4	4	4	4	4
pH (initial)	9.1	8.7	8.9	9.3	9	9.4	9	9.7	9.7	9.3
pH (Leachate fluid)	6.8	5.1	6.8	6.8	6.8	6.8	6.2	6.2	6.2	6.2
pH (off)	9.5	9.3	9.5	9.4	9.6	9.5	9.5	9.4	9.4	9.4
Lead (mg/L)	0.12	0.001	0.004	0.13	0.001	0.002	<0.001	0.013	0.015	0.003
TP5A_TR01-1	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**	**Day 6**	**Day 7**	**Day 8**	**Day 9**	**Day 10**
Leachate Fluid	4	4	4	4	4	4	4	4	4	4
pH (initial)	9.6	9.1	9.5	9.8	9.6	9.9	9.6	9.9	9.8	9.8
pH (Leachate fluid)	6.8	5.1	6.8	6.8	6.8	6.8	6.2	6.2	6.2	6.2
pH (off)	10	9.6	9.5	9.8	9.8	9.7	9.9	9.7	9.7	9.8
Lead (mg/L)	0.002	<0.001	0.017	0.075	0.004	0.003	0.058	<0.001	1	<0.001
TP5A_TR03-1	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**	**Day 6**	**Day 7**	**Day 8**	**Day 9**	**Day 10**
Leachate Fluid	4	4	4	4	4	4	4	4	4	4
pH (initial)	9.4	8.9	9.3	9.7	9.4	9.9	9.5	10	9.9	9.7
pH (Leachate fluid)	6.8	5.1	6.8	6.8	6.8	6.8	6.2	6.2	6.2	6.2
pH (off)	10	9.7	9.7	9.8	9.8	9.8	10	9.8	9.8	9.8
Lead (mg/L)	<0.001	0.036	0.031	0.053	0.047	0.042	<0.001	0.016	0.017	0.001

11. PROPOSED DISPOSAL LOCATION

It is proposed the treated and validated material will be disposed to a local landfill (to be confirmed) once the amendment to development consent conditions and EPL for the nominated receiving facility are approved.

12. CONTINGENCY PLAN

The contingencies presented in **Table 12-1** are to be implemented where unexpected site conditions or circumstances occur.

Table 12-1: Contingency Plan

Contingency Event	Contingency Action	Personnel Responsible
Validation sampling indicates screened ballast is unsuitable for onsite reuse	Further removal of contaminated fines or immobilisation and disposal	Remediation Contractor following consideration from Principal and Principal's Environmental Representative
Validation sampling of immobilised material indicates not suitable for disposal as immobilised GSW	Further immobilisation will occur	Remediation Contractor following consideration from Principal and Principal's Environmental Representative
Discovery of unexpected materials	Contact the Principal's representative, sort materials into a segregated stockpile and discuss possible disposal options with the Principal or the Principal's Representative	Principal, following notification from the Remediation Contractor

13. VALIDATION PLAN

The following is the validation Sampling and Analysis Quality plan (SAQP) to be implemented to validate the screening and immobilisation of lead contamianted waste from the Tarago Rail Yard.

13.1 Validation Data Quality Objectives

Specific Data Quality Objectives (DQOs) have been developed for the validation of field and analytical data obtained during the remediation. The DQO process is a systemic, seven step process that defines the criteria that the validation sampling should satisfy in accordance with the requirements of NSW EPA (2017) *Guidelines for the NSW Site Auditor Scheme* (3rd Edition). DQOs specific to the screening and immobilisation of waste from the Tarago Rail Yard are presented below.

13.1.1 Step 1: State the Problem

Lead impacted soil exists at the site. Remediation is required to mitigate potential exposure risks into the future. The proposed remedial strategy includes excavation of lead impacted material, transport to a landfill for mechanical screening to remove ballast and chemical immobilisation of lead in fines, return of ballast for reuse at the site and dispsoal of fines as immobilised GSW.

13.1.2 Step 2: Identify the Decisions

The validation SAQP is to ensure that contaminated material excavated from the Woodlawn Siding and surrounding soils (described in further detail on **Figures 2a** – **2e**) is appropratiely screened to allow onsite reuse of ballast and immobilised to allow offsite disposal under a SIA.

13.1.3 Step 3: Identify Inputs to the Decision

The following inputs into the decision-making process are required:

- fpXRF measurement of lead concentrations to refine excavation areas onsite before excavation commences
- Documented materials tracking of all material movements including source excavation, transport. Screening and immobilisation, return of ballast to site and disposal of immobilised GSW
- fpXRF measurement of lead during remediation to define vertical and horizontal excavation limits onsite
- Validation sampling of screened ballast and analyses for total lead to confirm suitability for reuse onsite
- Validation sampling of immobilised ballast fines for TCLP lead to confirm suitability for disposal as immobilised GSW
- fpXRF measurement of lead in the screening and immobilisation compound before establishment of the compound and at completion of remediation
- Survey of validation excavations to define contaminated areas remaining onsite

13.1.4 Step 4: Define the Study Boundary

The study boundary includes proposed excavation areas onsite (the Woodlawn Siding and surrounding soils as defined on **Figures 2a** – **2e**) and the screening and immobilisation compound.

13.1.5 Step 5: Development of Decision Rules

Data will be considered reliable if it satisfies the limits of decision error defined in **Section 13.1.6**.

Excavation will be considered sufficient when lead concentrations in remnant soils onsite are below the nominated remediation criteria of 2,200 mg/kg or excavation must be limited to preserve the structural integrity of operational lines.

Screened ballast will be considered suitable for reuse if the 95% UCL of lead concentrations in screened ballast after remediation is less than the nominated remediation criteria of 2,200 mg/kg.

Ballast fines will be considered suitable for disposal as immobilised GSW if the 95% UCL of lead leachate (TCLP) is less than the limit for lead leachate in GSW defined in the NSW EPA Waste Classification Guidelines (TCLP1 – 5 mg/L).

Clean-up of the screening and immobilisation compound after remediation will be considered complete when the 95% UCL of lead concentrations in remnant surface soils is below either the Tier 1 health investigation level for lead industrial land or the 95% UCL of lead concentrations in remnant surface soils before establishing the compound.

13.1.6 Step 6: Specify Performance Criteria

Validation performance criteria are defined to assess potential for a false positive or false negative in validation data. Performance criteria for fpXRF measurements of lead in soil, and sampling for laboratory analyses of surface water and airborne dust are presented in **Table 13-1** below.

Table 13-1 Performance Criteria for Validation Sampling

	fpXRF Measurements	**Sampling of Screened Ballast and Immobilised Ballast Fines**
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 US EPA 2007, *Method 6200, Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment*.	Soil sampling for laboratory analyses will occur in general accordance with *AS 4482.1-2005 Guide to the investigation and sampling of sites with potentially contaminated soil - Non-volatile and semi-volatile compounds* and *AS 1141.3.1 – 2012 Methods for Sampling and Testing Aggregates, Method 3.1: Sampling – Aggregates*
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:	• XRF readings will be collected by an experienced scientist holding a NSW EPA license required for field based XRF testing • XRF readings will be collected from soil in-situ and measurements will be taken by placing the XRF directly on the ground surface. • the soil surface to be measured will be cleared of debris and grass prior to taking the measurement to ensure that there is no obstruction, that the analyser window is protected and that contact with the sample surface is maintained during measurements. • As moisture is known to affect measured concentrations, visually dry surfaces will be chosen for measurement. • Soil sampling for confirmatory laboratory analyses will occur in general accordance with *AS 4482.1-2005 Guide to the investigation and sampling of sites with potentially contaminated soil - Non-*	In the field, precision will be maintained by: • Using standard operating procedures for the collection of soil samples. • Collection of soil samples by suitably experienced environmental scientists. • Use of disposable nitrile rubber gloves between sampling locations. • Placement of samples directly into designated single use sampling containers. • Collection of intra-laboratory and inter-laboratory duplicate samples at a rate of 1 in 20 primary samples. • Collection of one rinsate sample on reusable sampling equipment at the end of each day. • Recording of sample identification and analytical requirements on chain of custody documents. • Samples transported to the laboratory under chain of custody conditions to a laboratory with NATA

	fpXRF Measurements	**Sampling of Screened Ballast and Immobilised Ballast Fines**
	volatile and semi-volatile compounds. This will include: ○ Collection of samples by a suitably experienced environmental scientist ○ Use of disposable nitrile rubber gloves between locations ○ Soil samples will be placed immediately into laboratory supplied and appropriately preserved sampling vessels. ○ Sample numbers, preservation and analytical requirements are to be recorded on chain of custody documents. • Samples are to be transported to the laboratory under chain of custody conditions to a laboratory with NATA accreditation for COPCs.	accreditation for the analytical methods prescribed. • 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:	• All locations sampled as outlined in **Section 13.1.7**. • Sampling completed by experienced personnel • Field documentation completed correctly	• All locations sampled as outlined in **Section 13.1.7**. • Sampling completed by experienced personnel • Field documentation completed correctly
Representativeness: The representativeness of the field data will be judged by:	• Non-disposable sampling equipment, such as the hand auger, will be thoroughly decontaminated between locations using Decon 90 solution and deionised rinsate water. • At each location, a pair of disposable nitrile gloves will be	• Non-disposable sampling equipment, such as the hand auger, will be thoroughly decontaminated between locations using Decon®90 solution and deionised rinsate water. • At each location, a pair of disposable nitrile gloves will be worn while sampling and

	fpXRF Measurements	**Sampling of Screened Ballast and Immobilised Ballast Fines**
	worn while sampling and handling the sample; gloves will be replaced between each successive sample. • Soil analytical samples will be collected directly into the sampling vessels.	handling the sample; gloves will be replaced between each successive sample. • 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:	• Use of the same appropriate sampling methodologies • Same sampling depths will be used (i.e.: 0-0.05 mbgl) • Analytical samples will be collected for submission to the laboratory • Photographs will be taken of sampling location conditions at the time of sampling.	• Use of the same appropriate sampling methodologies • Same sampling depths will be used (where practical) • Analytical samples will be collected for submission to the laboratory • Photographs will be taken of sampling location conditions at the time of sampling.

Performance criteria for analyses of soil duplicates are defined as follows:

- Data will be analysed adopting RPD control limits of +/- 30%.
  Where concentration levels are less than two times the PQL, the Absolute Difference (AD) shall be calculated. Data will be considered acceptable if the: AD <2.5 times the PQL.

  Any data which does not conform to these acceptance criteria will be examined for determination of suitability.
- 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.

Decision Error Protocol

If the data received is not in accordance with the defined acceptable limits outlined in Steps 5 and 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:

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

Rectifying Non-conformances

If any of the validation procedures or criteria identified are not followed or met, this will constitute a non-conformance. The significance of the non-conformance will determine if rectification is required after discussion with the site auditor. In order to address any non-conformances, the Principal's Environmental Representative must assess the significance of each non-conformance and put their conclusion and recommendation to the auditor for approval.

13.1.7 Step 7: Optimise the Design for Obtaining Data

All validation samples are to be collected in accordance with the DQOs outlined in this Section.

Validation samples, frequency of collection, the analysis required, and justification is presented in **Table 13-2**.

Table 13-2: Validation Plan

Validation Method	Validation Requirements	Measurement / Analyses
Validation of remnant soils	fpXRF measurements onsite demonstrating lead in excavation surface soils is < 2200 mg/kg. fpXRF measurements at the immobilsiation compound deomnstrating the 95% UCL of lead concentrations in remnant surface soils is below either the Tier 1 health investigation level for lead industrial land or the 95% UCL of lead concentrations in remnant surface soils before establishing the compound. Measurements will occur to achieve a density of 1/100 m^2 across the base of excavation areas on 10 meter icnrements along excavation walls. Measurements will occur to achieve a density of 1/100 m^2 across the immobilisation compound. Validation sampling has occurred in areas where excavation of lead impacted soils occurred during loop extension. Analytical results will be provided in the validation report though were observed to fall below site assessment criteria. Excavation for rail loop construction was followed by importation and placemnet of rail construction materials. Further validation is not considered warranted though would also not be feasible without disturbing active rail formation. Review of material tracking demonstrating appropriate and controlled movement of lead impacted materials. Lead impacted soils will remain in onsite following remediation and will be managed under a long term EMP.	fpXRF measurements of lead supplemented by laboratory QC samples and existing primary laboratory analyses.
Validation of screened ballast and immobilised fines	Screened ballast will be considered suitable for reuse if the 95% UCL of lead concentrations in screened ballast after remediation is less than the Industrial Health Investigation Level for lead of 1,500 mg/kg (NEPC 2013). Ballast fines will be considered suitable for disposal as immobilised GSW if the 95% UCL of lead leachate (TCLP) is less than the limit for lead leachate in GSW defined in the NSW EPA Waste Classification Guidelines (TCLP1 – 5 mg/L). Validation sampling of screened ballast and immobilised fines stockpiles will be completed by the Principals environmental representative. Sampling will occur to achieve a density of 1/25 m^3 with a minimum of three samples.	Laboratory analyses of screened ballast for total lead and immobilised fines for lead leachate (TCLP).

13.2 Validation Reporting

A validation Report will be prepared in general accordance with the relevant sections of NSW OEH (2020) *Guidelines for Consultants Reporting on Contaminated Land* and the NSW EPA *Guidelines for the NSW Site Auditor Scheme 3rd Edition* (NSW EPA 2017). The Validation Report will include:

- Executive summary
- Scope of work
- Site Description
- Summary of site history and previous investigations
- Remediation activities undertaken, including the extent of the excavation works (survey information) and observations made during excavation works
- Supporting factual evidence of the remediation work including photographic and field records and materials tracking data
- Validation sampling and analysis results
- Quality assurance/ quality control (QA/QC) protocols for field work and laboratory analysis and
- A statement indicating the adequacy of the remediation completed, degree to which lead impacts have been removed and if / where impacts remain.

Please contact the undersigned if you have any questions.

Yours sincerely,

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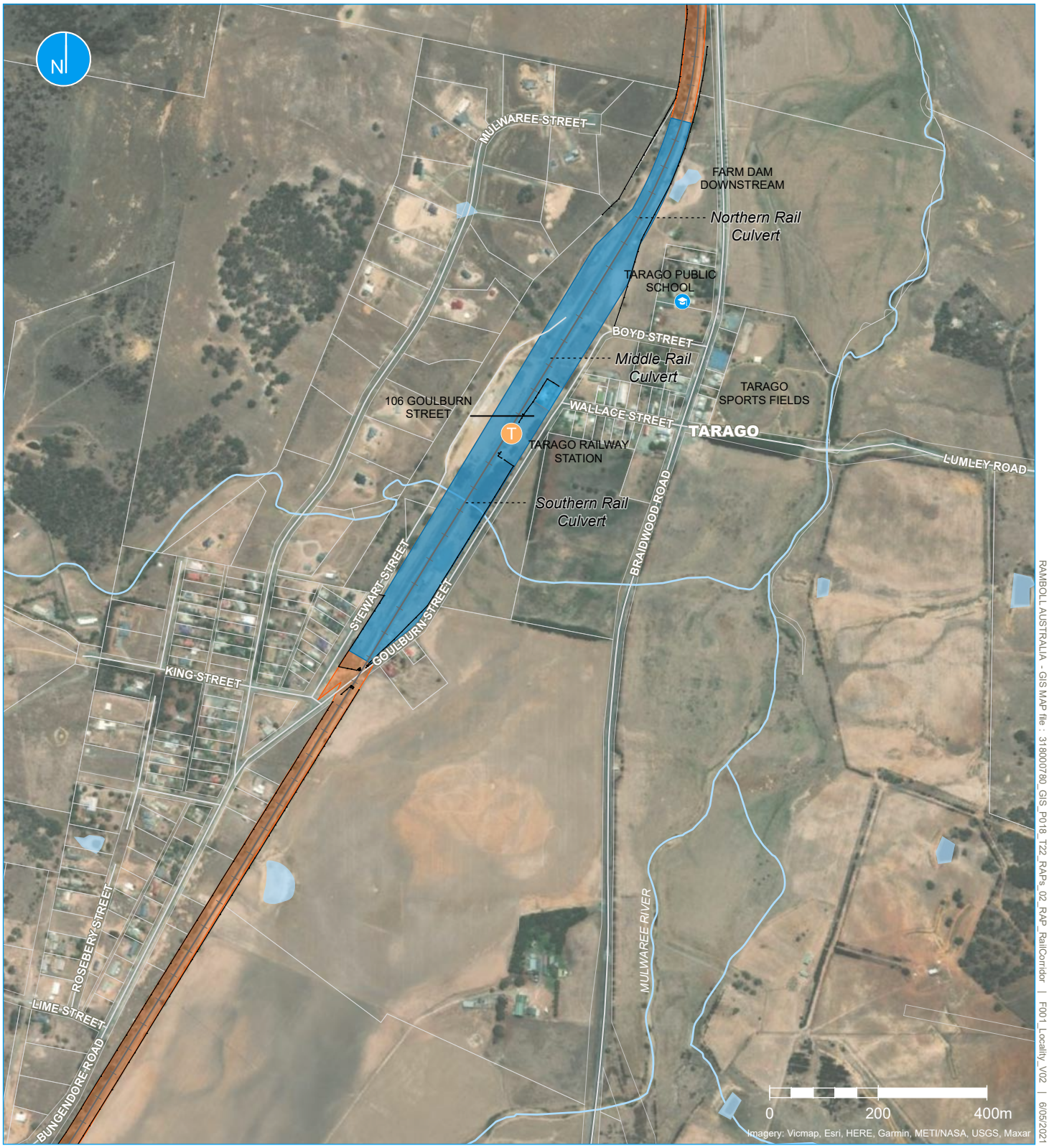
APPENDIX 1
FIGURES



RAMBOLL AUSTRALIA - GIS MAP file : 318000780_GIS_P018_T22_RAPs_02_RAP_RailCorridor | F001_Locality_V02 | 6/05/2021

A4
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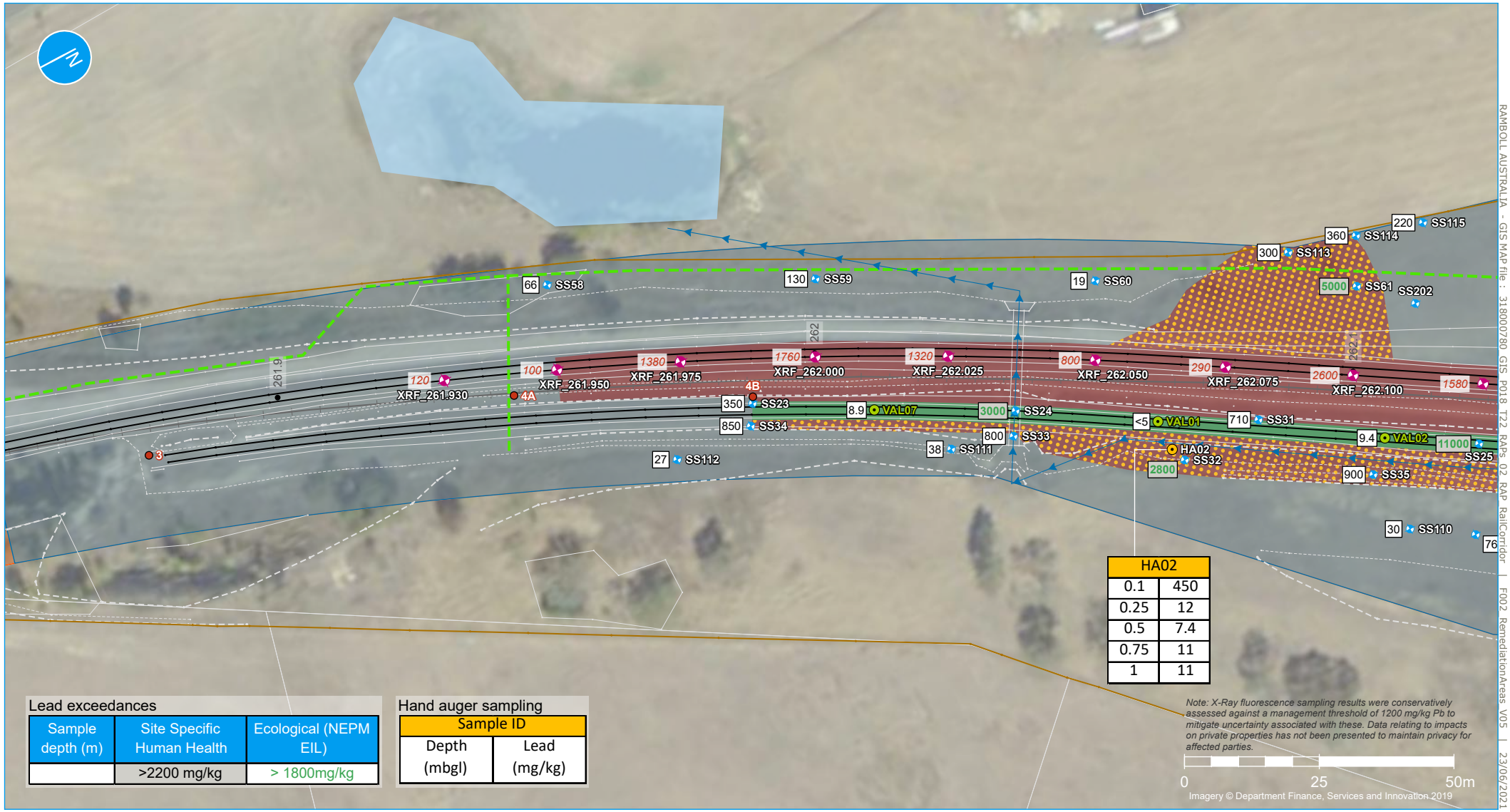
Legend

- Site boundary
- Rail corridor
- Rail corridor fence

Figure 1 | Locality 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)
- 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 to remain
- Lead impacted area surrounding the siding (excluding all rail formation) - proposed excavation depth 0.3 mbgl
- Area of excavation during loop extension (no further excavation proposed)

A4
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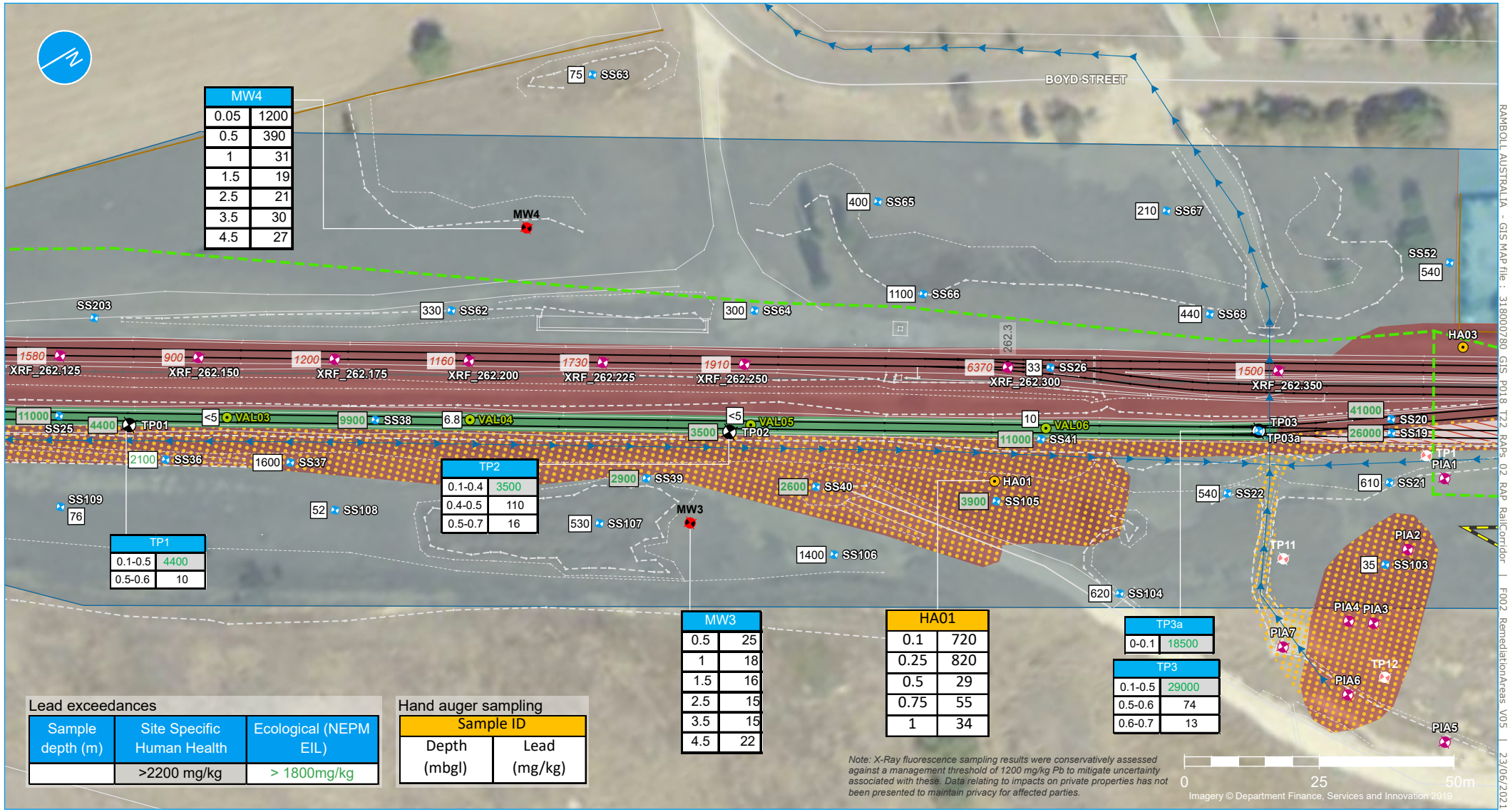
Figure 2a | Site Plan



RAMBOLL AUSTRALIA - GIS MAP file : 318000780 GIS P018 T22 RAPs 02 RAP RailCorridor | F002 RemediationAreas V05 | 23/06/2021

Legend

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

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 to remain
- Redundant Woodlawn siding - propopsed excavation depth 0.5 mbgl
- Lead impacted area surrounding the siding (excluding all rail formation) - proposed excavation depth 0.3 mbgl
- Area of excavation during loop extension (no further excavation proposed)

A4
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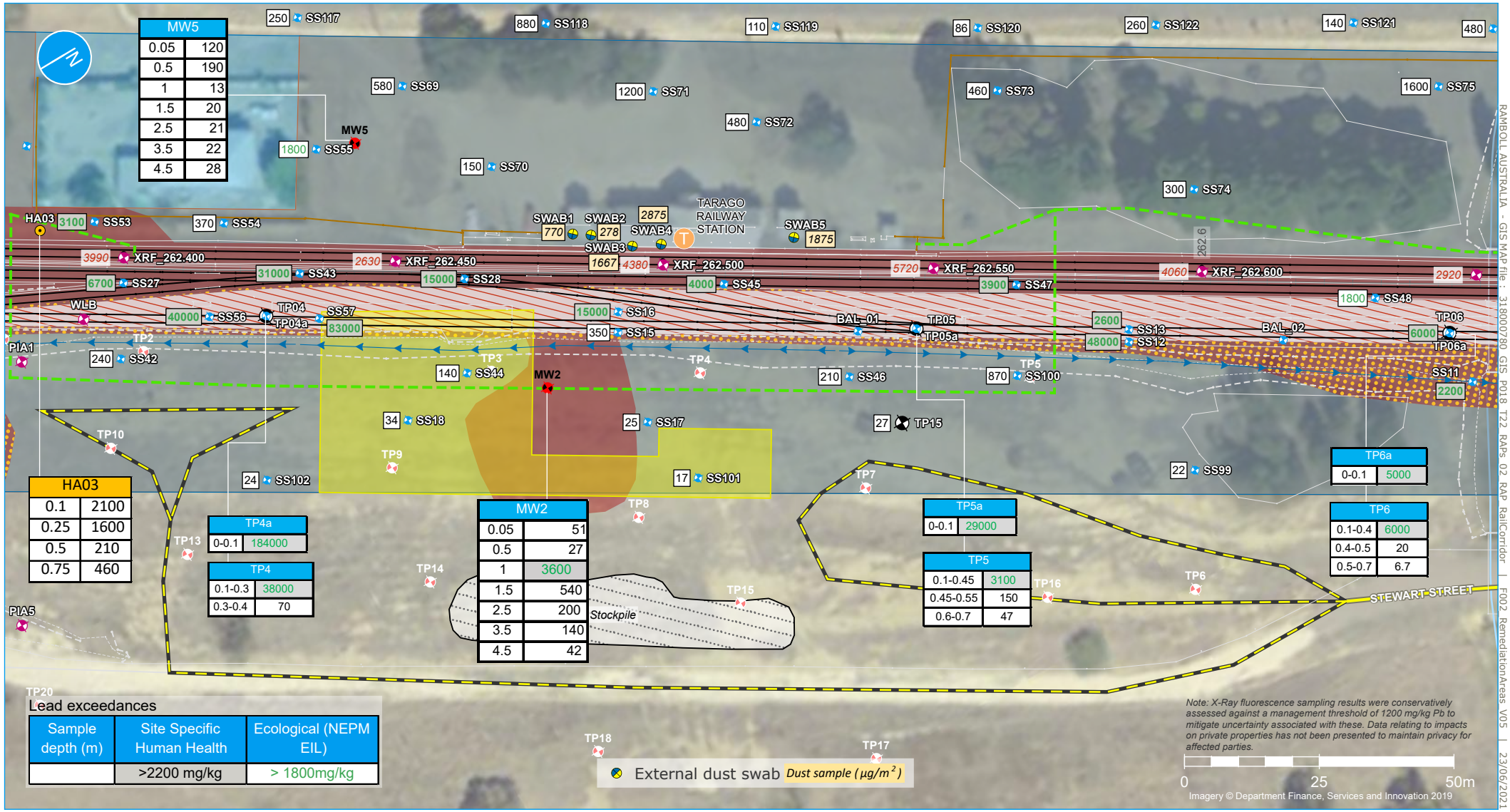
Location

Figure 2b | Site Plan



Legend

- Site boundary
- Rail corridor fence
- 0.1km chainage point
- Signal trench (approximate)
- Surface water flow (indicative)
- Former loadout road (approximate)
- Former loadout complex building footprint

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

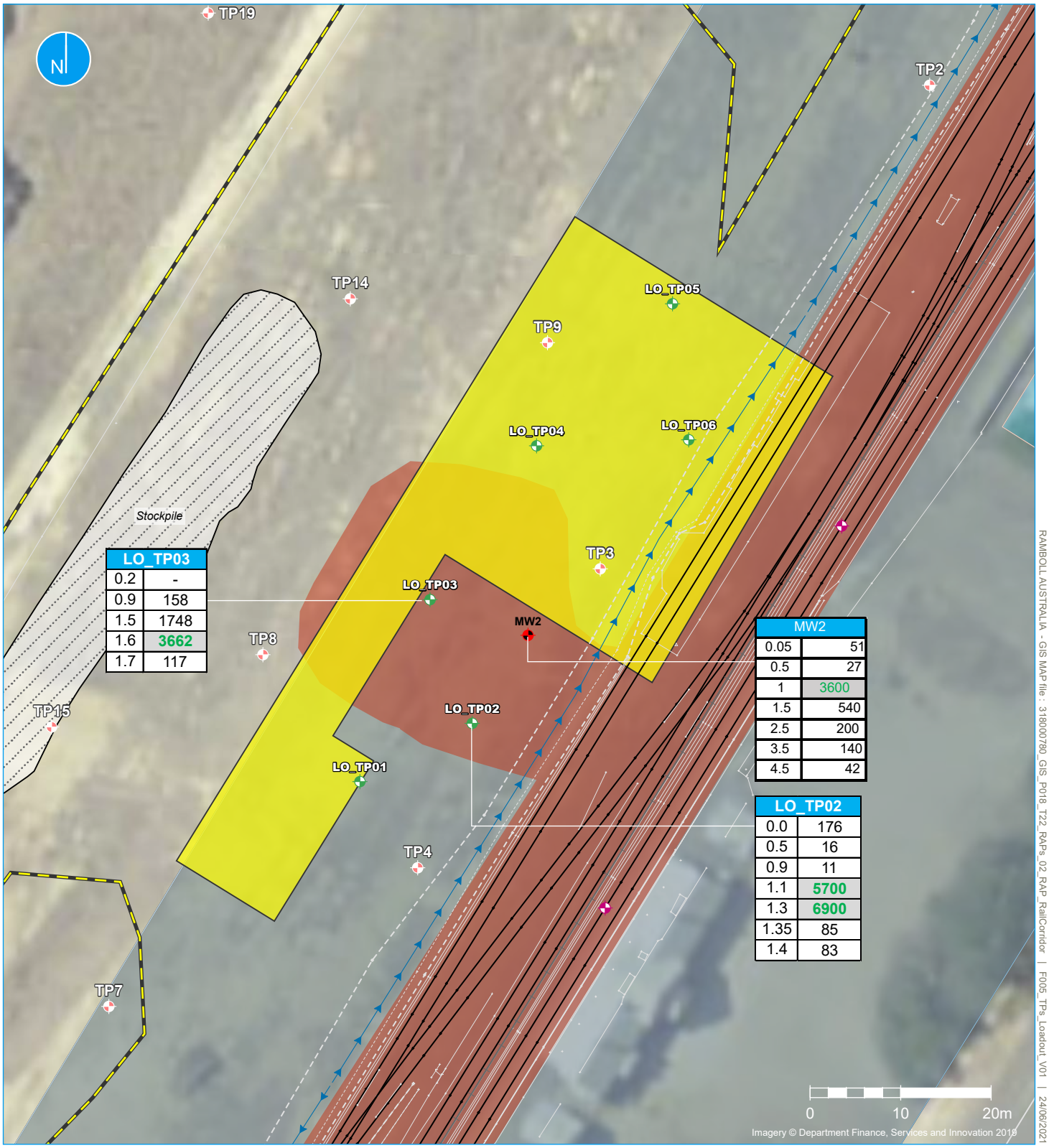
- X-Ray fluorescence sampling (Ramboll 2019, 2020)
- Shallow soil (Ramboll 2019)
- Test pit (Ramboll 2019)
- Hand auger (Ramboll 2019)
- 1200 Lead concentration for XRF sample (mg/kg)
- Groundwater monitoring location
- Test pit (loadout complex)

- Lead impacted area to remain
- Redundant Woodlawn siding - propopsed excavation depth 0.5 mbgl
- Lead impacted area surrounding the siding (excluding all rail formation) - proposed excavation depth 0.3 mbgl
- Haul route

A4 1:1,000

Location

Figure 2c | Site Plan



RAMBOLL AUSTRALIA - GIS MAP file : 318000780_GIS_P018_T22_RAPs_02_RAP_RailCorridor | F005_TPs_Loadout_V01 | 24/06/2021

A4
1:600

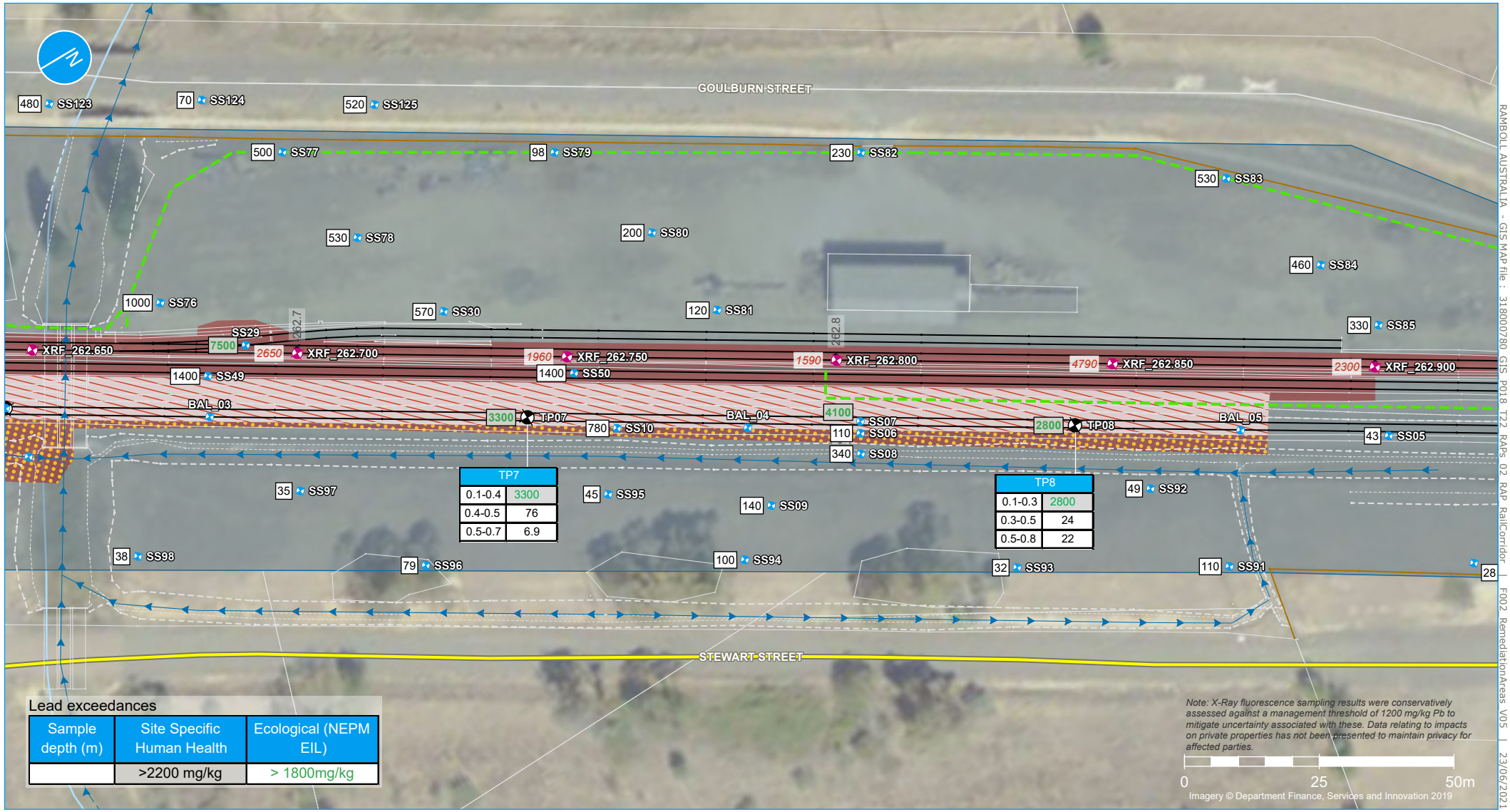
Legend

- Former loadout complex building footprint
- Former loadout road (approximate)
- Site boundary
- Surface water flow (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 2ci | Loadout complex sampling locations



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

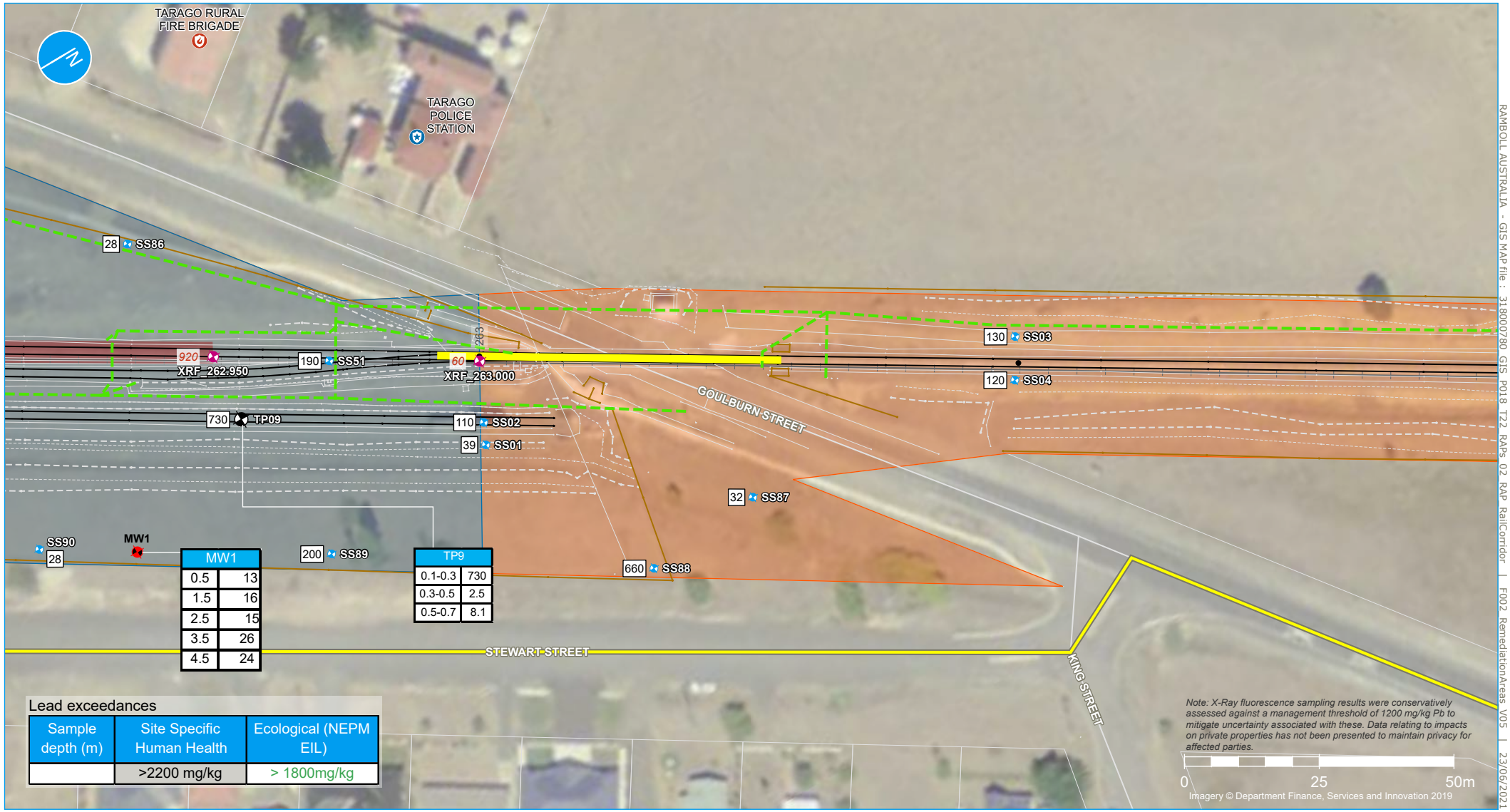
- X-Ray fluorescence sampling (Ramboll 2019, 2020)
- Shallow soil (Ramboll 2019)
- Test pit (Ramboll 2019)
- 1200 Lead concentration for XRF sample (mg/kg)

- Lead impacted area to remain
- Redundant Woodlawn siding - propopsed excavation depth 0.5 mbgl
- Lead impacted area surrounding the siding (excluding all rail formation) - proposed excavation depth 0.3 mbgl
- Haul route

A4
1:1,000

Location

Figure 2d | Site Plan



Legend

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

Survey lines

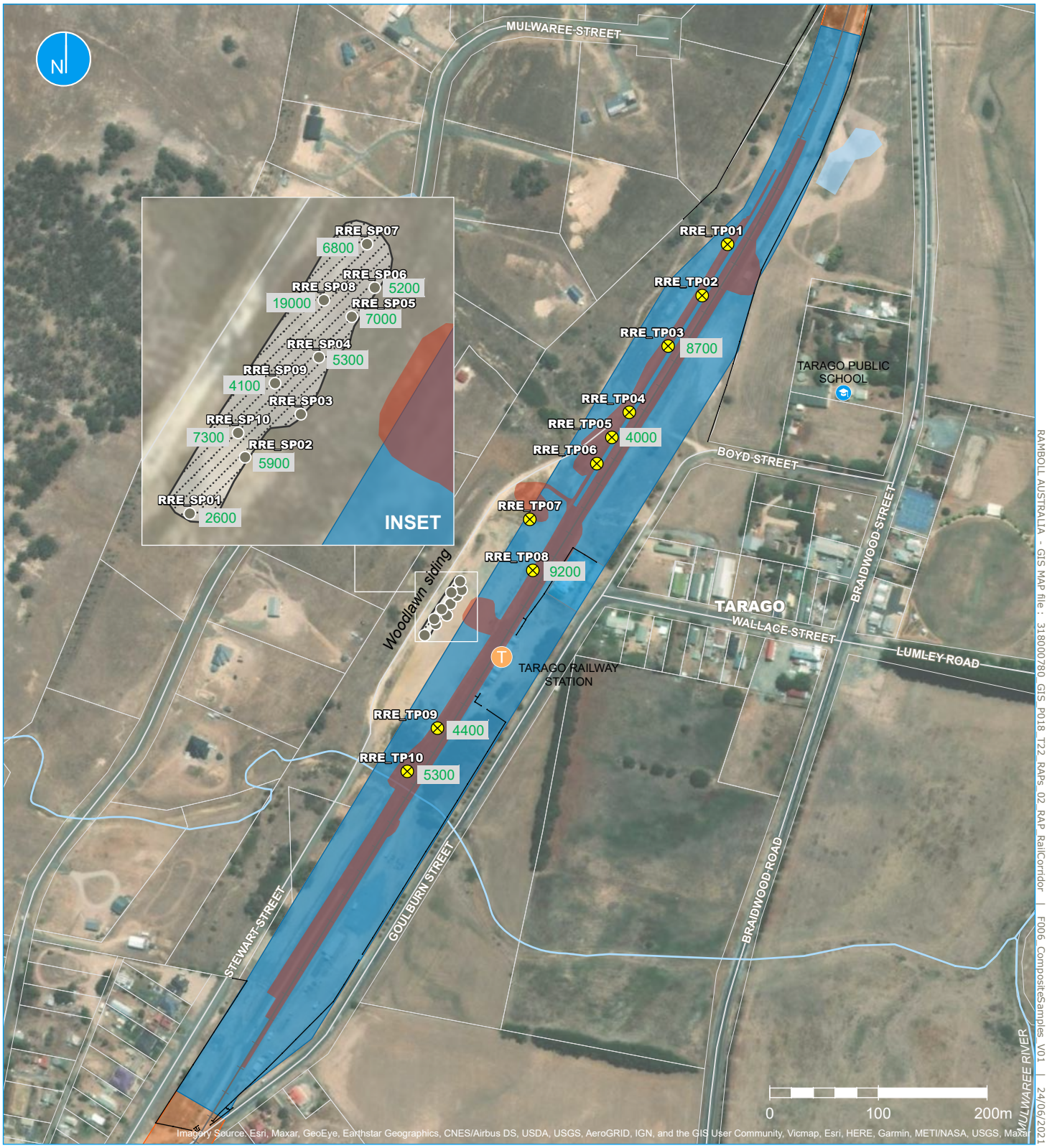
- Rail track
- Top of bank
- Bottom of bank
- Other elements

- 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 to remain
- Haul route

A4
1:1,000

Figure 2e | Site Plan



A4
1:5,000

Legend

- Site boundary
- Rail corridor
- Rail corridor fence
- Lead impacted area
- Stockpile (JHR)

Composite sampling (Ramboll 2020)

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

Figure 3 | Soil Sampling for the Resource Recovery Exemption

APPENDIX 2
LABORATORY CERTIFICATES 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 **668047-S**
Project name
Project ID 318000780
Received Date Jul 26, 2019

Client Sample ID			**TP1 0.1-0.5**	**TP1 0.5-0.6**	**TP2 0.1-0.4**	**TP2 0.4-0.5**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S19-Jl39891**	**S19-Jl39892**	**S19-Jl39893**	**S19-Jl39894**
Date Sampled			**Jul 26, 2019**	**Jul 26, 2019**	**Jul 26, 2019**	**Jul 26, 2019**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	4400	10	3500	110
% Moisture	1	%	3.9	4.8	2.7	4.4

Client Sample ID			**TP2 0.5-0.7**	**TP3 0.1-0.5**	**TP3 0.5-0.6**	**TP3 0.6-0.7**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S19-Jl39895**	**S19-Jl39896**	**S19-Jl39897**	**S19-Jl39898**
Date Sampled			**Jul 26, 2019**	**Jul 26, 2019**	**Jul 26, 2019**	**Jul 26, 2019**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	16	29000	74	13
% Moisture	1	%	9.2	9.8	6.4	9.1

Client Sample ID			**TP4 0.1-0.3**	**TP4 0.3-0.4**	**TP5 0.1-0.45**	**TP5 0.45-0.55**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S19-Jl39899**	**S19-Jl39900**	**S19-Jl39901**	**S19-Jl39902**
Date Sampled			**Jul 26, 2019**	**Jul 26, 2019**	**Jul 26, 2019**	**Jul 26, 2019**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	38000	70	3100	150
% Moisture	1	%	4.2	8.4	5.6	5.4

Client Sample ID			TP5 0.6-0.7	TP6 0.1-0.4	TP6 0.4-0.5	TP6 0.5-0.7
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-JI39903	S19-JI39904	S19-JI39905	S19-JI39906
Date Sampled			Jul 26, 2019	Jul 26, 2019	Jul 26, 2019	Jul 26, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	47	6000	20	6.7
% Moisture	1	%	12	5.8	6.5	11

Client Sample ID			TP7 0.1-0.4	TP7 0.4-0.5	TP7 0.5-0.7	TP8 0.1-0.3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-JI39907	S19-JI39908	S19-JI39909	S19-JI39910
Date Sampled			Jul 26, 2019	Jul 26, 2019	Jul 26, 2019	Jul 26, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	3300	76	6.9	2800
% Moisture	1	%	3.7	5.7	11	2.2

Client Sample ID			TP8 0.3-0.5	TP8 0.5-0.8	TP9 0.1-0.3	TP9 0.3-0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-JI39911	S19-JI39912	S19-JI39913	S19-JI39914
Date Sampled			Jul 26, 2019	Jul 26, 2019	Jul 26, 2019	Jul 26, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	24	22	600	< 5
% Moisture	1	%	6.0	9.5	2.4	6.1

Client Sample ID			TP9 0.5-0.7	TP15 0.1	TP15 0.8	SS1 0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-JI39915	S19-JI39918	S19-JI39919	S19-JI39920
Date Sampled			Jul 26, 2019	Jul 26, 2019	Jul 26, 2019	Jul 26, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	8.1	27	26	39
% Moisture	1	%	10	6.1	12	4.6

Client Sample ID			SS2 0.0-0.1	SS3 0.0-0.1	SS4 0.0-0.1	SS5 0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-JI39921	S19-JI39922	S19-JI39923	S19-JI39924
Date Sampled			Jul 26, 2019	Jul 26, 2019	Jul 26, 2019	Jul 26, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	110	130	120	43
% Moisture	1	%	3.2	7.5	5.6	2.8

Client Sample ID			SS6 0.0-0.1	SS7 0.0-0.1	SS8 0.0-0.1	SS9 0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-JI39925	S19-JI39926	S19-JI39927	S19-JI39928
Date Sampled			Jul 26, 2019	Jul 26, 2019	Jul 26, 2019	Jul 26, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	110	4100	340	140
% Moisture	1	%	2.8	4.4	19	6.2

Client Sample ID			SS10 0.0-0.1	SS11 0.0-0.1	SS12 0.0-0.1	SS13 0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-JI39929	S19-JI39930	S19-JI39931	S19-JI39932
Date Sampled			Jul 26, 2019	Jul 26, 2019	Jul 26, 2019	Jul 26, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	780	2200	32000	2600
% Moisture	1	%	2.2	5.8	3.3	1.2

Client Sample ID			SS14 0.0-0.1	SS15 0.0-0.1	SS16 0.0-0.1	D02_260719
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-JI39933	S19-JI39934	S19-JI39935	S19-JI39936
Date Sampled			Jul 26, 2019	Jul 26, 2019	Jul 26, 2019	Jul 26, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	31	350	15000	280
% Moisture	1	%	6.8	4.7	1.9	5.0

Client Sample ID			D03_260719	SS17_0.0-0.1	SS18_0.0-0.1	SS19_0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-Jl39937	S19-Jl39997	S19-Jl39998	S19-Jl39999
Date Sampled			Jul 26, 2019	Jul 26, 2019	Jul 26, 2019	Jul 26, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	120	25	34	26000
% Moisture	1	%	5.5	3.2	4.8	2.4

Client Sample ID			SS20_0.0-0.1	SS21	SS22
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			S19-Jl40000	S19-Jl40001	S19-Jl40002
Date Sampled			Jul 26, 2019	Jul 26, 2019	Jul 26, 2019
Test/Reference	LOR	Unit			
Heavy Metals					
Lead	5	mg/kg	35000	610	540
% Moisture	1	%	3.6	2.2	3.4

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 (regarding both quality and NATA accreditation).

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	Jul 29, 2019	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Jul 29, 2019	14 Days
- Method: LTM-GEN-7080 Moisture			

Company Name:	Ramboll Australia Pty Ltd	**Order No.:**		**Received:**	Jul 26, 2019 5:54 PM
Address:	Level 3/100 Pacific Highway North Sydney NSW 2060	**Report #:**	668047	**Due:**	Jul 29, 2019
		Phone:	02 9954 8118	**Priority:**	1 Day
		Fax:	02 9954 8150	**Contact Name:**	Stephen Maxwell
Project Name:					
Project ID:	318000780				

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						HOLD	Lead	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	TP1 0.1-0.5	Jul 26, 2019		Soil	S19-Jl39891		X	X
2	TP1 0.5-0.6	Jul 26, 2019		Soil	S19-Jl39892		X	X
3	TP2 0.1-0.4	Jul 26, 2019		Soil	S19-Jl39893		X	X
4	TP2 0.4-0.5	Jul 26, 2019		Soil	S19-Jl39894		X	X
5	TP2 0.5-0.7	Jul 26, 2019		Soil	S19-Jl39895		X	X
6	TP3 0.1-0.5	Jul 26, 2019		Soil	S19-Jl39896		X	X
7	TP3 0.5-0.6	Jul 26, 2019		Soil	S19-Jl39897		X	X
8	TP3 0.6-0.7	Jul 26, 2019		Soil	S19-Jl39898		X	X
9	TP4 0.1-0.3	Jul 26, 2019		Soil	S19-Jl39899		X	X

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Sample Detail						HOLD	Lead	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
10	TP4 0.3-0.4	Jul 26, 2019		Soil	S19-Jl39900		X	X
11	TP5 0.1-0.45	Jul 26, 2019		Soil	S19-Jl39901		X	X
12	TP5 0.45-0.55	Jul 26, 2019		Soil	S19-Jl39902		X	X
13	TP5 0.6-0.7	Jul 26, 2019		Soil	S19-Jl39903		X	X
14	TP6 0.1-0.4	Jul 26, 2019		Soil	S19-Jl39904		X	X
15	TP6 0.4-0.5	Jul 26, 2019		Soil	S19-Jl39905		X	X
16	TP6 0.5-0.7	Jul 26, 2019		Soil	S19-Jl39906		X	X
17	TP7 0.1-0.4	Jul 26, 2019		Soil	S19-Jl39907		X	X
18	TP7 0.4-0.5	Jul 26, 2019		Soil	S19-Jl39908		X	X
19	TP7 0.5-0.7	Jul 26, 2019		Soil	S19-Jl39909		X	X
20	TP8 0.1-0.3	Jul 26, 2019		Soil	S19-Jl39910		X	X
21	TP8 0.3-0.5	Jul 26, 2019		Soil	S19-Jl39911		X	X

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
22	TP8 0.5-0.8	Jul 26, 2019		Soil	S19-Jl39912		X	X
23	TP9 0.1-0.3	Jul 26, 2019		Soil	S19-Jl39913		X	X
24	TP9 0.3-0.5	Jul 26, 2019		Soil	S19-Jl39914		X	X
25	TP9 0.5-0.7	Jul 26, 2019		Soil	S19-Jl39915		X	X
26	TP15 0.1	Jul 26, 2019		Soil	S19-Jl39918		X	X
27	TP15 0.8	Jul 26, 2019		Soil	S19-Jl39919		X	X
28	SS1 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39920		X	X
29	SS2 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39921		X	X
30	SS3 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39922		X	X
31	SS4 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39923		X	X
32	SS5 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39924		X	X
33	SS6 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39925		X	X

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
34	SS7 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39926		X	X
35	SS8 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39927		X	X
36	SS9 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39928		X	X
37	SS10 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39929		X	X
38	SS11 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39930		X	X
39	SS12 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39931		X	X
40	SS13 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39932		X	X
41	SS14 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39933		X	X
42	SS15 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39934		X	X
43	SS16 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39935		X	X
44	D02_260719	Jul 26, 2019		Soil	S19-Jl39936		X	X
45	D03_260719	Jul 26, 2019		Soil	S19-Jl39937		X	X

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Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
46	TP10_0.8-1.0	Jul 26, 2019		Soil	S19-Jl39990	X		
47	TP11_0.5-0.6	Jul 26, 2019		Soil	S19-Jl39991	X		
48	TP11_0.8-1.0	Jul 26, 2019		Soil	S19-Jl39992	X		
49	TP12_0.5	Jul 26, 2019		Soil	S19-Jl39993	X		
50	TP13_0.5-0.6	Jul 26, 2019		Soil	S19-Jl39994	X		
51	TP13_0.8-0.9	Jul 26, 2019		Soil	S19-Jl39995	X		
52	TP14_0.6-0.8	Jul 26, 2019		Soil	S19-Jl39996	X		
53	SS17_0.0-0.1	Jul 26, 2019		Soil	S19-Jl39997		X	X
54	SS18_0.0-0.1	Jul 26, 2019		Soil	S19-Jl39998		X	X
55	SS19_0.0-0.1	Jul 26, 2019		Soil	S19-Jl39999		X	X
56	SS20_0.0-0.1	Jul 26, 2019		Soil	S19-Jl40000		X	X
57	SS21	Jul 26, 2019		Soil	S19-Jl40001		X	X

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Eurofins Analytical Services Manager : Andrew Black

Sample Detail						HOLD	Lead	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
58	SS22	Jul 26, 2019		Soil	S19-Jl40002		X	X
59	D01_260719	Jul 26, 2019		Soil	S19-Jl40003	X		
Test Counts						8	51	51

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	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Lead			mg/kg	< 5			5	Pass	
LCS - % Recovery									
Heavy Metals									
Lead			%	127			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Heavy Metals				Result 1					
Lead	S19-JI39895	CP	%	119			70-130	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	S19-JI39894	CP	mg/kg	110	92	19	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S19-JI39896	CP	%	9.8	9.4	5.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S19-JI39904	CP	mg/kg	6000	6600	10	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S19-JI39906	CP	%	11	11	4.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S19-JI39914	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S19-JI39918	CP	%	6.1	5.5	10	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S19-JI39928	CP	%	6.2	5.2	17	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S19-JI39997	CP	%	3.2	3.8	17	30%	Pass	

Comments

Sample Integrity

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

Authorised By

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.

Environ
PO Box560
North Sydney
NSW 2060

Attention: **Stephen Maxwell**

Report **668047-S-V2**
Project name
Project ID 318000780
Received Date Jul 26, 2019

Client Sample ID			**TP1 0.1-0.5**	**TP1 0.5-0.6**	**TP2 0.1-0.4**	**TP2 0.4-0.5**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S19-Jl39891**	**S19-Jl39892**	**S19-Jl39893**	**S19-Jl39894**
Date Sampled			**Jul 26, 2019**	**Jul 26, 2019**	**Jul 26, 2019**	**Jul 26, 2019**
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	10	0.7	7	2.1
Lead	5	mg/kg	4400	10	3500	110
% Moisture	1	%	3.9	4.8	2.7	4.4

Client Sample ID			**TP2 0.5-0.7**	**TP3 0.1-0.5**	**TP3 0.5-0.6**	**TP3 0.6-0.7**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S19-Jl39895**	**S19-Jl39896**	**S19-Jl39897**	**S19-Jl39898**
Date Sampled			**Jul 26, 2019**	**Jul 26, 2019**	**Jul 26, 2019**	**Jul 26, 2019**
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	< 0.4	3.4	< 0.4	0.8
Lead	5	mg/kg	16	29000	74	13
% Moisture	1	%	9.2	9.8	6.4	9.1

Client Sample ID			**TP4 0.1-0.3**	**TP4 0.3-0.4**	**TP5 0.1-0.45**	**TP5 0.45-0.55**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S19-Jl39899**	**S19-Jl39900**	**S19-Jl39901**	**S19-Jl39902**
Date Sampled			**Jul 26, 2019**	**Jul 26, 2019**	**Jul 26, 2019**	**Jul 26, 2019**
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	0.8	2.9	-	1.4
Lead	5	mg/kg	38000	70	3100	150
% Moisture	1	%	4.2	8.4	5.6	5.4

Client Sample ID			TP5 0.6-0.7	TP6 0.1-0.4	TP6 0.4-0.5	TP6 0.5-0.7
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-JI39903	S19-JI39904	S19-JI39905	S19-JI39906
Date Sampled			Jul 26, 2019	Jul 26, 2019	Jul 26, 2019	Jul 26, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	1.8	3.5	0.7	0.7
Lead	5	mg/kg	47	6000	20	6.7
% Moisture	1	%	12	5.8	6.5	11

Client Sample ID			TP7 0.1-0.4	TP7 0.4-0.5	TP7 0.5-0.7	TP8 0.1-0.3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-JI39907	S19-JI39908	S19-JI39909	S19-JI39910
Date Sampled			Jul 26, 2019	Jul 26, 2019	Jul 26, 2019	Jul 26, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	3.8	< 0.4	< 0.4	3.5
Lead	5	mg/kg	3300	76	6.9	2800
% Moisture	1	%	3.7	5.7	11	2.2

Client Sample ID			TP8 0.3-0.5	TP8 0.5-0.8	TP9 0.1-0.3	TP9 0.3-0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-JI39911	S19-JI39912	S19-JI39913	S19-JI39914
Date Sampled			Jul 26, 2019	Jul 26, 2019	Jul 26, 2019	Jul 26, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	< 0.4	< 0.4	2.3	< 0.4
Lead	5	mg/kg	24	22	600	< 5
% Moisture	1	%	6.0	9.5	2.4	6.1

Client Sample ID			TP9 0.5-0.7	TP15 0.1	TP15 0.8	SS1 0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-JI39915	S19-JI39918	S19-JI39919	S19-JI39920
Date Sampled			Jul 26, 2019	Jul 26, 2019	Jul 26, 2019	Jul 26, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	0.5
Lead	5	mg/kg	8.1	27	26	39
% Moisture	1	%	10	6.1	12	4.6

Client Sample ID			SS2 0.0-0.1	SS3 0.0-0.1	SS4 0.0-0.1	SS5 0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-JI39921	S19-JI39922	S19-JI39923	S19-JI39924
Date Sampled			Jul 26, 2019	Jul 26, 2019	Jul 26, 2019	Jul 26, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	0.6	3.1	3.5	0.7
Lead	5	mg/kg	110	130	120	43
% Moisture	1	%	3.2	7.5	5.6	2.8

Client Sample ID			SS6 0.0-0.1	SS7 0.0-0.1	SS8 0.0-0.1	SS9 0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-JI39925	S19-JI39926	S19-JI39927	S19-JI39928
Date Sampled			Jul 26, 2019	Jul 26, 2019	Jul 26, 2019	Jul 26, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	0.4	18	2.7	1.5
Lead	5	mg/kg	110	4100	340	140
% Moisture	1	%	2.8	4.4	19	6.2

Client Sample ID			SS10 0.0-0.1	SS11 0.0-0.1	SS12 0.0-0.1	SS13 0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-JI39929	S19-JI39930	S19-JI39931	S19-JI39932
Date Sampled			Jul 26, 2019	Jul 26, 2019	Jul 26, 2019	Jul 26, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	0.8	3.4	-	14
Lead	5	mg/kg	780	2200	32000	2600
% Moisture	1	%	2.2	5.8	3.3	1.2

Client Sample ID			SS14 0.0-0.1	SS15 0.0-0.1	SS16 0.0-0.1	D02_260719
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-JI39933	S19-JI39934	S19-JI39935	S19-JI39936
Date Sampled			Jul 26, 2019	Jul 26, 2019	Jul 26, 2019	Jul 26, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	< 0.4	4.6	-	1.5
Lead	5	mg/kg	31	350	15000	280
% Moisture	1	%	6.8	4.7	1.9	5.0

Client Sample ID			D03_260719	SS17_0.0-0.1	SS18_0.0-0.1	SS19_0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-JI39937	S19-JI39997	S19-JI39998	S19-JI39999
Date Sampled			Jul 26, 2019	Jul 26, 2019	Jul 26, 2019	Jul 26, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	1.1	-	-	-
Lead	5	mg/kg	120	25	34	26000
% Moisture	1	%	5.5	3.2	4.8	2.4

Client Sample ID			SS20_0.0-0.1	SS21	SS22
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			S19-JI40000	S19-JI40001	S19-JI40002
Date Sampled			Jul 26, 2019	Jul 26, 2019	Jul 26, 2019
Test/Reference	LOR	Unit			
Heavy Metals					
Lead	5	mg/kg	35000	610	540
% Moisture	1	%	3.6	2.2	3.4

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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	May 26, 2021	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Jul 29, 2019	14 Days
- Method: LTM-GEN-7080 Moisture			

eurofins | Environment Testing

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NATA # 1261 Site # 18217

Brisbane
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NATA # 1261 Site # 20794

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

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

Project Name:
Project ID: 318000780

Order No.:
Report #: 668047
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Jul 26, 2019 5:54 PM
Due: Jul 29, 2019
Priority: 1 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						HOLD	Lead	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	TP1 0.1-0.5	Jul 26, 2019		Soil	S19-Jl39891		X	X
2	TP1 0.5-0.6	Jul 26, 2019		Soil	S19-Jl39892		X	X
3	TP2 0.1-0.4	Jul 26, 2019		Soil	S19-Jl39893		X	X
4	TP2 0.4-0.5	Jul 26, 2019		Soil	S19-Jl39894		X	X
5	TP2 0.5-0.7	Jul 26, 2019		Soil	S19-Jl39895		X	X
6	TP3 0.1-0.5	Jul 26, 2019		Soil	S19-Jl39896		X	X
7	TP3 0.5-0.6	Jul 26, 2019		Soil	S19-Jl39897		X	X
8	TP3 0.6-0.7	Jul 26, 2019		Soil	S19-Jl39898		X	X
9	TP4 0.1-0.3	Jul 26, 2019		Soil	S19-Jl39899		X	X

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Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
10	TP4 0.3-0.4	Jul 26, 2019		Soil	S19-Jl39900		X	X
11	TP5 0.1-0.45	Jul 26, 2019		Soil	S19-Jl39901		X	X
12	TP5 0.45-0.55	Jul 26, 2019		Soil	S19-Jl39902		X	X
13	TP5 0.6-0.7	Jul 26, 2019		Soil	S19-Jl39903		X	X
14	TP6 0.1-0.4	Jul 26, 2019		Soil	S19-Jl39904		X	X
15	TP6 0.4-0.5	Jul 26, 2019		Soil	S19-Jl39905		X	X
16	TP6 0.5-0.7	Jul 26, 2019		Soil	S19-Jl39906		X	X
17	TP7 0.1-0.4	Jul 26, 2019		Soil	S19-Jl39907		X	X
18	TP7 0.4-0.5	Jul 26, 2019		Soil	S19-Jl39908		X	X
19	TP7 0.5-0.7	Jul 26, 2019		Soil	S19-Jl39909		X	X
20	TP8 0.1-0.3	Jul 26, 2019		Soil	S19-Jl39910		X	X
21	TP8 0.3-0.5	Jul 26, 2019		Soil	S19-Jl39911		X	X

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Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
22	TP8 0.5-0.8	Jul 26, 2019		Soil	S19-Jl39912		X	X
23	TP9 0.1-0.3	Jul 26, 2019		Soil	S19-Jl39913		X	X
24	TP9 0.3-0.5	Jul 26, 2019		Soil	S19-Jl39914		X	X
25	TP9 0.5-0.7	Jul 26, 2019		Soil	S19-Jl39915		X	X
26	TP15 0.1	Jul 26, 2019		Soil	S19-Jl39918		X	X
27	TP15 0.8	Jul 26, 2019		Soil	S19-Jl39919		X	X
28	SS1 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39920		X	X
29	SS2 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39921		X	X
30	SS3 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39922		X	X
31	SS4 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39923		X	X
32	SS5 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39924		X	X
33	SS6 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39925		X	X

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NATA # 1261
Site # 23736

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

Project Name:
Project ID: 318000780

Order No.:
Report #: 668047
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Jul 26, 2019 5:54 PM
Due: Jul 29, 2019
Priority: 1 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						HOLD	Lead	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
34	SS7 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39926		X	X
35	SS8 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39927		X	X
36	SS9 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39928		X	X
37	SS10 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39929		X	X
38	SS11 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39930		X	X
39	SS12 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39931		X	X
40	SS13 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39932		X	X
41	SS14 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39933		X	X
42	SS15 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39934		X	X
43	SS16 0.0-0.1	Jul 26, 2019		Soil	S19-Jl39935		X	X
44	D02_260719	Jul 26, 2019		Soil	S19-Jl39936		X	X
45	D03_260719	Jul 26, 2019		Soil	S19-Jl39937		X	X

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
46	TP10_0.8-1.0	Jul 26, 2019		Soil	S19-Jl39990	X		
47	TP11_0.5-0.6	Jul 26, 2019		Soil	S19-Jl39991	X		
48	TP11_0.8-1.0	Jul 26, 2019		Soil	S19-Jl39992	X		
49	TP12_0.5	Jul 26, 2019		Soil	S19-Jl39993	X		
50	TP13_0.5-0.6	Jul 26, 2019		Soil	S19-Jl39994	X		
51	TP13_0.8-0.9	Jul 26, 2019		Soil	S19-Jl39995	X		
52	TP14_0.6-0.8	Jul 26, 2019		Soil	S19-Jl39996	X		
53	SS17_0.0-0.1	Jul 26, 2019		Soil	S19-Jl39997		X	X
54	SS18_0.0-0.1	Jul 26, 2019		Soil	S19-Jl39998		X	X
55	SS19_0.0-0.1	Jul 26, 2019		Soil	S19-Jl39999		X	X
56	SS20_0.0-0.1	Jul 26, 2019		Soil	S19-Jl40000		X	X
57	SS21	Jul 26, 2019		Soil	S19-Jl40001		X	X

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Priority: 1 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						HOLD	Lead	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
58	SS22	Jul 26, 2019		Soil	S19-Jl40002		X	X
59	D01_260719	Jul 26, 2019		Soil	S19-Jl40003	X		
Test Counts						8	51	51

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Quality Control Results

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Cadmium			mg/kg	< 0.4			0.4	Pass	
Lead			mg/kg	< 5			5	Pass	
LCS - % Recovery									
Heavy Metals									
Cadmium			%	119			80-120	Pass	
Lead			%	127			80-120	Fail	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Heavy Metals				Result 1					
Cadmium	S19-JI39895	CP	%	124			75-125	Pass	
Lead	S19-JI39895	CP	%	119			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Cadmium	S19-JI39905	CP	%	131			75-125	Fail	
Spike - % Recovery									
Heavy Metals				Result 1					
Cadmium	S19-JI39927	CP	%	123			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	S19-JI39894	CP	mg/kg	110	92	19	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S19-JI39896	CP	%	9.8	9.4	5.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S19-JI39904	CP	mg/kg	6000	6600	10	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S19-JI39906	CP	%	11	11	4.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S19-JI39914	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S19-JI39918	CP	%	6.1	5.5	10	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S19-JI39928	CP	%	6.2	5.2	17	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S19-JI39997	CP	%	3.2	3.8	17	30%	Pass	

Comments

V2- new version to import Cd results as per client request.

1. The results in this report supersede any previously corresponded results.
2. All Soil Results are reported on a dry basis.
3. Samples are analysed on an as received basis.

ABBREVIATIONS

mg/kg : milligrams per kilograms, mg/L : milligrams per litre, ppm : parts per million,
LOR : Limit of Reporting
RPD : Relative Percent Difference
CRM : Certified Reference Material
LCS : Laboratory Control Sample

Sample Integrity

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

Authorised by:

Andrew Black Analytical Services Manager

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.

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

NATA Accredited
Accreditation Number 1261
Site Number 18217

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

Attention: **Stephen Maxwell**

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

Client Sample ID			**SS23**	**SS24**	**SS25**	**SS26**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S19-Au17274**	**S19-Au17275**	**S19-Au17276**	**S19-Au17277**
Date Sampled			**Aug 12, 2019**	**Aug 12, 2019**	**Aug 12, 2019**	**Aug 12, 2019**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	350	3000	11000	33
% Moisture	1	%	1.7	3.3	4.9	2.7

Client Sample ID			**SS27**	**SS28**	**SS29**	**SS30**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S19-Au17278**	**S19-Au17279**	**S19-Au17280**	**S19-Au17281**
Date Sampled			**Aug 12, 2019**	**Aug 12, 2019**	**Aug 12, 2019**	**Aug 12, 2019**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	6700	12000	3700	470
% Moisture	1	%	6.7	5.7	3.9	3.5

Client Sample ID			**D01_120819**	**D02_120819**
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**S19-Au17282**	**S19-Au17283**
Date Sampled			**Aug 12, 2019**	**Aug 12, 2019**
Test/Reference	LOR	Unit		
Heavy Metals				
Lead	5	mg/kg	13000	570
% Moisture	1	%	6.1	4.4

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 13, 2019	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Aug 13, 2019	14 Days
- Method: LTM-GEN-7080 Moisture			

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Company Name: Ramboll Australia Pty Ltd
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Project Name:
Project ID: 318000780

Order No.:
Report #: 670968
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Aug 14, 2019 9:43 AM
Due: Aug 15, 2019
Priority: 1 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Alena Bounkeua

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

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Contact Name: Stephen Maxwell

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Melbourne Laboratory - NATA Site # 1254 & 14271																					X
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794																					
Perth Laboratory - NATA Site # 23736																					
10	D01_120819	Aug 12, 2019		Soil	S19-Au17282							X						X			
11	D02_120819	Aug 12, 2019		Soil	S19-Au17283							X						X			
12	D01_130819	Aug 12, 2019		Water	S19-Au17284	X	X	X	X	X	X		X	X	X	X	X		X		X
13	SPIKE	Aug 12, 2019		Water	S19-Au17285															X	
14	BLANK	Aug 12, 2019		Water	S19-Au17286															X	
Test Counts						2	2	2	2	2	2	10	2	2	2	2	2	10	2	2	2

Internal Quality Control Review and Glossary

General

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	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Lead			mg/kg	< 5			5	Pass	
LCS - % Recovery									
Heavy Metals									
Lead			%	104			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Heavy Metals				Result 1					
Lead	S19-Au11644	NCP	%	102			70-130	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	S19-Au17274	CP	mg/kg	350	380	6.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S19-Au17274	CP	%	1.7	1.2	35	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
Q15	The RPD reported passes Eurofins | mgt's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised By

Alena Bounkeua	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.

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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 **673583-S**
Project name 318000780
Received Date Aug 27, 2019

Client Sample ID			**SS30**	**SS31**	**SS32**	**SS33**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S19-Au39075**	**S19-Au39076**	**S19-Au39077**	**S19-Au39078**
Date Sampled			**Aug 27, 2019**	**Aug 27, 2019**	**Aug 27, 2019**	**Aug 27, 2019**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	2100	710	2400	800
% Moisture	1	%	2.4	1.5	2.2	3.8

Client Sample ID			**SS34**	**SS35**	**SS37**	**SS38**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S19-Au39079**	**S19-Au39080**	**S19-Au39082**	**S19-Au39083**
Date Sampled			**Aug 27, 2019**	**Aug 27, 2019**	**Aug 27, 2019**	**Aug 27, 2019**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	850	900	1600	9900
% Moisture	1	%	1.7	2.4	1.8	1.8

Client Sample ID			**SS39**	**SS40**	**SS41**	**SS42**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S19-Au39084**	**S19-Au39085**	**S19-Au39086**	**S19-Au39087**
Date Sampled			**Aug 27, 2019**	**Aug 27, 2019**	**Aug 27, 2019**	**Aug 27, 2019**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	2900	2600	11000	240
% Moisture	1	%	1.2	2.3	3.0	4.8

Client Sample ID			SS43	SS44	SS45	SS46
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-Au39088	S19-Au39089	S19-Au39090	S19-Au39091
Date Sampled			Aug 27, 2019	Aug 27, 2019	Aug 27, 2019	Aug 27, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	31000	140	4000	210
% Moisture	1	%	7.5	8.7	6.1	9.6

Client Sample ID			SS47	SS48	SS49	SS50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-Au39092	S19-Au39093	S19-Au39094	S19-Au39095
Date Sampled			Aug 27, 2019	Aug 27, 2019	Aug 27, 2019	Aug 27, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	3900	1800	1400	1400
% Moisture	1	%	7.4	6.9	5.9	7.3

Client Sample ID			SS51	D01_270819	D02_270819
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			S19-Au39096	S19-Au39097	S19-Au39098
Date Sampled			Aug 27, 2019	Aug 27, 2019	Aug 27, 2019
Test/Reference	LOR	Unit			
Heavy Metals					
Lead	5	mg/kg	190	2800	230
% Moisture	1	%	3.0	2.6	4.8

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 27, 2019	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Aug 27, 2019	14 Days
- Method: LTM-GEN-7080 Moisture			

eurofins | Environment Testing

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Site # 1254 & 14271

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NATA # 1261 Site # 18217

Brisbane
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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

Company Name:	Ramboll Australia Pty Ltd	**Order No.:**		**Received:**	Aug 27, 2019 5:45 PM
Address:	Level 3/100 Pacific Highway North Sydney NSW 2060	**Report #:**	673583	**Due:**	Aug 28, 2019
		Phone:	02 9954 8118	**Priority:**	1 Day
		Fax:	02 9954 8150	**Contact Name:**	Stephen Maxwell
Project Name:	318000780				

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						CANCELLED	Lead	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	SS30	Aug 27, 2019		Soil	S19-Au39075		X	X
2	SS31	Aug 27, 2019		Soil	S19-Au39076		X	X
3	SS32	Aug 27, 2019		Soil	S19-Au39077		X	X
4	SS33	Aug 27, 2019		Soil	S19-Au39078		X	X
5	SS34	Aug 27, 2019		Soil	S19-Au39079		X	X
6	SS35	Aug 27, 2019		Soil	S19-Au39080		X	X
7	SS36	Aug 27, 2019		Soil	S19-Au39081	X		
8	SS37	Aug 27, 2019		Soil	S19-Au39082		X	X
9	SS38	Aug 27, 2019		Soil	S19-Au39083		X	X
10	SS39	Aug 27, 2019		Soil	S19-Au39084		X	X

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Address: Level 3/100 Pacific Highway
North Sydney
NSW 2060

Project Name: 318000780

Order No.:
Report #: 673583
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Aug 27, 2019 5:45 PM
Due: Aug 28, 2019
Priority: 1 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						CANCELLED	Lead	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
11	SS40	Aug 27, 2019		Soil	S19-Au39085		X	X
12	SS41	Aug 27, 2019		Soil	S19-Au39086		X	X
13	SS42	Aug 27, 2019		Soil	S19-Au39087		X	X
14	SS43	Aug 27, 2019		Soil	S19-Au39088		X	X
15	SS44	Aug 27, 2019		Soil	S19-Au39089		X	X
16	SS45	Aug 27, 2019		Soil	S19-Au39090		X	X
17	SS46	Aug 27, 2019		Soil	S19-Au39091		X	X
18	SS47	Aug 27, 2019		Soil	S19-Au39092		X	X
19	SS48	Aug 27, 2019		Soil	S19-Au39093		X	X
20	SS49	Aug 27, 2019		Soil	S19-Au39094		X	X
21	SS50	Aug 27, 2019		Soil	S19-Au39095		X	X
22	SS51	Aug 27, 2019		Soil	S19-Au39096		X	X
23	D01_270819	Aug 27, 2019		Soil	S19-Au39097		X	X

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Project Name:	318000780		

Received:	Aug 27, 2019 5:45 PM
Due:	Aug 28, 2019
Priority:	1 Day
Contact Name:	Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						CANCELLED	Lead	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
24	D02_270819	Aug 27, 2019		Soil	S19-Au39098		X	X
Test Counts						1	23	23

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	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Lead			mg/kg	< 5			5	Pass	
LCS - % Recovery									
Heavy Metals									
Lead			%	128			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Heavy Metals				Result 1					
Lead	S19-Au30488	NCP	%	120			70-130	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	S19-Au39083	CP	mg/kg	9900	9500	4.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S19-Au39084	CP	%	1.2	1.6	27	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S19-Au39094	CP	mg/kg	1400	1300	4.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S19-Au39094	CP	%	5.9	6.7	13	30%	Pass	

Comments

Sample Integrity

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

Authorised By

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.

Environ
PO Box560
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NSW 2060

NATA Accredited
Accreditation Number 1261
Site Number 18217

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

Attention: **Stephen Maxwell**

Report **694957-S-V3**
Project name 318000780
Received Date Dec 20, 2019

Client Sample ID			**HA01_0.1**	**HA01_0.25**	**HA01_0.5**	**HA01_0.75**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S19-De30523**	**S19-De30524**	**S19-De30525**	**S19-De30526**
Date Sampled			**Dec 18, 2019**	**Dec 18, 2019**	**Dec 18, 2019**	**Dec 18, 2019**
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	4.2	1.9	0.6	2
Lead	5	mg/kg	720	820	29	55
% Moisture	1	%	2.2	7.0	18	17

Client Sample ID			**HA01_1.0**	**HA02_0.1**	**HA02_0.25**	**HA02_0.5**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S19-De30527**	**S19-De30528**	**S19-De30529**	**S19-De30530**
Date Sampled			**Dec 18, 2019**	**Dec 18, 2019**	**Dec 18, 2019**	**Dec 18, 2019**
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	< 0.4	12	1	< 0.4
Lead	5	mg/kg	34	450	12	7.4
% Moisture	1	%	15	2.3	13	10

Client Sample ID			**HA02_0.75**	**HA02_1.0**	**HA03_0.1**	**HA03_0.25**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S19-De30531**	**S19-De30532**	**S19-De30533**	**S19-De30534**
Date Sampled			**Dec 18, 2019**	**Dec 18, 2019**	**Dec 18, 2019**	**Dec 18, 2019**
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	< 0.4	< 0.4	2.5	0.5
Lead	5	mg/kg	11	11	2100	1600
% Moisture	1	%	14	13	4.2	8.0

Client Sample ID			HA03_0.5	HA03_0.75	SS113	SS114
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-De30535	S19-De30536	S19-De30537	S19-De30538
Date Sampled			Dec 18, 2019	Dec 18, 2019	Dec 19, 2019	Dec 19, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	0.4	0.8	3.8	1.8
Lead	5	mg/kg	210	460	300	360
% Moisture	1	%	11	12	3.5	2.2

Client Sample ID			SS115	SS116	SS117	SS118
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-De30539	S19-De30540	S19-De30541	S19-De30542
Date Sampled			Dec 19, 2019	Dec 19, 2019	Dec 19, 2019	Dec 19, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	0.9	2.4	2.7	8.7
Copper	5	mg/kg	-	-	50	310
Lead	5	mg/kg	220	250	250	880
Zinc	5	mg/kg	-	-	540	1300
% Moisture	1	%	3.4	< 1	3.1	2.3

Client Sample ID			SS119	SS120	SS121	SS122
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-De30543	S19-De30544	S19-De30545	S19-De30546
Date Sampled			Dec 19, 2019	Dec 19, 2019	Dec 19, 2019	Dec 19, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	0.8	0.7	1.2	2.7
Copper	5	mg/kg	21	20	40	59
Lead	5	mg/kg	110	86	140	260
Zinc	5	mg/kg	160	150	260	530
% Moisture	1	%	3.4	3.0	1.1	2.3

Client Sample ID			SS123	SS124	SS125	SS126
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-De30547	S19-De30548	S19-De30549	S19-De30550
Date Sampled			Dec 19, 2019	Dec 19, 2019	Dec 19, 2019	Dec 19, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	3.3	0.7	5	1
Copper	5	mg/kg	81	32	110	-
Lead	5	mg/kg	480	70	520	110
Zinc	5	mg/kg	700	180	850	-
% Moisture	1	%	1.2	3.9	2.6	2.4

Client Sample ID			SS127	SS128	SS129	SS130
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-De30551	S19-De30552	S19-De30553	S19-De30554
Date Sampled			Dec 19, 2019	Dec 19, 2019	Dec 19, 2019	Dec 19, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	1	< 0.4	< 0.4	0.6
Lead	5	mg/kg	89	39	61	190
% Moisture	1	%	3.6	2.5	3.2	1.1

Client Sample ID			SS131	SS132	SS133	SS134
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-De30555	S19-De30556	S19-De30557	S19-De30558
Date Sampled			Dec 19, 2019	Dec 19, 2019	Dec 19, 2019	Dec 19, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	0.6	< 0.4	< 0.4	< 0.4
Lead	5	mg/kg	240	17	46	42
% Moisture	1	%	1.3	< 1	< 1	1.0

Client Sample ID			SS135	SS136	SS137	SS138
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-De30559	S19-De30560	S19-De30561	S19-De30562
Date Sampled			Dec 19, 2019	Dec 19, 2019	Dec 19, 2019	Dec 19, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	< 0.4	3.8	2.7	1.8
Lead	5	mg/kg	59	1200	1100	210
% Moisture	1	%	3.2	2.1	< 1	1.1

Client Sample ID			SS139	SS140	SS141	PAINT1
Sample Matrix			Soil	Soil	Soil	Paint
Eurofins Sample No.			S19-De30563	S19-De30564	S19-De30565	S19-De30587
Date Sampled			Dec 19, 2019	Dec 19, 2019	Dec 19, 2019	Dec 19, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	9.5	7.4	3.9	-
Lead	5	mg/kg	800	660	390	-
% Moisture	1	%	1.1	1.6	1.5	-
Lead (% w/w)	0.01	%	-	-	-	0.09

Client Sample ID			PAINT2	PAINT3	PAINT4	PAINT5
Sample Matrix			Paint	Paint	Paint	Paint
Eurofins Sample No.			S19-De30588	S19-De30589	S19-De30590	S19-De30591
Date Sampled			Dec 19, 2019	Dec 19, 2019	Dec 19, 2019	Dec 19, 2019
Test/Reference	LOR	Unit				
Lead (% w/w)	0.01	%	0.25	1.8	0.29	0.03

Client Sample ID			PAINT6	PAINT7	PAINT8	D01_191219
Sample Matrix			Paint	Paint	Paint	Soil
Eurofins Sample No.			S19-De30592	S19-De30593	S19-De30594	S19-De30595
Date Sampled			Dec 19, 2019	Dec 19, 2019	Dec 19, 2019	Dec 19, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	-	-	-	2.2
Lead	5	mg/kg	-	-	-	320
% Moisture	1	%	-	-	-	3.5
Lead (% w/w)	0.01	%	0.07	16	15	-

Client Sample ID			D02_191219	D03_191219
Sample Matrix			Soil	Soil
Eurofins Sample No.			S19-De30596	S19-De30597
Date Sampled			Dec 19, 2019	Dec 19, 2019
Test/Reference	LOR	Unit		
Heavy Metals				
Cadmium	0.4	mg/kg	0.7	3.2
Lead	5	mg/kg	98	1100
% Moisture	1	%	2.6	2.6

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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	May 26, 2021	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
- Method: LTM-MET-3030 Metals in Soils by ICP-OES			
Lead (% w/w)	Sydney	Dec 23, 2019	6 Months
- Method: LTM-MET-3040 Metals in Waters Soils & Sediments by ICP-MS			
% Moisture	Melbourne	Dec 20, 2019	14 Days
- Method: LTM-GEN-7080 Moisture			

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North Sydney
NSW 2060

Project Name: 318000780

Order No.:
Report #: 694957
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Dec 20, 2019 11:00 AM
Due: Dec 31, 2019
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Lead	Lead	Lead (% w/w)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X			X
Sydney Laboratory - NATA Site # 18217							X	X	
Brisbane Laboratory - NATA Site # 20794									
Perth Laboratory - NATA Site # 23736									
External Laboratory									
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**				
1	HA01_0.1	Dec 18, 2019		Soil	S19-De30523	X			X
2	HA01_0.25	Dec 18, 2019		Soil	S19-De30524	X			X
3	HA01_0.5	Dec 18, 2019		Soil	S19-De30525	X			X
4	HA01_0.75	Dec 18, 2019		Soil	S19-De30526	X			X
5	HA01_1.0	Dec 18, 2019		Soil	S19-De30527	X			X
6	HA02_0.1	Dec 18, 2019		Soil	S19-De30528	X			X
7	HA02_0.25	Dec 18, 2019		Soil	S19-De30529	X			X
8	HA02_0.5	Dec 18, 2019		Soil	S19-De30530	X			X
9	HA02_0.75	Dec 18, 2019		Soil	S19-De30531	X			X
10	HA02_1.0	Dec 18, 2019		Soil	S19-De30532	X			X
11	HA03_0.1	Dec 18, 2019		Soil	S19-De30533	X			X

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Sample Detail						Lead	Lead	Lead (% w/w)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X			X
Sydney Laboratory - NATA Site # 18217							X	X	
Brisbane Laboratory - NATA Site # 20794									
Perth Laboratory - NATA Site # 23736									
12	HA03_0.25	Dec 18, 2019		Soil	S19-De30534	X			X
13	HA03_0.5	Dec 18, 2019		Soil	S19-De30535	X			X
14	HA03_0.75	Dec 18, 2019		Soil	S19-De30536	X			X
15	SS113	Dec 19, 2019		Soil	S19-De30537	X			X
16	SS114	Dec 19, 2019		Soil	S19-De30538	X			X
17	SS115	Dec 19, 2019		Soil	S19-De30539	X			X
18	SS116	Dec 19, 2019		Soil	S19-De30540	X			X
19	SS117	Dec 19, 2019		Soil	S19-De30541	X			X
20	SS118	Dec 19, 2019		Soil	S19-De30542	X			X
21	SS119	Dec 19, 2019		Soil	S19-De30543	X			X
22	SS120	Dec 19, 2019		Soil	S19-De30544	X			X
23	SS121	Dec 19, 2019		Soil	S19-De30545	X			X
24	SS122	Dec 19, 2019		Soil	S19-De30546	X			X

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Sample Detail						Lead	Lead	Lead (% w/w)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X			X
Sydney Laboratory - NATA Site # 18217							X	X	
Brisbane Laboratory - NATA Site # 20794									
Perth Laboratory - NATA Site # 23736									
25	SS123	Dec 19, 2019		Soil	S19-De30547	X			X
26	SS124	Dec 19, 2019		Soil	S19-De30548	X			X
27	SS125	Dec 19, 2019		Soil	S19-De30549	X			X
28	SS126	Dec 19, 2019		Soil	S19-De30550	X			X
29	SS127	Dec 19, 2019		Soil	S19-De30551	X			X
30	SS128	Dec 19, 2019		Soil	S19-De30552	X			X
31	SS129	Dec 19, 2019		Soil	S19-De30553	X			X
32	SS130	Dec 19, 2019		Soil	S19-De30554	X			X
33	SS131	Dec 19, 2019		Soil	S19-De30555	X			X
34	SS132	Dec 19, 2019		Soil	S19-De30556	X			X
35	SS133	Dec 19, 2019		Soil	S19-De30557	X			X
36	SS134	Dec 19, 2019		Soil	S19-De30558	X			X
37	SS135	Dec 19, 2019		Soil	S19-De30559	X			X

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Sample Detail						Lead	Lead	Lead (% w/w)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X			X
Sydney Laboratory - NATA Site # 18217							X	X	
Brisbane Laboratory - NATA Site # 20794									
Perth Laboratory - NATA Site # 23736									
38	SS136	Dec 19, 2019		Soil	S19-De30560	X			X
39	SS137	Dec 19, 2019		Soil	S19-De30561	X			X
40	SS138	Dec 19, 2019		Soil	S19-De30562	X			X
41	SS139	Dec 19, 2019		Soil	S19-De30563	X			X
42	SS140	Dec 19, 2019		Soil	S19-De30564	X			X
43	SS141	Dec 19, 2019		Soil	S19-De30565	X			X
44	SWAB1	Dec 19, 2019		Wipes	S19-De30566		X		
45	SWAB2	Dec 19, 2019		Wipes	S19-De30567		X		
46	SWAB3	Dec 19, 2019		Wipes	S19-De30568		X		
47	SWAB4	Dec 19, 2019		Wipes	S19-De30569		X		
48	SWAB5	Dec 19, 2019		Wipes	S19-De30570		X		
49	SWAB6	Dec 19, 2019		Wipes	S19-De30571		X		
50	SWAB7	Dec 19, 2019		Wipes	S19-De30572		X		

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Sample Detail						Lead	Lead	Lead (% w/w)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X			X
Sydney Laboratory - NATA Site # 18217							X	X	
Brisbane Laboratory - NATA Site # 20794									
Perth Laboratory - NATA Site # 23736									
51	SWAB8	Dec 19, 2019		Wipes	S19-De30573		X		
52	SWAB9	Dec 19, 2019		Wipes	S19-De30574		X		
53	SWAB10	Dec 19, 2019		Wipes	S19-De30575		X		
54	SWAB11	Dec 19, 2019		Wipes	S19-De30576		X		
55	SWAB12	Dec 19, 2019		Wipes	S19-De30577		X		
56	SWAB13	Dec 19, 2019		Wipes	S19-De30578		X		
57	SWAB14	Dec 19, 2019		Wipes	S19-De30579		X		
58	SWAB15	Dec 19, 2019		Wipes	S19-De30580		X		
59	SWAB16	Dec 19, 2019		Wipes	S19-De30581		X		
60	SWAB17	Dec 19, 2019		Wipes	S19-De30582		X		
61	SWAB18	Dec 19, 2019		Wipes	S19-De30583		X		
62	SWAB19	Dec 19, 2019		Wipes	S19-De30584		X		
63	SWAB20	Dec 19, 2019		Wipes	S19-De30585		X		

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Sample Detail						Lead	Lead	Lead (% w/w)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X			X
Sydney Laboratory - NATA Site # 18217							X	X	
Brisbane Laboratory - NATA Site # 20794									
Perth Laboratory - NATA Site # 23736									
64	SWAB21	Dec 19, 2019		Wipes	S19-De30586		X		
65	PAINT1	Dec 19, 2019		Paint	S19-De30587			X	
66	PAINT2	Dec 19, 2019		Paint	S19-De30588			X	
67	PAINT3	Dec 19, 2019		Paint	S19-De30589			X	
68	PAINT4	Dec 19, 2019		Paint	S19-De30590			X	
69	PAINT5	Dec 19, 2019		Paint	S19-De30591			X	
70	PAINT6	Dec 19, 2019		Paint	S19-De30592			X	
71	PAINT7	Dec 19, 2019		Paint	S19-De30593			X	
72	PAINT8	Dec 19, 2019		Paint	S19-De30594			X	
73	D01_191219	Dec 19, 2019		Soil	S19-De30595	X			X
74	D02_191219	Dec 19, 2019		Soil	S19-De30596	X			X
75	D03_191219	Dec 19, 2019		Soil	S19-De30597	X			X
76	QA1	Dec 19, 2019		Wipes	S19-De30598		X		

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Sample Detail						Lead	Lead	Lead (% w/w)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X			X
Sydney Laboratory - NATA Site # 18217							X	X	
Brisbane Laboratory - NATA Site # 20794									
Perth Laboratory - NATA Site # 23736									
77	QA2	Dec 19, 2019		Wipes	S19-De30599		X		
Test Counts						69	69	8	46

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Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Heavy Metals							
Cadmium	mg/kg	< 0.4			0.4	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Heavy Metals							
Cadmium	%	109			80-120	Pass	
Copper	%	114			80-120	Pass	
Lead	%	117			80-120	Pass	
Zinc	%	112			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Cadmium	S19-De30524	CP	%	105			75-125	Pass	
Copper	S19-De30524	CP	%	66			75-125	Fail	
Zinc	S19-De30524	CP	%	42			75-125	Fail	
Spike - % Recovery									
Heavy Metals				Result 1					
Cadmium	S19-De30534	CP	%	104			75-125	Pass	
Copper	S19-De30534	CP	%	129			75-125	Fail	
Zinc	S19-De30534	CP	%	127			75-125	Fail	
Spike - % Recovery									
Heavy Metals				Result 1					
Cadmium	S19-De30544	CP	%	106			75-125	Pass	
Copper	S19-De30544	CP	%	199			75-125	Fail	
Lead	S19-De30544	CP	%	91			75-125	Pass	
Zinc	S19-De30544	CP	%	105			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Cadmium	S19-De30554	CP	%	119			75-125	Pass	
Copper	S19-De30554	CP	%	116			75-125	Pass	
Zinc	S19-De30554	CP	%	262			75-125	Fail	Q08
Spike - % Recovery									
Heavy Metals				Result 1					
Cadmium	S19-De30564	CP	%	86			75-125	Pass	
Copper	S19-De30564	CP	%	70			75-125	Fail	Q08

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Copper	S19-De30523	CP	mg/kg	260	180	37	30%	Fail	
Lead	S19-De30523	CP	mg/kg	720	650	11	30%	Pass	
Zinc	S19-De30523	CP	mg/kg	420	390	7.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Copper	S19-De30524	CP	mg/kg	150	150	<1	30%	Pass	
Lead	S19-De30524	CP	mg/kg	820	830	1.0	30%	Pass	
Zinc	S19-De30524	CP	mg/kg	300	300	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S19-De30530	CP	%	10	10	2.0	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Copper	S19-De30533	CP	mg/kg	420	380	9.0	30%	Pass	
Lead	S19-De30533	CP	mg/kg	2100	1900	5.0	30%	Pass	
Zinc	S19-De30533	CP	mg/kg	360	400	11	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Copper	S19-De30534	CP	mg/kg	230	230	1.0	30%	Pass	
Lead	S19-De30534	CP	mg/kg	1600	1600	1.0	30%	Pass	
Zinc	S19-De30534	CP	mg/kg	180	180	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S19-De30540	CP	%	< 1	< 1	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S19-De30543	CP	mg/kg	110	97	10	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S19-De30544	CP	mg/kg	86	86	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S19-De30550	CP	%	2.4	2.5	3.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Copper	S19-De30553	CP	mg/kg	17	17	1.0	30%	Pass	
Lead	S19-De30553	CP	mg/kg	61	64	6.0	30%	Pass	
Zinc	S19-De30553	CP	mg/kg	190	200	6.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Copper	S19-De30554	CP	mg/kg	32	32	1.0	30%	Pass	
Lead	S19-De30554	CP	mg/kg	190	190	1.0	30%	Pass	
Zinc	S19-De30554	CP	mg/kg	280	280	1.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S19-De30560	CP	%	2.1	1.9	11	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Copper	S19-De30563	CP	mg/kg	200	200	<1	30%	Pass	
Lead	S19-De30563	CP	mg/kg	800	790	2.0	30%	Pass	
Zinc	S19-De30563	CP	mg/kg	1100	1100	4.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Copper	S19-De30564	CP	mg/kg	130	140	3.0	30%	Pass	
Lead	S19-De30564	CP	mg/kg	660	670	2.0	30%	Pass	
Zinc	S19-De30564	CP	mg/kg	1500	1500	2.0	30%	Pass	

Comments

V3- new version to import Cd as per client request on soil samples.

1. The results in this report supersede any previously corresponded results.
2. All Soil Results are reported on a dry basis.
3. Samples are analysed on an as received basis.

ABBREVIATIONS

mg/kg : milligrams per kilograms, mg/L : milligrams per litre, ppm : parts per million,

LOR : Limit of Reporting

RPD : Relative Percent Difference

CRM : Certified Reference Material

LCS : Laboratory Control Sample

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference
Q15	The RPD reported passes mgt-LabMark's Acceptance Criteria as stipulated in AS-POL-002. Refer to Glossary Page of this report for further details

Authorised by:

Andrew Black Analytical Services Manager

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.

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

Attention: **Stephen Maxwell**

Report **772644-S**
Project name LEAD TRIAL
Project ID 318000780
Received Date Feb 08, 2021

Client Sample ID			**TP3A_BALA**	**TP3A_BALB**	**TP3A_BALC**	**TP5A_BALA**
Sample Matrix			**Rock**	**Rock**	**Rock**	**Rock**
Eurofins Sample No.			**S21-Fe16479**	**S21-Fe16480**	**S21-Fe16481**	**S21-Fe16482**
Date Sampled			**Feb 08, 2021**	**Feb 08, 2021**	**Feb 08, 2021**	**Feb 08, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	550	2800	2100	560
% Moisture	1	%	< 1	< 1	< 1	1.1

Client Sample ID			**TP5A_BALB**	**TP5A_BALC**	**TP6A_BALA**	**TP6A_BALB**
Sample Matrix			**Rock**	**Rock**	**Rock**	**Rock**
Eurofins Sample No.			**S21-Fe16483**	**S21-Fe16484**	**S21-Fe16485**	**S21-Fe16486**
Date Sampled			**Feb 08, 2021**	**Feb 08, 2021**	**Feb 08, 2021**	**Feb 08, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	420	390	1100	360
% Moisture	1	%	1.2	1.2	1.2	< 1

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	Feb 18, 2021	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Feb 09, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			

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: LEAD TRIAL
Project ID: 318000780

Order No.:
Report #: 772644
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Feb 8, 2021 2:15 PM
Due: Feb 15, 2021
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						HOLD	Lead	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						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	TP3A_BALA	Feb 08, 2021		Rock	S21-Fe16479		X	X
2	TP3A_BALB	Feb 08, 2021		Rock	S21-Fe16480		X	X
3	TP3A_BALC	Feb 08, 2021		Rock	S21-Fe16481		X	X
4	TP5A_BALA	Feb 08, 2021		Rock	S21-Fe16482		X	X
5	TP5A_BALB	Feb 08, 2021		Rock	S21-Fe16483		X	X
6	TP5A_BALC	Feb 08, 2021		Rock	S21-Fe16484		X	X
7	TP6A_BALA	Feb 08, 2021		Rock	S21-Fe16485		X	X
8	TP6A_BALB	Feb 08, 2021		Rock	S21-Fe16486		X	X
9	TP6A_BALC	Feb 08, 2021		Rock	S21-Fe16487	X		

eurofins | Environment Testing

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

Order No.:
Report #: 772644
Phone: 02 9954 8118
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Received: Feb 8, 2021 2:15 PM
Due: Feb 15, 2021
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail	HOLD	Lead	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271			
Sydney Laboratory - NATA Site # 18217	X	X	X
Brisbane Laboratory - NATA Site # 20794			
Perth Laboratory - NATA Site # 23736			
Mayfield Laboratory			
External Laboratory			
Test Counts	2	8	8

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	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Lead			mg/kg	< 5			5	Pass	
LCS - % Recovery									
Heavy Metals									
Lead			%	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					
Lead	S21-Fe35255	NCP	%	97			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	S21-Fe31701	NCP	mg/kg	23	20	15	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S21-Fe16479	CP	%	< 1	< 1	<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
John Nguyen	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.

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

Attention: **Stephen Maxwell**

Report **772646-L**
Project name TREATABLILITY TRIAL
Project ID 318000780
Received Date Feb 08, 2021

Client Sample ID			**TP3A_A_SCR**	**TP3A_B_SCR**	**TP3A_C_SCR**	**TP5A_A_SCR**
Sample Matrix			**US Leachate**	**US Leachate**	**US Leachate**	**US Leachate**
Eurofins Sample No.			**S21-Fe16506**	**S21-Fe16507**	**S21-Fe16508**	**S21-Fe16509**
Date Sampled			**Feb 08, 2021**	**Feb 08, 2021**	**Feb 08, 2021**	**Feb 08, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.01	mg/L	14	28	10	190
USA Leaching Procedure						
Leachate Fluid[C01]		comment	1.0	1.0	1.0	1.0
pH (initial)	0.1	pH Units	2.9	3.1	3.1	7.1
pH (off)	0.1	pH Units	5.0	5.0	5.0	5.0
pH (USA HCl addition)	0.1	pH Units	1.5	1.6	1.6	1.9

Client Sample ID			**TP5A_B_SCR**	**TP5A_C_SCR**
Sample Matrix			**US Leachate**	**US Leachate**
Eurofins Sample No.			**S21-Fe16510**	**S21-Fe16511**
Date Sampled			**Feb 08, 2021**	**Feb 08, 2021**
Test/Reference	LOR	Unit		
Heavy Metals				
Lead	0.01	mg/L	180	190
USA Leaching Procedure				
Leachate Fluid[C01]		comment	1.0	1.0
pH (initial)	0.1	pH Units	4.3	4.3
pH (off)	0.1	pH Units	5.0	5.0
pH (USA HCl addition)	0.1	pH Units	1.7	2.0

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	Feb 15, 2021	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
USA Leaching Procedure	Sydney	Feb 10, 2021	14 Days
- Method: LTM-GEN-7010 Leaching Procedure for Soils & Solid Wastes			

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: TREATABLILITY TRIAL
Project ID: 318000780

Order No.:
Report #: 772646
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Feb 8, 2021 2:15 PM
Due: Feb 15, 2021
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Lead	USA Leaching Procedure	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						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	TP3A_A_SCR	Feb 08, 2021		Soil	S21-Fe16500	X		X
2	TP3A_B_SCR	Feb 08, 2021		Soil	S21-Fe16501	X		X
3	TP3A_C_SCR	Feb 08, 2021		Soil	S21-Fe16502	X		X
4	TP5A_A_SCR	Feb 08, 2021		Soil	S21-Fe16503	X		X
5	TP5A_B_SCR	Feb 08, 2021		Soil	S21-Fe16504	X		X
6	TP5A_C_SCR	Feb 08, 2021		Soil	S21-Fe16505	X		X
7	TP3A_A_SCR	Feb 08, 2021		US Leachate	S21-Fe16506	X	X	
8	TP3A_B_SCR	Feb 08, 2021		US Leachate	S21-Fe16507	X	X	
9	TP3A_C_SCR	Feb 08, 2021		US Leachate	S21-Fe16508	X	X	

eurofins | Environment Testing

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Project Name: TREATABLILITY TRIAL
Project ID: 318000780

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Phone: 02 9954 8118
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Received: Feb 8, 2021 2:15 PM
Due: Feb 15, 2021
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Lead	USA Leaching Procedure	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
Mayfield Laboratory								
External Laboratory								
10	TP5A_A_SCR	Feb 08, 2021		US Leachate	S21-Fe16509	X	X	
11	TP5A_B_SCR	Feb 08, 2021		US Leachate	S21-Fe16510	X	X	
12	TP5A_C_SCR	Feb 08, 2021		US Leachate	S21-Fe16511	X	X	
Test Counts						12	6	6

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.

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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

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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.
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TCLP	Toxicity Characteristic Leaching Procedure
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SRA	Sample Receipt Advice
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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	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Lead			mg/L	< 0.01			0.01	Pass	
LCS - % Recovery									
Heavy Metals									
Lead			%	98			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	S21-Fe23191	NCP	%	96			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	S21-Fe24422	NCP	mg/L	0.23	0.24	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
C01	Leachate Fluid Key: 1 - pH 5.0; 2 - pH 2.9; 3 - pH 9.2; 4 - Reagent (DI) water; 5 - Client sample, 6 - other

Authorised by:

Andrew Black	Analytical Services Manager
John Nguyen	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.

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

Attention: **Stephen Maxwell**

Report **772646-S**
Project name TREATABLILITY TRIAL
Project ID 318000780
Received Date Feb 08, 2021

Client Sample ID			**TP3A_A_SCR**	**TP3A_B_SCR**	**TP3A_C_SCR**	**TP5A_A_SCR**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S21-Fe16500**	**S21-Fe16501**	**S21-Fe16502**	**S21-Fe16503**
Date Sampled			**Feb 08, 2021**	**Feb 08, 2021**	**Feb 08, 2021**	**Feb 08, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	5	mg/kg	16000	15000	19000	39000
% Moisture	1	%	8.0	8.4	8.5	2.6

Client Sample ID			**TP5A_B_SCR**	**TP5A_C_SCR**
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**S21-Fe16504**	**S21-Fe16505**
Date Sampled			**Feb 08, 2021**	**Feb 08, 2021**
Test/Reference	LOR	Unit		
Heavy Metals				
Lead	5	mg/kg	35000	37000
% Moisture	1	%	2.6	4.0

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	Feb 10, 2021	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Feb 09, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			

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Site # 1254 & 14271

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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: TREATABLILITY TRIAL
Project ID: 318000780

Order No.:
Report #: 772646
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Feb 8, 2021 2:15 PM
Due: Feb 15, 2021
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Lead	USA Leaching Procedure	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						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	TP3A_A_SCR	Feb 08, 2021		Soil	S21-Fe16500	X		X
2	TP3A_B_SCR	Feb 08, 2021		Soil	S21-Fe16501	X		X
3	TP3A_C_SCR	Feb 08, 2021		Soil	S21-Fe16502	X		X
4	TP5A_A_SCR	Feb 08, 2021		Soil	S21-Fe16503	X		X
5	TP5A_B_SCR	Feb 08, 2021		Soil	S21-Fe16504	X		X
6	TP5A_C_SCR	Feb 08, 2021		Soil	S21-Fe16505	X		X
7	TP3A_A_SCR	Feb 08, 2021		US Leachate	S21-Fe16506	X	X	
8	TP3A_B_SCR	Feb 08, 2021		US Leachate	S21-Fe16507	X	X	
9	TP3A_C_SCR	Feb 08, 2021		US Leachate	S21-Fe16508	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: TREATABLILITY TRIAL
Project ID: 318000780

Order No.:
Report #: 772646
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Feb 8, 2021 2:15 PM
Due: Feb 15, 2021
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Lead	USA Leaching Procedure	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
Mayfield Laboratory								
External Laboratory								
10	TP5A_A_SCR	Feb 08, 2021		US Leachate	S21-Fe16509	X	X	
11	TP5A_B_SCR	Feb 08, 2021		US Leachate	S21-Fe16510	X	X	
12	TP5A_C_SCR	Feb 08, 2021		US Leachate	S21-Fe16511	X	X	
Test Counts						12	6	6

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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.

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	%	109			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S21-Fe16501	CP	%	8.4	8.6	3.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S21-Fe16504	CP	mg/kg	35000	37000	6.0	30%	Pass	

Comments

Sample Integrity

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

Authorised by:

Andrew Black	Analytical Services Manager
John Nguyen	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.

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

Attention: **Stephen Maxwell**

Report **774893-L**
Project name TREATABILITY TRIAL
Project ID 318000780
Received Date Feb 17, 2021

Client Sample ID			**TP3A_D_SCR**	**TP3A_TR01-1**	**TP3A_TR01-2**	**TP3A_TR02-1**
Sample Matrix			**US Leachate**	**US Leachate**	**US Leachate**	**US Leachate**
Eurofins Sample No.			**S21-Fe36599**	**S21-Fe36600**	**S21-Fe36601**	**S21-Fe36602**
Date Sampled			**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.01	mg/L	35	< 0.01	< 0.01	< 0.01
USA Leaching Procedure						
Leachate Fluid[C01]		comment	1.0	1.0	1.0	1.0
pH (initial)	0.1	pH Units	3.3	9.2	9.3	9.5
pH (off)	0.1	pH Units	5.0	9.0	9.0	9.2
pH (USA HCl addition)	0.1	pH Units	1.8	1.9	1.9	2.0

Client Sample ID			**TP3A_TR02-2**	**TP3A_TR03-1**	**TP3A_TR03-2**	**TP3A_TR04-1**
Sample Matrix			**US Leachate**	**US Leachate**	**US Leachate**	**US Leachate**
Eurofins Sample No.			**S21-Fe36603**	**S21-Fe36604**	**S21-Fe36605**	**S21-Fe36606**
Date Sampled			**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.01	mg/L	< 0.01	0.01	0.03	< 0.01
USA Leaching Procedure						
Leachate Fluid[C01]		comment	1.0	1.0	1.0	1.0
pH (initial)	0.1	pH Units	9.5	9.7	9.7	8.8
pH (off)	0.1	pH Units	9.3	8.8	9.2	8.5
pH (USA HCl addition)	0.1	pH Units	1.9	2.0	2.0	1.9

Client Sample ID			**TP3A_TR04-2**	**TP3A_TR05-1**	**TP3A_TR05-2**	**TP3A_TR06-1**
Sample Matrix			**US Leachate**	**US Leachate**	**US Leachate**	**US Leachate**
Eurofins Sample No.			**S21-Fe36607**	**S21-Fe36608**	**S21-Fe36609**	**S21-Fe36610**
Date Sampled			**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.01	mg/L	0.04	< 0.01	0.04	0.03
USA Leaching Procedure						
Leachate Fluid[C01]		comment	1.0	1.0	1.0	1.0
pH (initial)	0.1	pH Units	8.9	9.6	9.6	9.6
pH (off)	0.1	pH Units	8.3	9.3	9.3	8.9
pH (USA HCl addition)	0.1	pH Units	1.9	1.9	1.8	1.9

Client Sample ID			TP3A_TR06-2	TP5A_D_SCR	TP5A_TR01-1	TP5A_TR01-2
Sample Matrix			US Leachate	US Leachate	US Leachate	US Leachate
Eurofins Sample No.			S21-Fe36611	S21-Fe36612	S21-Fe36613	S21-Fe36614
Date Sampled			Feb 17, 2021	Feb 17, 2021	Feb 17, 2021	Feb 17, 2021
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.01	mg/L	0.01	140	0.19	< 0.01
USA Leaching Procedure						
Leachate Fluid[C01]		comment	1.0	1.0	1.0	1.0
pH (initial)	0.1	pH Units	9.5	5.3	9.7	9.8
pH (off)	0.1	pH Units	9.0	5.1	9.2	9.0
pH (USA HCl addition)	0.1	pH Units	1.9	1.9	2.0	1.9

Client Sample ID			TP5A_TR02-1	TP5A_TR02-2	TP5A_TR03-1	TP5A_TR03-2
Sample Matrix			US Leachate	US Leachate	US Leachate	US Leachate
Eurofins Sample No.			S21-Fe36615	S21-Fe36616	S21-Fe36617	S21-Fe36618
Date Sampled			Feb 17, 2021	Feb 17, 2021	Feb 17, 2021	Feb 17, 2021
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.01	mg/L	0.05	0.02	0.03	0.03
USA Leaching Procedure						
Leachate Fluid[C01]		comment	1.0	1.0	1.0	1.0
pH (initial)	0.1	pH Units	9.7	9.7	9.7	10.0
pH (off)	0.1	pH Units	9.2	9.2	8.7	8.7
pH (USA HCl addition)	0.1	pH Units	2.0	1.9	1.9	2.0

Client Sample ID			TP5A_TR04-1	TP5A_TR04-2	TP5A_TR05-1	TP5A_TR05-2
Sample Matrix			US Leachate	US Leachate	US Leachate	US Leachate
Eurofins Sample No.			S21-Fe36619	S21-Fe36620	S21-Fe36621	S21-Fe36622
Date Sampled			Feb 17, 2021	Feb 17, 2021	Feb 17, 2021	Feb 17, 2021
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.01	mg/L	0.05	< 0.01	< 0.01	0.01
USA Leaching Procedure						
Leachate Fluid[C01]		comment	1.0	1.0	1.0	1.0
pH (initial)	0.1	pH Units	9.9	9.4	9.8	9.8
pH (off)	0.1	pH Units	9.2	9.0	9.1	9.4
pH (USA HCl addition)	0.1	pH Units	1.9	1.8	1.9	1.9

Client Sample ID			TP5A_TR06-1	TP5A_TR06-2	TP5A_TR07-1	TP5A_TR07-2
Sample Matrix			US Leachate	US Leachate	US Leachate	US Leachate
Eurofins Sample No.			S21-Fe36623	S21-Fe36624	S21-Fe36625	S21-Fe36626
Date Sampled			Feb 17, 2021	Feb 17, 2021	Feb 17, 2021	Feb 17, 2021
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.01	mg/L	0.05	0.02	0.08	0.05
USA Leaching Procedure						
Leachate Fluid[C01]		comment	1.0	1.0	1.0	1.0
pH (initial)	0.1	pH Units	9.9	9.8	9.6	9.6
pH (off)	0.1	pH Units	9.4	9.3	9.4	9.3
pH (USA HCl addition)	0.1	pH Units	1.9	1.9	1.8	2.0

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	Feb 23, 2021	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
USA Leaching Procedure	Sydney	Feb 20, 2021	14 Days
- Method: LTM-GEN-7010 Leaching Procedure for Soils & Solid Wastes			

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Phone : 0800 856 450
IANZ # 1290

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

Project Name: TREATABILITY TRIAL
Project ID: 318000780

Order No.:
Report #: 774893
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Feb 17, 2021 3:00 PM
Due: Feb 24, 2021
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Lead	pH (1:5 Aqueous extract at 25°C as rec.)	USA Leaching Procedure	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217						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	TP3A_D_SCR	Feb 17, 2021		Soil	S21-Fe36583	X	X		X
2	TP3A_TR01-1	Feb 17, 2021		Soil	S21-Fe36584	X			X
3	TP3A_TR02-1	Feb 17, 2021		Soil	S21-Fe36585	X			X
4	TP3A_TR03-1	Feb 17, 2021		Soil	S21-Fe36586	X			X
5	TP3A_TR04-1	Feb 17, 2021		Soil	S21-Fe36587	X			X
6	TP3A_TR05-1	Feb 17, 2021		Soil	S21-Fe36588	X			X
7	TP3A_TR06-1	Feb 17, 2021		Soil	S21-Fe36589	X			X
8	TP5A_D_SCR	Feb 17, 2021		Soil	S21-Fe36590	X	X		X
9	TP5A_TR01-1	Feb 17, 2021		Soil	S21-Fe36591	X			X

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

Project Name: TREATABILITY TRIAL
Project ID: 318000780

Order No.:
Report #: 774893
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Feb 17, 2021 3:00 PM
Due: Feb 24, 2021
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Lead	pH (1:5 Aqueous extract at 25°C as rec.)	USA Leaching Procedure	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217						X	X	X	X
Brisbane Laboratory - NATA Site # 20794									
Perth Laboratory - NATA Site # 23736									
Mayfield Laboratory									
External Laboratory									
10	TP5A_TR02-1	Feb 17, 2021		Soil	S21-Fe36592	X			X
11	TP5A_TR03-1	Feb 17, 2021		Soil	S21-Fe36593	X			X
12	TP5A_TR04-1	Feb 17, 2021		Soil	S21-Fe36594	X			X
13	TP5A_TR05-1	Feb 17, 2021		Soil	S21-Fe36595	X			X
14	TP5A_TR06-1	Feb 17, 2021		Soil	S21-Fe36596	X			X
15	TP5A_TR07-1	Feb 17, 2021		Soil	S21-Fe36597	X			X
16	TP3A_D_SCR	Feb 17, 2021		US Leachate	S21-Fe36599	X		X	
17	TP3A_TR01-1	Feb 17, 2021		US Leachate	S21-Fe36600	X		X	
18	TP3A_TR01-2	Feb 17, 2021		US Leachate	S21-Fe36601	X		X	
19	TP3A_TR02-1	Feb 17, 2021		US Leachate	S21-Fe36602	X		X	
20	TP3A_TR02-2	Feb 17, 2021		US Leachate	S21-Fe36603	X		X	

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Sydney Laboratory - NATA Site # 18217						X	X	X	X
Brisbane Laboratory - NATA Site # 20794									
Perth Laboratory - NATA Site # 23736									
Mayfield Laboratory									
External Laboratory									
21	TP3A_TR03-1	Feb 17, 2021		US Leachate	S21-Fe36604	X		X	
22	TP3A_TR03-2	Feb 17, 2021		US Leachate	S21-Fe36605	X		X	
23	TP3A_TR04-1	Feb 17, 2021		US Leachate	S21-Fe36606	X		X	
24	TP3A_TR04-2	Feb 17, 2021		US Leachate	S21-Fe36607	X		X	
25	TP3A_TR05-1	Feb 17, 2021		US Leachate	S21-Fe36608	X		X	
26	TP3A_TR05-2	Feb 17, 2021		US Leachate	S21-Fe36609	X		X	
27	TP3A_TR06-1	Feb 17, 2021		US Leachate	S21-Fe36610	X		X	
28	TP3A_TR06-2	Feb 17, 2021		US Leachate	S21-Fe36611	X		X	
29	TP5A_D_SCR	Feb 17, 2021		US Leachate	S21-Fe36612	X		X	
30	TP5A_TR01-1	Feb 17, 2021		US Leachate	S21-Fe36613	X		X	
31	TP5A_TR01-2	Feb 17, 2021		US Leachate	S21-Fe36614	X		X	

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Brisbane Laboratory - NATA Site # 20794									
Perth Laboratory - NATA Site # 23736									
Mayfield Laboratory									
External Laboratory									
32	TP5A_TR02-1	Feb 17, 2021		US Leachate	S21-Fe36615	X		X	
33	TP5A_TR02-2	Feb 17, 2021		US Leachate	S21-Fe36616	X		X	
34	TP5A_TR03-1	Feb 17, 2021		US Leachate	S21-Fe36617	X		X	
35	TP5A_TR03-2	Feb 17, 2021		US Leachate	S21-Fe36618	X		X	
36	TP5A_TR04-1	Feb 17, 2021		US Leachate	S21-Fe36619	X		X	
37	TP5A_TR04-2	Feb 17, 2021		US Leachate	S21-Fe36620	X		X	
38	TP5A_TR05-1	Feb 17, 2021		US Leachate	S21-Fe36621	X		X	
39	TP5A_TR05-2	Feb 17, 2021		US Leachate	S21-Fe36622	X		X	
40	TP5A_TR06-1	Feb 17, 2021		US Leachate	S21-Fe36623	X		X	
41	TP5A_TR06-2	Feb 17, 2021		US Leachate	S21-Fe36624	X		X	
42	TP5A_TR07-1	Feb 17, 2021		US Leachate	S21-Fe36625	X		X	

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Project ID: 318000780

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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
Brisbane Laboratory - NATA Site # 20794									
Perth Laboratory - NATA Site # 23736									
Mayfield Laboratory									
External Laboratory									
43	TP5A_TR07-2	Feb 17, 2021		US Leachate	S21-Fe36626	X		X	
Test Counts						43	2	28	15

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	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Lead			mg/L	< 0.01			0.01	Pass	
LCS - % Recovery									
Heavy Metals									
Lead			%	93			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Heavy Metals				Result 1					
Lead	S21-Fe36618	CP	%	82			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	S21-Fe36599	CP	mg/L	35	35	1.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S21-Fe36609	CP	mg/L	0.04	0.04	3.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S21-Fe36619	CP	mg/L	0.05	0.03	42	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
C01	Leachate Fluid Key: 1 - pH 5.0; 2 - pH 2.9; 3 - pH 9.2; 4 - Reagent (DI) water; 5 - Client sample, 6 - other
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
John Nguyen	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.

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 **774893-S**
Project name TREATABILITY TRIAL
Project ID 318000780
Received Date Feb 17, 2021

Client Sample ID			**TP3A_D_SCR**	**TP3A_TR01-1**	**TP3A_TR02-1**	**TP3A_TR03-1**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S21-Fe36583**	**S21-Fe36584**	**S21-Fe36585**	**S21-Fe36586**
Date Sampled			**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**
Test/Reference	LOR	Unit				
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	2.8	-	-	-
% Moisture	1	%	7.8	15	16	13
Heavy Metals						
Lead	5	mg/kg	10000	8200	9600	18000

Client Sample ID			**TP3A_TR04-1**	**TP3A_TR05-1**	**TP3A_TR06-1**	**TP5A_D_SCR**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S21-Fe36587**	**S21-Fe36588**	**S21-Fe36589**	**S21-Fe36590**
Date Sampled			**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**
Test/Reference	LOR	Unit				
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	-	-	-	4.2
% Moisture	1	%	13	14	12	2.4
Heavy Metals						
Lead	5	mg/kg	9500	9900	9100	19000

Client Sample ID			**TP5A_TR01-1**	**TP5A_TR02-1**	**TP5A_TR03-1**	**TP5A_TR04-1**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S21-Fe36591**	**S21-Fe36592**	**S21-Fe36593**	**S21-Fe36594**
Date Sampled			**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**
Test/Reference	LOR	Unit				
% Moisture	1	%	17	13	20	18
Heavy Metals						
Lead	5	mg/kg	17000	15000	18000	20000

Client Sample ID			TP5A_TR05-1	TP5A_TR06-1	TP5A_TR07-1
Sample Matrix			**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S21-Fe36595**	**S21-Fe36596**	**S21-Fe36597**
Date Sampled			**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**
Test/Reference	LOR	Unit			
% Moisture	1	%	13	16	15
Heavy Metals					
Lead	5	mg/kg	10000	13000	12000

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
pH (1:5 Aqueous extract at 25°C as rec.)	Sydney	Feb 20, 2021	7 Days
- Method: LTM-GEN-7090 pH in soil by ISE			
Heavy Metals	Sydney	Feb 22, 2021	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Feb 18, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			

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4	TP3A_TR03-1	Feb 17, 2021		Soil	S21-Fe36586	X			X
5	TP3A_TR04-1	Feb 17, 2021		Soil	S21-Fe36587	X			X
6	TP3A_TR05-1	Feb 17, 2021		Soil	S21-Fe36588	X			X
7	TP3A_TR06-1	Feb 17, 2021		Soil	S21-Fe36589	X			X
8	TP5A_D_SCR	Feb 17, 2021		Soil	S21-Fe36590	X	X		X
9	TP5A_TR01-1	Feb 17, 2021		Soil	S21-Fe36591	X			X

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

Project Name: TREATABILITY TRIAL
Project ID: 318000780

Order No.:
Report #: 774893
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Feb 17, 2021 3:00 PM
Due: Feb 24, 2021
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Lead	pH (1:5 Aqueous extract at 25°C as rec.)	USA Leaching Procedure	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217						X	X	X	X
Brisbane Laboratory - NATA Site # 20794									
Perth Laboratory - NATA Site # 23736									
Mayfield Laboratory									
External Laboratory									
10	TP5A_TR02-1	Feb 17, 2021		Soil	S21-Fe36592	X			X
11	TP5A_TR03-1	Feb 17, 2021		Soil	S21-Fe36593	X			X
12	TP5A_TR04-1	Feb 17, 2021		Soil	S21-Fe36594	X			X
13	TP5A_TR05-1	Feb 17, 2021		Soil	S21-Fe36595	X			X
14	TP5A_TR06-1	Feb 17, 2021		Soil	S21-Fe36596	X			X
15	TP5A_TR07-1	Feb 17, 2021		Soil	S21-Fe36597	X			X
16	TP3A_D_SCR	Feb 17, 2021		US Leachate	S21-Fe36599	X		X	
17	TP3A_TR01-1	Feb 17, 2021		US Leachate	S21-Fe36600	X		X	
18	TP3A_TR01-2	Feb 17, 2021		US Leachate	S21-Fe36601	X		X	
19	TP3A_TR02-1	Feb 17, 2021		US Leachate	S21-Fe36602	X		X	
20	TP3A_TR02-2	Feb 17, 2021		US Leachate	S21-Fe36603	X		X	

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Sydney Laboratory - NATA Site # 18217						X	X	X	X
Brisbane Laboratory - NATA Site # 20794									
Perth Laboratory - NATA Site # 23736									
Mayfield Laboratory									
External Laboratory									
21	TP3A_TR03-1	Feb 17, 2021		US Leachate	S21-Fe36604	X		X	
22	TP3A_TR03-2	Feb 17, 2021		US Leachate	S21-Fe36605	X		X	
23	TP3A_TR04-1	Feb 17, 2021		US Leachate	S21-Fe36606	X		X	
24	TP3A_TR04-2	Feb 17, 2021		US Leachate	S21-Fe36607	X		X	
25	TP3A_TR05-1	Feb 17, 2021		US Leachate	S21-Fe36608	X		X	
26	TP3A_TR05-2	Feb 17, 2021		US Leachate	S21-Fe36609	X		X	
27	TP3A_TR06-1	Feb 17, 2021		US Leachate	S21-Fe36610	X		X	
28	TP3A_TR06-2	Feb 17, 2021		US Leachate	S21-Fe36611	X		X	
29	TP5A_D_SCR	Feb 17, 2021		US Leachate	S21-Fe36612	X		X	
30	TP5A_TR01-1	Feb 17, 2021		US Leachate	S21-Fe36613	X		X	
31	TP5A_TR01-2	Feb 17, 2021		US Leachate	S21-Fe36614	X		X	

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Project ID: 318000780

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Sydney Laboratory - NATA Site # 18217						X	X	X	X
Brisbane Laboratory - NATA Site # 20794									
Perth Laboratory - NATA Site # 23736									
Mayfield Laboratory									
External Laboratory									
32	TP5A_TR02-1	Feb 17, 2021		US Leachate	S21-Fe36615	X		X	
33	TP5A_TR02-2	Feb 17, 2021		US Leachate	S21-Fe36616	X		X	
34	TP5A_TR03-1	Feb 17, 2021		US Leachate	S21-Fe36617	X		X	
35	TP5A_TR03-2	Feb 17, 2021		US Leachate	S21-Fe36618	X		X	
36	TP5A_TR04-1	Feb 17, 2021		US Leachate	S21-Fe36619	X		X	
37	TP5A_TR04-2	Feb 17, 2021		US Leachate	S21-Fe36620	X		X	
38	TP5A_TR05-1	Feb 17, 2021		US Leachate	S21-Fe36621	X		X	
39	TP5A_TR05-2	Feb 17, 2021		US Leachate	S21-Fe36622	X		X	
40	TP5A_TR06-1	Feb 17, 2021		US Leachate	S21-Fe36623	X		X	
41	TP5A_TR06-2	Feb 17, 2021		US Leachate	S21-Fe36624	X		X	
42	TP5A_TR07-1	Feb 17, 2021		US Leachate	S21-Fe36625	X		X	

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Project Name: TREATABILITY TRIAL
Project ID: 318000780

Order No.:
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Phone: 02 9954 8118
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Received: Feb 17, 2021 3:00 PM
Due: Feb 24, 2021
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Lead	pH (1:5 Aqueous extract at 25°C as rec.)	USA Leaching Procedure	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217						X	X	X	X
Brisbane Laboratory - NATA Site # 20794									
Perth Laboratory - NATA Site # 23736									
Mayfield Laboratory									
External Laboratory									
43	TP5A_TR07-2	Feb 17, 2021		US Leachate	S21-Fe36626	X		X	
Test Counts						43	2	28	15

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	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Lead			mg/kg	< 5			5	Pass	
LCS - % Recovery									
Heavy Metals									
Lead			%	92			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	S21-Fe34686	NCP	%	94			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
pH (1:5 Aqueous extract at 25°C as rec.)	S21-Fe36583	CP	pH Units	2.8	2.8	Pass	30%	Pass	
% Moisture	S21-Fe36583	CP	%	7.8	8.1	3.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S21-Fe36583	CP	mg/kg	10000	9400	8.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S21-Fe36593	CP	%	20	19	5.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S21-Fe36593	CP	mg/kg	18000	16000	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

Authorised by:

Andrew Black	Analytical Services Manager
Charl Du Preez	Senior Analyst-Inorganic (NSW)
John Nguyen	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.

Ramboll Environ Australia Pty Ltd
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North Sydney
NSW 2060

Attention: **Stephen Maxwell**

Report **777838-L**
Project name ADDITIONAL TREATABILITY TRIAL
Project ID 318000780
Received Date Mar 03, 2021

Client Sample ID			**TP3A_TR01-1 (DAY 1)**	**TP3A_TR01-1 (DAY 2)**	**0448224653**	**TP3A_TR01-1 (DAY 4)**
Sample Matrix			**Leachate - MEP**	**Leachate - MEP**	**Leachate - MEP**	**Leachate - MEP**
Eurofins Sample No.			**S21-Ma06656**	**S21-Ma06657**	**S21-Ma06658**	**S21-Ma06659**
Date Sampled			**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.001	mg/L	< 0.001	0.001	0.003	0.002
AUS Leaching Procedure						
Leachate Fluid[C01]		comment	4.0	4.0	4.0	4.0
pH (initial)	0.1	pH Units	9.4	8.7	8.8	9.3
pH (Leachate fluid)	0.1	pH Units	6.8	5.1	6.8	6.8
pH (off)	0.1	pH Units	9.6	9.2	9.5	9.5

Client Sample ID			**TP3A_TR01-1 (DAY 5)**	**TP3A_TR01-1 (DAY 6)**	**TP3A_TR01-1 (DAY 7)**	**TP3A_TR01-1 (DAY 8)**
Sample Matrix			**Leachate - MEP**	**Leachate - MEP**	**Leachate - MEP**	**Leachate - MEP**
Eurofins Sample No.			**S21-Ma06660**	**S21-Ma06661**	**S21-Ma06662**	**S21-Ma06663**
Date Sampled			**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.001	mg/L	< 0.001	0.002	< 0.001	< 0.001
AUS Leaching Procedure						
Leachate Fluid[C01]		comment	4.0	4.0	4.0	4.0
pH (initial)	0.1	pH Units	8.8	9.0	9.1	9.7
pH (Leachate fluid)	0.1	pH Units	6.8	6.8	6.2	6.2
pH (off)	0.1	pH Units	9.3	9.3	9.8	9.3

Client Sample ID			TP3A_TR01-1 (DAY 9)	TP3A_TR01-1 (DAY 10)	TP3A_TR03-1 (DAY 1)	TP3A_TR03-1 (DAY 2)
Sample Matrix			Leachate - MEP	Leachate - MEP	Leachate - MEP	Leachate - MEP
Eurofins Sample No.			S21-Ma06664	S21-Ma06665	S21-Ma06666	S21-Ma06667
Date Sampled			Feb 17, 2021	Feb 17, 2021	Feb 17, 2021	Feb 17, 2021
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.001	mg/L	0.004	0.017	0.12	0.001
AUS Leaching Procedure						
Leachate Fluid[C01]		comment	4.0	4.0	4.0	4.0
pH (initial)	0.1	pH Units	9.7	9.2	9.1	8.7
pH (Leachate fluid)	0.1	pH Units	6.2	6.2	6.8	5.1
pH (off)	0.1	pH Units	9.3	9.1	9.5	9.3

Client Sample ID			TP3A_TR03-1 (DAY 3)	TP3A_TR03-1 (DAY 4)	TP3A_TR03-1 (DAY 5)	TP3A_TR03-1 (DAY 6)
Sample Matrix			Leachate - MEP	Leachate - MEP	Leachate - MEP	Leachate - MEP
Eurofins Sample No.			S21-Ma06668	S21-Ma06669	S21-Ma06670	S21-Ma06671
Date Sampled			Feb 17, 2021	Feb 17, 2021	Feb 17, 2021	Feb 17, 2021
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.001	mg/L	0.004	0.13	0.001	0.002
AUS Leaching Procedure						
Leachate Fluid[C01]		comment	4.0	4.0	4.0	4.0
pH (initial)	0.1	pH Units	8.9	9.3	9.0	9.4
pH (Leachate fluid)	0.1	pH Units	6.8	6.8	6.8	6.8
pH (off)	0.1	pH Units	9.5	9.4	9.6	9.5

Client Sample ID			TP3A_TR03-1 (DAY 7)	TP3A_TR03-1 (DAY 8)	TP3A_TR03-1 (DAY 9)	TP3A_TR03-1 (DAY 10)
Sample Matrix			Leachate - MEP	Leachate - MEP	Leachate - MEP	Leachate - MEP
Eurofins Sample No.			S21-Ma06672	S21-Ma06673	S21-Ma06674	S21-Ma06675
Date Sampled			Feb 17, 2021	Feb 17, 2021	Feb 17, 2021	Feb 17, 2021
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.001	mg/L	< 0.001	0.013	0.015	0.003
AUS Leaching Procedure						
Leachate Fluid[C01]		comment	4.0	4.0	4.0	4.0
pH (initial)	0.1	pH Units	9.0	9.7	9.7	9.3
pH (Leachate fluid)	0.1	pH Units	6.2	6.2	6.2	6.2
pH (off)	0.1	pH Units	9.5	9.4	9.4	9.4

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	Mar 22, 2021	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
AUS Leaching Procedure	Sydney	Mar 19, 2021	7 Days
- Method: LTM-GEN-7010 Leaching Procedure for Soils & Solid Wastes			

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Company Name:	Ramboll Australia Pty Ltd	**Order No.:**	
Address:	Level 3/100 Pacific Highway North Sydney NSW 2060	**Report #:** **Phone:** **Fax:**	777838 02 9954 8118 02 9954 8150
Project Name:	ADDITIONAL TREATABILITY TRIAL		
Project ID:	318000780		

Received:	Mar 3, 2021 12:14 PM
Due:	Mar 17, 2021
Priority:	10 Day
Contact Name:	Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Lead	AUS Leaching Procedure
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217						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	TP3A_TR01-1 (DAY 1)	Feb 17, 2021		Leachate - MEP	S21-Ma06656	X	X
2	TP3A_TR01-1 (DAY 2)	Feb 17, 2021		Leachate - MEP	S21-Ma06657	X	X
3	TP3A_TR01-1 (DAY 3)	Feb 17, 2021		Leachate - MEP	S21-Ma06658	X	X
4	TP3A_TR01-1 (DAY 4)	Feb 17, 2021		Leachate - MEP	S21-Ma06659	X	X
5	TP3A_TR01-1 (DAY 5)	Feb 17, 2021		Leachate - MEP	S21-Ma06660	X	X
6	TP3A_TR01-1	Feb 17, 2021		Leachate -	S21-Ma06661	X	X

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Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory							
External Laboratory							
	(DAY 6)			MEP			
7	TP3A_TR01-1 (DAY 7)	Feb 17, 2021		Leachate - MEP	S21-Ma06662	X	X
8	TP3A_TR01-1 (DAY 8)	Feb 17, 2021		Leachate - MEP	S21-Ma06663	X	X
9	TP3A_TR01-1 (DAY 9)	Feb 17, 2021		Leachate - MEP	S21-Ma06664	X	X
10	TP3A_TR01-1 (DAY 10)	Feb 17, 2021		Leachate - MEP	S21-Ma06665	X	X
11	TP3A_TR03-1 (DAY 1)	Feb 17, 2021		Leachate - MEP	S21-Ma06666	X	X
12	TP3A_TR03-1 (DAY 2)	Feb 17, 2021		Leachate - MEP	S21-Ma06667	X	X

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Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory							
External Laboratory							
13	TP3A_TR03-1 (DAY 3)	Feb 17, 2021		Leachate - MEP	S21-Ma06668	X	X
14	TP3A_TR03-1 (DAY 4)	Feb 17, 2021		Leachate - MEP	S21-Ma06669	X	X
15	TP3A_TR03-1 (DAY 5)	Feb 17, 2021		Leachate - MEP	S21-Ma06670	X	X
16	TP3A_TR03-1 (DAY 6)	Feb 17, 2021		Leachate - MEP	S21-Ma06671	X	X
17	TP3A_TR03-1 (DAY 7)	Feb 17, 2021		Leachate - MEP	S21-Ma06672	X	X
18	TP3A_TR03-1 (DAY 8)	Feb 17, 2021		Leachate - MEP	S21-Ma06673	X	X
19	TP3A_TR03-1	Feb 17, 2021		Leachate -	S21-Ma06674	X	X

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Sydney Laboratory - NATA Site # 18217						X	X
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory							
External Laboratory							
	(DAY 9)			MEP			
20	TP3A_TR03-1 (DAY 10)	Feb 17, 2021		Leachate - MEP	S21-Ma06675	X	X
Test Counts						20	20

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	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Lead			mg/L	< 0.001			0.001	Pass	
LCS - % Recovery									
Heavy Metals									
Lead			%	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					
Lead	S21-Ma06668	CP	%	122			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Lead	S21-Ma06670	CP	%	109			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Lead	S21-Ma06672	CP	%	96			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**	**Result 2**	**RPD**	**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S21-Ma06659	CP	mg/L	0.002	0.002	4.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S21-Ma06661	CP	mg/L	0.002	0.002	21	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S21-Ma06663	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
C01	Leachate Fluid Key: 1 - pH 5.0; 2 - pH 2.9; 3 - pH 9.2; 4 - Reagent (DI) water; 5 - Client sample, 6 - other

Authorised by:

Ryan Gilbert	Analytical Services Manager
John Nguyen	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.

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

Attention: **Stephen Maxwell**

Report **777842-L**
Project name ADDITIONAL TREATABILITY TRIAL
Project ID 318000780
Received Date Mar 03, 2021

Client Sample ID			**TP5A_TR01-1 (DAY 1)**	**TP5A_TR01-1 (DAY 2)**	**TP5A_TR01-1 (DAY 3)**	**TP5A_TR01-1 (DAY 4)**
Sample Matrix			**Leachate - MEP**	**Leachate - MEP**	**Leachate - MEP**	**Leachate - MEP**
Eurofins Sample No.			**S21-Ma06676**	**S21-Ma06677**	**S21-Ma06678**	**S21-Ma06679**
Date Sampled			**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.001	mg/L	0.002	< 0.001	0.017	0.075
AUS Leaching Procedure						
Leachate Fluid[C01]		comment	4.0	4.0	4.0	4.0
pH (initial)	0.1	pH Units	9.6	9.1	9.5	9.8
pH (Leachate fluid)	0.1	pH Units	6.8	5.1	6.8	6.8
pH (off)	0.1	pH Units	10	9.6	9.5	9.8

Client Sample ID			**TP5A_TR01-1 (DAY 5)**	**TP5A_TR01-1 (DAY 6)**	**TP5A_TR01-1 (DAY 7)**	**TP5A_TR01-1 (DAY 8)**
Sample Matrix			**Leachate - MEP**	**Leachate - MEP**	**Leachate - MEP**	**Leachate - MEP**
Eurofins Sample No.			**S21-Ma06680**	**S21-Ma06681**	**S21-Ma06682**	**S21-Ma06683**
Date Sampled			**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.001	mg/L	0.004	0.003	0.058	< 0.001
AUS Leaching Procedure						
Leachate Fluid[C01]		comment	4.0	4.0	4.0	4.0
pH (initial)	0.1	pH Units	9.6	9.9	9.6	9.9
pH (Leachate fluid)	0.1	pH Units	6.8	6.8	6.2	6.2
pH (off)	0.1	pH Units	9.8	9.7	9.9	9.7

Client Sample ID			TP5A_TR01-1 (DAY 9)	TP5A_TR01-1 (DAY 10)	TP5A_TR03-1 (DAY 1)	TP5A_TR03-1 (DAY 2)
Sample Matrix			**Leachate - MEP**	**Leachate - MEP**	**Leachate - MEP**	**Leachate - MEP**
Eurofins Sample No.			**S21-Ma06684**	**S21-Ma06685**	**S21-Ma06686**	**S21-Ma06687**
Date Sampled			**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.001	mg/L	1.0	< 0.001	< 0.001	0.036
AUS Leaching Procedure						
Leachate Fluid[C01]		comment	4.0	4.0	4.0	4.0
pH (initial)	0.1	pH Units	9.8	9.8	9.4	8.9
pH (Leachate fluid)	0.1	pH Units	6.2	6.2	6.8	5.1
pH (off)	0.1	pH Units	9.7	9.8	10.0	9.7

Client Sample ID			TP5A_TR03-1 (DAY 3)	TP5A_TR03-1 (DAY 4)	TP5A_TR03-1 (DAY 5)	TP5A_TR03-1 (DAY 6)
Sample Matrix			**Leachate - MEP**	**Leachate - MEP**	**Leachate - MEP**	**Leachate - MEP**
Eurofins Sample No.			**S21-Ma06688**	**S21-Ma06689**	**S21-Ma06690**	**S21-Ma06691**
Date Sampled			**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.001	mg/L	0.031	0.053	0.047	0.042
AUS Leaching Procedure						
Leachate Fluid[C01]		comment	4.0	4.0	4.0	4.0
pH (initial)	0.1	pH Units	9.3	9.7	9.4	9.9
pH (Leachate fluid)	0.1	pH Units	6.8	6.8	6.8	6.8
pH (off)	0.1	pH Units	9.7	9.8	9.8	9.8

Client Sample ID			TP5A_TR03-1 (DAY 7)	TP5A_TR03-1 (DAY 8)	TP5A_TR03-1 (DAY 9)	TP5A_TR03-1 (DAY 10)
Sample Matrix			**Leachate - MEP**	**Leachate - MEP**	**Leachate - MEP**	**Leachate - MEP**
Eurofins Sample No.			**S21-Ma06692**	**S21-Ma06693**	**S21-Ma06694**	**S21-Ma06695**
Date Sampled			**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**	**Feb 17, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.001	mg/L	< 0.001	0.016	0.017	0.001
AUS Leaching Procedure						
Leachate Fluid[C01]		comment	4.0	4.0	4.0	4.0
pH (initial)	0.1	pH Units	9.5	10.0	9.9	9.7
pH (Leachate fluid)	0.1	pH Units	6.2	6.2	6.2	6.2
pH (off)	0.1	pH Units	10.0	9.8	9.8	9.8

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	Mar 22, 2021	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
AUS Leaching Procedure	Sydney	Mar 19, 2021	7 Days
- Method: LTM-GEN-7010 Leaching Procedure for Soils & Solid Wastes			

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3	TP5A_TR01-1 (DAY 3)	Feb 17, 2021		Leachate - MEP	S21-Ma06678	X	X
4	TP5A_TR01-1 (DAY 4)	Feb 17, 2021		Leachate - MEP	S21-Ma06679	X	X
5	TP5A_TR01-1 (DAY 5)	Feb 17, 2021		Leachate - MEP	S21-Ma06680	X	X
6	TP5A_TR01-1	Feb 17, 2021		Leachate -	S21-Ma06681	X	X

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

Project Name: ADDITIONAL TREATABILITY TRIAL
Project ID: 318000780

Order No.:
Report #: 777842
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Mar 3, 2021 12:14 PM
Due: Mar 17, 2021
Priority: 10 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Lead	AUS Leaching Procedure
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217						X	X
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory							
External Laboratory							
	(DAY 6)			MEP			
7	TP5A_TR01-1 (DAY 7)	Feb 17, 2021		Leachate - MEP	S21-Ma06682	X	X
8	TP5A_TR01-1 (DAY 8)	Feb 17, 2021		Leachate - MEP	S21-Ma06683	X	X
9	TP5A_TR01-1 (DAY 9)	Feb 17, 2021		Leachate - MEP	S21-Ma06684	X	X
10	TP5A_TR01-1 (DAY 10)	Feb 17, 2021		Leachate - MEP	S21-Ma06685	X	X
11	TP5A_TR03-1 (DAY 1)	Feb 17, 2021		Leachate - MEP	S21-Ma06686	X	X
12	TP5A_TR03-1 (DAY 2)	Feb 17, 2021		Leachate - MEP	S21-Ma06687	X	X

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Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory							
External Laboratory							
13	TP5A_TR03-1 (DAY 3)	Feb 17, 2021		Leachate - MEP	S21-Ma06688	X	X
14	TP5A_TR03-1 (DAY 4)	Feb 17, 2021		Leachate - MEP	S21-Ma06689	X	X
15	TP5A_TR03-1 (DAY 5)	Feb 17, 2021		Leachate - MEP	S21-Ma06690	X	X
16	TP5A_TR03-1 (DAY 6)	Feb 17, 2021		Leachate - MEP	S21-Ma06691	X	X
17	TP5A_TR03-1 (DAY 7)	Feb 17, 2021		Leachate - MEP	S21-Ma06692	X	X
18	TP5A_TR03-1 (DAY 8)	Feb 17, 2021		Leachate - MEP	S21-Ma06693	X	X
19	TP5A_TR03-1	Feb 17, 2021		Leachate -	S21-Ma06694	X	X

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Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory							
External Laboratory							
	(DAY 9)			MEP			
20	TP5A_TR03-1 (DAY 10)	Feb 17, 2021		Leachate - MEP	S21-Ma06695	X	X
Test Counts						20	20

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							
Lead	mg/L	< 0.001			0.001	Pass	
LCS - % Recovery							
Heavy Metals							
Lead	%	116			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	S21-Ma06679	CP	%	84			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Lead	S21-Ma06687	CP	%	99			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Lead	S21-Ma06691	CP	%	89			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Lead	S21-Ma06693	CP	%	112			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Lead	S21-Ma06694	CP	%	92			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Lead	S21-Ma06695	CP	%	104			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S21-Ma06680	CP	mg/L	0.004	0.002	62	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
C01	Leachate Fluid Key: 1 - pH 5.0; 2 - pH 2.9; 3 - pH 9.2; 4 - Reagent (DI) water; 5 - Client sample, 6 - other
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:

Ryan Gilbert	Analytical Services Manager
John Nguyen	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.

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

Attention: **Stephen Maxwell**

Report **799567-L**
Project name TARAGO CADMIUM ANALYSIS
Project ID 31800780
Received Date Jun 01, 2021

Client Sample ID			**TP3a_01**	**TP3a_02**	**TP3a_03**	**TP4a_01**
Sample Matrix			**US Leachate**	**US Leachate**	**US Leachate**	**US Leachate**
Eurofins Sample No.			**N21-Jn00956**	**N21-Jn00957**	**N21-Jn00958**	**N21-Jn00959**
Date Sampled			**Jun 01, 2021**	**Jun 01, 2021**	**Jun 01, 2021**	**Jun 01, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.005	mg/L	0.63	0.58	0.44	1.2
USA Leaching Procedure						
Leachate Fluid[C01]		comment	1.0	1.0	1.0	1.0
pH (initial)	0.1	pH Units	3.4	3.4	3.3	4.0
pH (off)	0.1	pH Units	4.9	4.9	4.9	4.8
pH (USA HCl addition)	0.1	pH Units	1.8	1.8	1.8	1.8

Client Sample ID			**TP4a_02**	**TP4a_03**	**TP5a_01**	**TP5a_02**
Sample Matrix			**US Leachate**	**US Leachate**	**US Leachate**	**US Leachate**
Eurofins Sample No.			**N21-Jn00960**	**N21-Jn00961**	**N21-Jn00962**	**N21-Jn00963**
Date Sampled			**Jun 01, 2021**	**Jun 01, 2021**	**Jun 01, 2021**	**Jun 01, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.005	mg/L	0.92	0.91	0.33	0.35
USA Leaching Procedure						
Leachate Fluid[C01]		comment	1.0	1.0	1.0	1.0
pH (initial)	0.1	pH Units	4.0	4.0	4.6	4.6
pH (off)	0.1	pH Units	4.9	4.9	5.0	5.0
pH (USA HCl addition)	0.1	pH Units	1.8	1.8	1.8	1.8

Client Sample ID			**TP5a_03**	**TP6a_01**	**TP6a_02**	**TP6a_03**
Sample Matrix			**US Leachate**	**US Leachate**	**US Leachate**	**US Leachate**
Eurofins Sample No.			**N21-Jn00964**	**N21-Jn00965**	**N21-Jn00966**	**N21-Jn00967**
Date Sampled			**Jun 01, 2021**	**Jun 01, 2021**	**Jun 01, 2021**	**Jun 01, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.005	mg/L	0.36	0.22	0.19	0.19
USA Leaching Procedure						
Leachate Fluid[C01]		comment	1.0	1.0	1.0	1.0
pH (initial)	0.1	pH Units	4.7	5.0	5.1	5.0
pH (off)	0.1	pH Units	5.0	5.0	5.0	5.0
pH (USA HCl addition)	0.1	pH Units	1.8	1.8	1.8	1.8

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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	Jun 03, 2021	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
USA Leaching Procedure	Sydney	Jun 02, 2021	14 Days
- Method: LTM-GEN-7010 Leaching Procedure for Soils & Solid Wastes			

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Received: Jun 1, 2021 12:40 PM
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Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Cadmium	USA Leaching Procedure	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
Mayfield Laboratory - NATA Site # 25079								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	TP3a_01	Jun 01, 2021		Soil	N21-Jn00912	X		X
2	TP3a_02	Jun 01, 2021		Soil	N21-Jn00913	X		X
3	TP3a_03	Jun 01, 2021		Soil	N21-Jn00914	X		X
4	TP4a_01	Jun 01, 2021		Soil	N21-Jn00915	X		X
5	TP4a_02	Jun 01, 2021		Soil	N21-Jn00916	X		X
6	TP4a_03	Jun 01, 2021		Soil	N21-Jn00917	X		X
7	TP5a_01	Jun 01, 2021		Soil	N21-Jn00918	X		X
8	TP5a_02	Jun 01, 2021		Soil	N21-Jn00919	X		X
9	TP5a_03	Jun 01, 2021		Soil	N21-Jn00920	X		X

Date Reported:Jun 03, 2021

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Perth Laboratory - NATA Site # 23736								
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External Laboratory								
10	TP6a_01	Jun 01, 2021		Soil	N21-Jn00921	X		X
11	TP6a_02	Jun 01, 2021		Soil	N21-Jn00922	X		X
12	TP6a_03	Jun 01, 2021		Soil	N21-Jn00923	X		X
13	TP3a_01	Jun 01, 2021		US Leachate	N21-Jn00956	X	X	
14	TP3a_02	Jun 01, 2021		US Leachate	N21-Jn00957	X	X	
15	TP3a_03	Jun 01, 2021		US Leachate	N21-Jn00958	X	X	
16	TP4a_01	Jun 01, 2021		US Leachate	N21-Jn00959	X	X	
17	TP4a_02	Jun 01, 2021		US Leachate	N21-Jn00960	X	X	
18	TP4a_03	Jun 01, 2021		US Leachate	N21-Jn00961	X	X	
19	TP5a_01	Jun 01, 2021		US Leachate	N21-Jn00962	X	X	
20	TP5a_02	Jun 01, 2021		US Leachate	N21-Jn00963	X	X	

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Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
Mayfield Laboratory - NATA Site # 25079								
External Laboratory								
21	TP5a_03	Jun 01, 2021		US Leachate	N21-Jn00964	X	X	
22	TP6a_01	Jun 01, 2021		US Leachate	N21-Jn00965	X	X	
23	TP6a_02	Jun 01, 2021		US Leachate	N21-Jn00966	X	X	
24	TP6a_03	Jun 01, 2021		US Leachate	N21-Jn00967	X	X	
Test Counts						24	12	12

Date Reported:Jun 03, 2021

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							
Cadmium	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Heavy Metals							
Cadmium	%	89			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Cadmium	N21-Jn00956	CP	mg/L	0.63	0.58	7.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Cadmium	N21-Jn00958	CP	mg/L	0.44	0.45	1.0	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
C01	Leachate Fluid Key: 1 - pH 5.0; 2 - pH 2.9; 3 - pH 9.2; 4 - Reagent (DI) water; 5 - Client sample, 6 - other

Authorised by:

Andrew Black	Analytical Services Manager
John Nguyen	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.

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

Attention: **Stephen Maxwell**

Report **799567-S**
Project name TARAGO CADMIUM ANALYSIS
Project ID 31800780
Received Date Jun 01, 2021

Client Sample ID			**TP3a_01**	**TP3a_02**	**TP3a_03**	**TP4a_01**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**N21-Jn00912**	**N21-Jn00913**	**N21-Jn00914**	**N21-Jn00915**
Date Sampled			**Jun 01, 2021**	**Jun 01, 2021**	**Jun 01, 2021**	**Jun 01, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	51	30	27	190
% Moisture	1	%	8.4	7.4	6.8	4.8

Client Sample ID			**TP4a_02**	**TP4a_03**	**TP5a_01**	**TP5a_02**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**N21-Jn00916**	**N21-Jn00917**	**N21-Jn00918**	**N21-Jn00919**
Date Sampled			**Jun 01, 2021**	**Jun 01, 2021**	**Jun 01, 2021**	**Jun 01, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	130	170	430	270
% Moisture	1	%	7.4	2.3	2.0	2.0

Client Sample ID			**TP5a_03**	**TP6a_01**	**TP6a_02**	**TP6a_03**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**N21-Jn00920**	**N21-Jn00921**	**N21-Jn00922**	**N21-Jn00923**
Date Sampled			**Jun 01, 2021**	**Jun 01, 2021**	**Jun 01, 2021**	**Jun 01, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.4	mg/kg	440	12	9.6	7.1
% Moisture	1	%	2.1	6.0	5.0	4.7

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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	Jun 02, 2021	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Jun 01, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			

eurofins | Environment Testing

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Site # 1254 & 14271

Sydney
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Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

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

Perth
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Welshpool WA 6106
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
NATA # 1261 Site # 25079

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
Address: Level 3/100 Pacific Highway
North Sydney
NSW 2060

Project Name: TARAGO CADMIUM ANALYSIS
Project ID: 31800780

Order No.: 318000780
Report #: 799567
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Jun 1, 2021 12:40 PM
Due: Jun 3, 2021
Priority: 2 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Cadmium	USA Leaching Procedure	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
Mayfield Laboratory - NATA Site # 25079								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	TP3a_01	Jun 01, 2021		Soil	N21-Jn00912	X		X
2	TP3a_02	Jun 01, 2021		Soil	N21-Jn00913	X		X
3	TP3a_03	Jun 01, 2021		Soil	N21-Jn00914	X		X
4	TP4a_01	Jun 01, 2021		Soil	N21-Jn00915	X		X
5	TP4a_02	Jun 01, 2021		Soil	N21-Jn00916	X		X
6	TP4a_03	Jun 01, 2021		Soil	N21-Jn00917	X		X
7	TP5a_01	Jun 01, 2021		Soil	N21-Jn00918	X		X
8	TP5a_02	Jun 01, 2021		Soil	N21-Jn00919	X		X
9	TP5a_03	Jun 01, 2021		Soil	N21-Jn00920	X		X

Date Reported:Jun 03, 2021

eurofins | Environment Testing

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External Laboratory								
10	TP6a_01	Jun 01, 2021		Soil	N21-Jn00921	X		X
11	TP6a_02	Jun 01, 2021		Soil	N21-Jn00922	X		X
12	TP6a_03	Jun 01, 2021		Soil	N21-Jn00923	X		X
13	TP3a_01	Jun 01, 2021		US Leachate	N21-Jn00956	X	X	
14	TP3a_02	Jun 01, 2021		US Leachate	N21-Jn00957	X	X	
15	TP3a_03	Jun 01, 2021		US Leachate	N21-Jn00958	X	X	
16	TP4a_01	Jun 01, 2021		US Leachate	N21-Jn00959	X	X	
17	TP4a_02	Jun 01, 2021		US Leachate	N21-Jn00960	X	X	
18	TP4a_03	Jun 01, 2021		US Leachate	N21-Jn00961	X	X	
19	TP5a_01	Jun 01, 2021		US Leachate	N21-Jn00962	X	X	
20	TP5a_02	Jun 01, 2021		US Leachate	N21-Jn00963	X	X	

Date Reported:Jun 03, 2021

eurofins | Environment Testing

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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

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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.
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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.
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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	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Cadmium			mg/kg	< 0.4			0.4	Pass	
LCS - % Recovery									
Heavy Metals									
Cadmium			%	104			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Heavy Metals				Result 1					
Cadmium	S21-My61675	NCP	%	111			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			
Cadmium	S21-My61674	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	N21-Jn00916	CP	%	7.4	6.4	15	30%	Pass	

Comments

Sample Integrity

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

Authorised by:

Andrew Black	Analytical Services Manager
John Nguyen	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 3
RAIL SLEEPER WASTE CLASSIFICATION

Intended for
John Holland Rail

Document type
Waste Classification Report

Date
26 March 2020

RAIL SLEEPER WASTE CLASSIFICATION TARAGO LOOP EXTENSION

RAMBOLL Bright ideas. Sustainable change.

RAIL SLEEPER WASTE CLASSIFICATION
TARAGO LOOP EXTENSION

Project name	**Tarago Loop Rail Sleeper Waste Classification**
Project no.	**318000780**
Recipient	**Wayne D'Souza**
Document type	**Report**
Version	**Draft**
Date	**26/03/2030**
Prepared by	**Lyon McLeod**
Checked by	**Fiona Robinson**
Approved by	**Stephen Maxwell**
Description	**The report presents a waste classification assessment for rail sleepers at the site of Tarago Loop Extension**
Ref	**318000780-T15-001**

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

CONTENTS

APPENDICES

1. INTRODUCTION

Ramboll Australia Pty Ltd (Ramboll) was commissioned by John Holland Rail to complete a waste classification in accordance with the *NSW EPA Waste Classification Guidelines (2014).* The classification was required for railway sleepers removed as part of the Tarago Loop Extension. The objective of the waste classification was to classify the railway sleepers for off-site disposal from the site.

1.1 Scope of Works

The scope of works included the following tasks:

- Preparation of a site-specific Health and Safety Plan for the site works
- Collection of four samples from the rail sleepers by hand
- Laboratory analysis of four samples (including QA/QC) for potential contaminants of concern
- Evaluated quality control and quality assurance for the sampling program
- Comparison of laboratory results to relevant site and waste classification guidelines
- Preparation of this report.

2. FIELD INVESTIGATIONS AND OBSERVATIONS

2.1 Sample Collection

Field sampling of the railway sleepers was completed 18 March 2020 by an environmental engineer suitably experienced as a contaminated land consultant. At the time of fieldwork sleepers were stockpiled within the corridor and occupied approximately 50 m^3 as shown in **Photo 1**.

Sleepers were observed to be aged, moderately degraded and laden with dust that was stained green at some locations.

Photo 1 – Location of sleeper within the rail corridor

Four samples were selected for laboratory analysis to exceed the minimum sampling density for stockpiles of 3 per 75m^3 prescribed in the *National Environment Protection Measure (NEPC 2013)*. Samples from the railway sleepers were selected for testing based on visual assessment for staining or other signs of contamination and targeted areas with the potential for contamination.

Samples for laboratory testing were recovered from the rail sleepers using a hand held drill and a hand saw create drill shavings and saw dust. Samples comprised materials recovered from the surface of the sleeper and at depths of up to 2 cm below the surface of the sleeper.

A total of four primary samples were recovered, SLE01, SLE02, SLE03 and SLE04.

2.2 Quality Assurance/ Quality Control

Quality assurance and quality control completed for the project is included in **Table 1**.

Table 1 QA/QC Review

Element	Field and Laboratory QA/QC
Sampling	Samples were collected 18 March 2020 by an experienced Environmental Engineer from Ramboll using a cordless drill and hand saw. Samples were placed directly into laboratory-supplied soil jars using single use gloved hands.
Decontamination	All reusable sampling equipment was cleaned thoroughly between sampling points.
Sample Handling	Samples were collected into laboratory-supplied soil jars and stored in a cooler box chilled with ice.
Chain of Custody	Samples were sent to the laboratory under chain of custody conditions.
Field Quality Control Samples	One duplicate sample pair (SLE02/ D01_180320) was sent to the laboratory for analysis. Relative percentage differences (RPDs) were calculated. RPDs for Lead (70%), Copper (31.4%) and TCLP lead (129%) exceed the adopted RPD (30%) and is likely attributed to heterogeneity in the distribution of contaminants within the sampled material. For the waste classification assessment, the maximum recorded concentration of lead and TCLP lead was adopted to provide a conservative assessment. The NSW Waste Guidelines (EPA, 2014) do not provide a criterion for Copper.
Laboratories Used	The primary laboratory was Eurofins and laboratory reports are NATA stamped.
Laboratory Quality Control Samples	Eurofins completed quality control sampling, including analysis of method blanks, laboratory duplicates, laboratory control samples and matrix spikes. Results were within required parameters aside from an elevated relative percent difference (RPD) for duplicate results for moisture content, which is not considered to affect the usability of the data.
Laboratory Reports	Laboratory reports relevant to this waste classification are attached in **Appendix 2.**

Based on the field and laboratory quality assurance completed the data is considered to be reliable for the purpose of determining a waste classification.

3. WASTE CLASSIFICATION

Waste is classified in the *NSW EPA Waste Classification Guidelines (2014)* following a five step process which assess pre-classification followed by chemical classification of the waste. A review against each of the waste classification steps for the railway sleeper waste is outlined in **Table 2**. Once a waste's classification has been established under a particular pre-classification below, there is no need to go to the next classification. The waste has that classification and must be managed accordingly.

Table 2 Waste Classification

Waste Classification Steps	Assessment
Step 1: Is the waste special waste?	No, the waste does not meet the criteria of special waste.
Step 2: Is the waste liquid waste?	No, the waste comprises timber sleepers.
Step 3: Is the waste pre-classified?	Yes, the waste is preclassified as construction and demolition waste as being waste derived from 'the construction, replacement, repair or alteration of infrastructure development such as roads, tunnels, sewage, water, electricity, telecommunications and airports'. However, as the waste was suspected to be impacted by lead ore concentrate additional chemical waste classification was considered warranted.
Step 4: Does the waste possess hazardous characteristics?	No, the waste does not meet the characteristics of pre-classified hazardous waste.
Step 5: Determining a waste's classification using chemical assessment.	Chemical classification of the four timber samples is presented in the attached **Table A1** provided in **Appendix 1**. Based on the mean[1] total and leachable chemical concentrations present, the waste is classified as General Solid Waste.
Waste Classification	**General Solid Waste**

1. A mean rather than 95%UCLaverage sample concentration was adopted as n=4.

Based on the pre-classification and the supplementary sampling completed the railway sleepers are classified as general solid waste and can be disposed of to an off-site facility licenced to receive this waste type.

This assessment has not considered the suitability of the sleepers for reuse on the site. The railway sleepers are considered to be a waste material and cannot legally be reused off the site.

4. LIMITATIONS

This document is issued in confidence to John Holland Rail for the purposes of waste classification in accordance with NSW Waste Guidelines (EPA, 2014).

Whilst reasonable attempts have been made to ensure that the contents of this report are accurate and complete at the time of writing, Ramboll Australia Pty Ltd disclaims any responsibility for loss or damage that may be occasioned directly or indirectly through the use of, or reliance on, the contents of this report.

5. REFERENCES

NEPC 2013 *National Environment Protection (Assessment of Site Contamination) Measure 1999 amended 2013*

NSW Environment Protection Authority (EPA) 2014 *Waste Classification Guidelines, Part 1: Classifying waste*

APPENDIX 1
RESULTS SUMMARY TABLE

Table A1: Waste Classification Results

	CT1 - General Solid Waste[1]	CT2 - Restricted Solid Waste[1]	SCC1 - General Solid Waste[2]	SCC2 - Restricted Solid Waste[2]	TCLP1 - General Solid Waste[2]	TCLP2 - Restricted Solid Waste[2]							
Sample Type:									Primary	Primary	Primary	Primary	Duplicate
Sample number:									S20-Ma28575	S20-Ma28576	S20-Ma28577	S20-Ma28578	S20-Ma28579
Sample date:									18-Mar-20	18-Mar-20	18-Mar-20	18-Mar-20	18-Mar-20
Sample ID:									SLE01	SLE02	SLE03	SLE04	D01_180320
Project Name:									John Holland	John Holland	John Holland	John Holland	John Holland
Compound:													
Site:									Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop	Tarago Rail Loop
Sampling Method:									NA	NA	NA	NA	NA
Sample Description									Woodchips	Woodchips	Woodchips	Woodchips	Woodchips
Analyte grouping/Analyte							**Units**	**LOR**					
Total Metals													
Arsenic	**100**	**400**	**500**	**2000**			mg/kg	5	< 2	6.9	6.5	< 2	4.6
Cadmium	**20**	**80**	**100**	**400**			mg/kg	1	15	11	7.6	11	11
Chromium (VI)	**100**	**400**	**1900**	**7600**			mg/kg	2	< 5	11	14	< 5	< 5
Copper							mg/kg	5	140	430	1700	230	590
Lead	**100**	**400**	**1500**	**6000**			mg/kg	5	**240**	**1300**	**1300**	**560**	**2700**
Mercury	**4**	**16**	**50**	**200**			mg/kg	0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1
Nickel	**40**	**160**	**1050**	**4200**			mg/kg	2	< 5	11	11	5.7	< 5
Zinc							mg/kg	5	2800	1200	1300	1100	1300
Organophosphorus Pesticides (OP)													
Azinphos-methyl							mg/kg	< 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
Chlorfenvinphos							mg/kg	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	**4**	**16**	**7.5**	**30**			mg/kg	< 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
Coumaphos							mg/kg	< 2	< 2	< 2	< 2	< 2	< 2
Demeton-O							mg/kg	< 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
Diazinon							mg/kg	< 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
Dimethoate							mg/kg	< 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
EPN							mg/kg	< 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
Ethoprop							mg/kg	< 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
Fenitrothion							mg/kg	< 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
Fenthion							mg/kg	< 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
Merphos							mg/kg	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Methyl parathion							mg/kg	< 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
Monocrotophos							mg/kg	< 2	< 2	< 2	< 2	< 2	< 2
Naled							mg/kg	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Omethoate							mg/kg	< 2	< 2	< 2	< 2	< 2	< 2
Phorate							mg/kg	< 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
Pyrazophos							mg/kg	< 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
Terbufos							mg/kg	< 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
Tokuthion							mg/kg	< 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
Polynuclear Aromatic Hydrocarbons													
Acenaphthene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	**0.8**	**3.2**	**10**	**23**			mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (lower bound) *							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *							mg/kg	< 0.6	0.6	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *							mg/kg	< 0.7	1.2	1.2	1.2	1.2	1.2
Benzo(b&j)fluoranthene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene							mg/kg	< 0.6	1.7	1.1	0.5	< 0.5	< 0.5
Phenanthrene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene							mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	**200**	**800**	**200**	**800**			mg/kg	< 0.6	1.7	1.1	0.5	< 0.5	< 0.5
TRH - 1999 NEPM Fractions (after silica gel clean-up)													
TRH C10-C14 (after silica gel clean-up)							mg/kg	< 100	< 100	< 100	< 100	220	< 100
TRH C10-C36 (Total) (after silica gel clean-up)	**10000**	**40000**	**10000**	**40000**			mg/kg	< 250	1200	< 250	750	< 250	2110
TRH C15-C28 (after silica gel clean-up)							mg/kg	< 250	300	< 250	320	< 250	510
TRH C29-C36 (after silica gel clean-up)							mg/kg	< 250	900	< 250	430	< 250	1600
Total Recoverable Hydrocarbons - NEPM 2013 Fractions													
TRH >C10-C16 (after silica gel clean-up)							mg/kg	< 250	< 250	< 250	< 250	< 250	< 250
TRH >C16-C34 (after silica gel clean-up)							mg/kg	< 500	1100	< 500	650	< 500	1700
TRH >C34-C40 (after silica gel clean-up)							mg/kg	< 500	< 500	< 500	< 500	< 500	840
Metals TCLP													
Arsenic					**5**	**20**	mg/L	0.1	--	--	--	--	--
Cadmium					**1**	**4**	mg/L	0.05	--	--	--	--	--
Chromium (VI)					**5**	**20**	mg/L	0.1	--	--	--	--	--
Copper							mg/L	0.1	--	--	--	--	--
Lead					**5**	**20**	mg/L	0.1	0.14	0.9	0.97	0.79	4.2
Nickel					**2**	**8**	mg/L	0.1	--	--	--	--	--
Zinc							mg/L	0.1	--	--	--	--	--
Mercury							mg/L	0.001	--	--	--	--	--

Blank Cell indicates no criterion available
LOR = Limit of Reporting
NSW EPA Waste Classification Guidelines - Part 1: Classification of Waste
[1] Maximum values of specific contaminant concentration (SCC) for classification without TCLP
[2] Maximum values for leachable concentration and specific contaminant concentration when used together
[3] PFOS and PFHxS are to be summed for comparison against the TCLP and SCC values.
[4] Values are the same for general solid waste (putrescible) and general solid waste (non-putrescible).
PFOS/PFOA values adopted from Addendum to the Waste Classification Guidelines (2014) – Part 1: classifying waste, October 2016 (NSW EPA). Noting these values have been based on the enHealth TDI values
Blank cell indicates no screening criterion available
For Limit of Reporting (LOR) refer to laboratory certificates of analysis
--- Indicates sample not analysed
Concentration in **red** font and grey box exceed CT1 screening value
Concentration in **blue** font and grey box exceed CT2 screening value
Concentration in **orange** font and grey box exceed SCC1 or TCLP1 screening value
Concentration in **green** font and grey box exceed SCC2 or TCLP 2 screening value
Concentrations below the LOR noted as <value

Table A2: QA/QC Results

	Sample Type:	Primary	Duplicate	RPD
	Sample number:	S20-Ma28576	S20-Ma28579	
	Sample date:	18-Mar-20	18-Mar-20	
	Sample ID:	SLE02	D01_180320	
	Project Name:	John Holland	John Holland	
	Compound:			
	Site:	Tarago Rail Loop	Tarago Rail Loop	
	Sampling Method:	NA	NA	
	Sample Description	Woodchips	Woodchips	

Analyte grouping/Analyte	Units	LOR			
Total Metals					
Arsenic	mg/kg	5	6.9	4.6	40.0
Cadmium	mg/kg	1	11	11	0.0
Chromium (VI)	mg/kg	2	11	< 5	nc
Copper	mg/kg	5	430	590	**31.4**
Lead	mg/kg	5	1300	2700	**70.0**
Mercury	mg/kg	0.1	< 0.1	< 0.1	nc
Nickel	mg/kg	2	11	< 5	nc
Zinc	mg/kg	5	1200	1300	8.0
Organophosphorus Pesticides (OP)					
Azinphos-methyl	mg/kg	< 0.2	< 0.2	< 0.2	nc
Bolstar	mg/kg	< 0.2	< 0.2	< 0.2	nc
Chlorfenvinphos	mg/kg	< 0.2	< 0.2	< 0.2	nc
Chlorpyrifos	mg/kg	< 0.2	< 0.2	< 0.2	nc
Chlorpyrifos-methyl	mg/kg	< 0.2	< 0.2	< 0.2	nc
Coumaphos	mg/kg	< 2	< 2	< 2	nc
Demeton-O	mg/kg	< 0.2	< 0.2	< 0.2	nc
Demeton-S	mg/kg	< 0.2	< 0.2	< 0.2	nc
Diazinon	mg/kg	< 0.2	< 0.2	< 0.2	nc
Dichlorvos	mg/kg	< 0.2	< 0.2	< 0.2	nc
Dimethoate	mg/kg	< 0.2	< 0.2	< 0.2	nc
Disulfoton	mg/kg	< 0.2	< 0.2	< 0.2	nc
EPN	mg/kg	< 0.2	< 0.2	< 0.2	nc
Ethion	mg/kg	< 0.2	< 0.2	< 0.2	nc
Ethoprop	mg/kg	< 0.2	< 0.2	< 0.2	nc
Ethyl parathion	mg/kg	< 0.2	< 0.2	< 0.2	nc
Fenitrothion	mg/kg	< 0.2	< 0.2	< 0.2	nc
Fensulfothion	mg/kg	< 0.2	< 0.2	< 0.2	nc
Fenthion	mg/kg	< 0.2	< 0.2	< 0.2	nc
Malathion	mg/kg	< 0.2	< 0.2	< 0.2	nc
Merphos	mg/kg	< 0.2	< 0.2	< 0.2	nc
Methyl parathion	mg/kg	< 0.2	< 0.2	< 0.2	nc
Mevinphos	mg/kg	< 0.2	< 0.2	< 0.2	nc
Monocrotophos	mg/kg	< 2	< 2	< 2	nc
Naled	mg/kg	< 0.2	< 0.2	< 0.2	nc
Omethoate	mg/kg	< 2	< 2	< 2	nc
Phorate	mg/kg	< 0.2	< 0.2	< 0.2	nc
Pirimiphos-methyl	mg/kg	< 0.2	< 0.2	< 0.2	nc
Pyrazophos	mg/kg	< 0.2	< 0.2	< 0.2	nc
Ronnel	mg/kg	< 0.2	< 0.2	< 0.2	nc
Terbufos	mg/kg	< 0.2	< 0.2	< 0.2	nc
Tetrachlorvinphos	mg/kg	< 0.2	< 0.2	< 0.2	nc
Tokuthion	mg/kg	< 0.2	< 0.2	< 0.2	nc
Trichloronate	mg/kg	< 0.2	< 0.2	< 0.2	nc
Polynuclear Aromatic Hydrocarbons					
Acenaphthene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Acenaphthylene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Anthracene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Benz(a)anthracene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Benzo(a)pyrene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Benzo(a)pyrene TEQ (lower bound) *	mg/kg	< 0.5	< 0.5	< 0.5	nc
Benzo(a)pyrene TEQ (medium bound) *	mg/kg	< 0.6	0.6	0.6	0.0
Benzo(a)pyrene TEQ (upper bound) *	mg/kg	< 0.7	1.2	1.2	0.0
Benzo(b&j)fluoranthene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Benzo(g.h.i)perylene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Benzo(k)fluoranthene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Chrysene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Dibenz(a.h)anthracene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Fluoranthene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Fluorene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Naphthalene	mg/kg	< 0.6	1.1	< 0.5	nc
Phenanthrene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Pyrene	mg/kg	< 0.5	< 0.5	< 0.5	nc
Total PAH*	mg/kg	< 0.6	1.1	< 0.5	nc
TRH - 1999 NEPM Fractions (after silica gel clean-up)					
TRH C10-C14 (after silica gel clean-up)	mg/kg	< 100	< 100	< 100	nc
TRH C10-C36 (Total) (after silica gel clean-up)	mg/kg	< 250	< 250	2110	nc
TRH C15-C28 (after silica gel clean-up)	mg/kg	< 250	< 250	510	nc
TRH C29-C36 (after silica gel clean-up)	mg/kg	< 250	< 250	1600	nc
Total Recoverable Hydrocarbons - NEPM 2013 Fractions					
TRH >C10-C16 (after silica gel clean-up)	mg/kg	< 250	< 250	< 250	nc
TRH >C16-C34 (after silica gel clean-up)	mg/kg	< 500	< 500	1700	nc
TRH >C34-C40 (after silica gel clean-up)	mg/kg	< 500	< 500	840	nc
Metals TCLP					
Arsenic	mg/L	0.1	--	--	--
Cadmium	mg/L	0.05	--	--	--
Chromium (VI)	mg/L	0.1	--	--	--
Copper	mg/L	0.1	--	--	--
Lead	mg/L	0.1	0.9	4.2	**129.4**
Nickel	mg/L	0.1	--	--	--
Zinc	mg/L	0.1	--	--	--
Mercury	mg/L	0.001	--	--	--

LOR = Limit of Reporting
<value = Less than the laboratory Limit of Reporting (LOR)
Bold shaded cells exceed RPD >30% and both samples have recorded concetrations >10 x LOR
Bold indicates when above the acceptance criteria for Trip Spikes/Blanks and Rinsates
nc = not calculated as one or more results are below the LOR.

APPENDIX 2
LABORATORY CERTIFICATES

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		EDD Format (ESdat, EQuIS, Custom)	Excel and PDF
Contact Name	Stephen Maxwell				
Phone №					
Special Directions					
Purchase Order					
Quote ID №	180813RAMN_1				

Sampler(s)	JB
Handed over by	JB
Email for Invoice	smaxwell@ramboll.com asiapac-accounts@ramboll.com
Email for Results	smaxwell@ramboll.com jblackwell@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
* Surcharges apply
☐ Other ( )

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))	TRH C10 - C40 (following silica gel cleanup)	PAH	M8 (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg)	OPP	TCLP BaP and Pb	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	SLE01	18/03/20	Timber	X	X	X	X	X									
2	SLE02	18/03/20	Timber	X	X	X	X	X									
3	SLE03	18/03/20	Timber	X	X	X	X	X									
4	SLE04	18/03/20	Timber	X	X	X	X	X									
5	D01_180320	18/03/20	Timber	X	X	X	X	X									
8																	
9																	
10																	
		Total Counts		5	5	5	5	5									

Method of Shipment	☐ Courier (#)	☐ Hand Delivered	☐ Postal	Name		Signature		Date	Time	Time
								___/___/___		___:___
Eurofins | mgt Laboratory Use Only	Received By	Suzanne Ford	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	19/3/2020	Time	6:45PM	Temperature
	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	___/___/___	Time	___:___	Report № 708717

Eurofins Environment Testing Australia Pty Ltd trading as Eurofins | mgt

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ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Sample Receipt Advice

Company name:	**Ramboll Australia Pty Ltd**
Contact name:	Stephen Maxwell
Project ID:	318000780
COC number:	Not provided
Turn around time:	3 Day
Date/Time received:	Mar 19, 2020 6:45 AM
Eurofins reference:	**708717**

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.

☒ Split sample sent to requested external lab.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

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

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

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

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

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 **708717-S**
Project name
Project ID 318000780
Received Date Mar 19, 2020

Client Sample ID			**SLE01**	**SLE02**	**SLE03**	**SLE04**
Sample Matrix			**Woodchips**	**Woodchips**	**Woodchips**	**Woodchips**
Eurofins Sample No.			**S20-Ma28575**	**S20-Ma28576**	**S20-Ma28577**	**S20-Ma28578**
Date Sampled			**Mar 18, 2020**	**Mar 18, 2020**	**Mar 18, 2020**	**Mar 18, 2020**
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	1.7	1.1	0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	1.7	1.1	0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	91	89	89	95
p-Terphenyl-d14 (surr.)	1	%	88	85	85	92
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorfenvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Coumaphos	2	mg/kg	< 2	< 2	< 2	< 2
Demeton-S	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dimethoate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2

Client Sample ID			SLE01	SLE02	SLE03	SLE04
Sample Matrix			Woodchips	Woodchips	Woodchips	Woodchips
Eurofins Sample No.			S20-Ma28575	S20-Ma28576	S20-Ma28577	S20-Ma28578
Date Sampled			Mar 18, 2020	Mar 18, 2020	Mar 18, 2020	Mar 18, 2020
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
EPN	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Malathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Monocrotophos	2	mg/kg	< 2	< 2	< 2	< 2
Naled	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Omethoate	2	mg/kg	< 2	< 2	< 2	< 2
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pirimiphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pyrazophos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbufos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tetrachlorvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	123	120	120	126
TRH - 2013 NEPM Fractions (after silica gel clean-up)						
TRH >C10-C16 (after silica gel clean-up)	50	mg/kg	< 250	< 250	< 250	< 250
TRH >C16-C34 (after silica gel clean-up)	100	mg/kg	1100	< 500	650	< 500
TRH >C34-C40 (after silica gel clean-up)	100	mg/kg	< 500	< 500	< 500	< 500
TRH - 1999 NEPM Fractions (after silica gel clean-up)						
TRH C10-C36 (Total) (after silica gel clean-up)	100	mg/kg	1200	< 250	750	< 250
TRH C10-C14 (after silica gel clean-up)	50	mg/kg	< 100	< 100	< 100	220
TRH C15-C28 (after silica gel clean-up)	100	mg/kg	300	< 250	320	< 250
TRH C29-C36 (after silica gel clean-up)	100	mg/kg	900	< 250	430	< 250
Heavy Metals						
Arsenic	2	mg/kg	< 2	6.9	6.5	< 2
Cadmium	0.4	mg/kg	15	11	7.6	11
Chromium	5	mg/kg	< 5	11	14	< 5
Copper	5	mg/kg	140	430	1700	230
Lead	5	mg/kg	240	1300	1300	560
Mercury	0.1	mg/kg	< 0.1	< 0.1	0.2	< 0.1
Nickel	5	mg/kg	< 5	11	11	5.7
Zinc	5	mg/kg	2800	1200	1300	1100

Client Sample ID			D01_180320
Sample Matrix			Woodchips
Eurofins Sample No.			S20-Ma28579
Date Sampled			Mar 18, 2020
Test/Reference	LOR	Unit	
Polycyclic Aromatic Hydrocarbons			
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2
Acenaphthene	0.5	mg/kg	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5
Anthracene	0.5	mg/kg	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5
Chrysene	0.5	mg/kg	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5
Fluorene	0.5	mg/kg	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5
Naphthalene	0.5	mg/kg	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5
Pyrene	0.5	mg/kg	< 0.5
Total PAH*	0.5	mg/kg	< 0.5
2-Fluorobiphenyl (surr.)	1	%	95
p-Terphenyl-d14 (surr.)	1	%	91
Organophosphorus Pesticides			
Azinphos-methyl	0.2	mg/kg	< 0.2
Bolstar	0.2	mg/kg	< 0.2
Chlorfenvinphos	0.2	mg/kg	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2
Coumaphos	2	mg/kg	< 2
Demeton-S	0.2	mg/kg	< 0.2
Demeton-O	0.2	mg/kg	< 0.2
Diazinon	0.2	mg/kg	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2
Dimethoate	0.2	mg/kg	< 0.2
Disulfoton	0.2	mg/kg	< 0.2
EPN	0.2	mg/kg	< 0.2
Ethion	0.2	mg/kg	< 0.2
Ethoprop	0.2	mg/kg	< 0.2
Ethyl parathion	0.2	mg/kg	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2
Fenthion	0.2	mg/kg	< 0.2
Malathion	0.2	mg/kg	< 0.2
Merphos	0.2	mg/kg	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2
Mevinphos	0.2	mg/kg	< 0.2
Monocrotophos	2	mg/kg	< 2
Naled	0.2	mg/kg	< 0.2
Omethoate	2	mg/kg	< 2

Client Sample ID			D01_180320
Sample Matrix			**Woodchips**
Eurofins Sample No.			**S20-Ma28579**
Date Sampled			**Mar 18, 2020**
Test/Reference	LOR	Unit	
Organophosphorus Pesticides			
Phorate	0.2	mg/kg	< 0.2
Pirimiphos-methyl	0.2	mg/kg	< 0.2
Pyrazophos	0.2	mg/kg	< 0.2
Ronnel	0.2	mg/kg	< 0.2
Terbufos	0.2	mg/kg	< 0.2
Tetrachlorvinphos	0.2	mg/kg	< 0.2
Tokuthion	0.2	mg/kg	< 0.2
Trichloronate	0.2	mg/kg	< 0.2
Triphenylphosphate (surr.)	1	%	131
TRH - 2013 NEPM Fractions (after silica gel clean-up)			
TRH >C10-C16 (after silica gel clean-up)	50	mg/kg	< 250
TRH >C16-C34 (after silica gel clean-up)	100	mg/kg	1700
TRH >C34-C40 (after silica gel clean-up)	100	mg/kg	840
TRH - 1999 NEPM Fractions (after silica gel clean-up)			
TRH C10-C36 (Total) (after silica gel clean-up)	100	mg/kg	2110
TRH C10-C14 (after silica gel clean-up)	50	mg/kg	< 100
TRH C15-C28 (after silica gel clean-up)	100	mg/kg	510
TRH C29-C36 (after silica gel clean-up)	100	mg/kg	1600
Heavy Metals			
Arsenic	2	mg/kg	4.6
Cadmium	0.4	mg/kg	11
Chromium	5	mg/kg	< 5
Copper	5	mg/kg	590
Lead	5	mg/kg	2700
Mercury	0.1	mg/kg	< 0.1
Nickel	5	mg/kg	< 5
Zinc	5	mg/kg	1300

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
Polycyclic Aromatic Hydrocarbons	Sydney	Mar 20, 2020	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Organophosphorus Pesticides	Sydney	Mar 20, 2020	14 Days
- Method: LTM-ORG-2200 Organophosphorus Pesticides by GC-MS			
Metals M8	Sydney	Mar 20, 2020	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
TRH - 2013 NEPM Fractions (after silica gel clean-up)	Sydney	Mar 20, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
TRH - 1999 NEPM Fractions (after silica gel clean-up)	Sydney	Mar 20, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			

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NATA # 1261 Site # 20794

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IANZ # 1290

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

Project Name:
Project ID: 318000780

Order No.:
Report #: 708717
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Mar 19, 2020 6:45 AM
Due: Mar 24, 2020
Priority: 3 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Benzo(a)pyrene	Lead	Polycyclic Aromatic Hydrocarbons	Organophosphorus Pesticides	USA Leaching Procedure	Metals M8	TRH (after Silica Gel cleanup)
Melbourne Laboratory - NATA Site # 1254 & 14271												
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794												
Perth Laboratory - NATA Site # 23736												
External Laboratory												
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**							
1	SLE01	Mar 18, 2020		Woodchips	S20-Ma28575			X	X		X	X
2	SLE02	Mar 18, 2020		Woodchips	S20-Ma28576			X	X		X	X
3	SLE03	Mar 18, 2020		Woodchips	S20-Ma28577			X	X		X	X
4	SLE04	Mar 18, 2020		Woodchips	S20-Ma28578			X	X		X	X
5	D01_180320	Mar 18, 2020		Woodchips	S20-Ma28579			X	X		X	X
6	SLE01	Mar 18, 2020		US Leachate	S20-Ma28580	X	X			X		
7	SLE02	Mar 18, 2020		US Leachate	S20-Ma28581	X	X			X		
8	SLE03	Mar 18, 2020		US Leachate	S20-Ma28582	X	X			X		
9	SLE04	Mar 18, 2020		US Leachate	S20-Ma28583	X	X			X		
10	DO1_180320	Mar 18, 2020		US Leachate	S20-Ma28584	X	X			X		

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Phone : 0800 856 450
IANZ # 1290

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

Project Name:
Project ID: 318000780

Order No.:
Report #: 708717
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Mar 19, 2020 6:45 AM
Due: Mar 24, 2020
Priority: 3 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail	Benzo(a)pyrene	Lead	Polycyclic Aromatic Hydrocarbons	Organophosphorus Pesticides	USA Leaching Procedure	Metals M8	TRH (after Silica Gel cleanup)
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
Test Counts	5	5	5	5	5	5	5

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							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Organophosphorus Pesticides							
Azinphos-methyl	mg/kg	< 0.2			0.2	Pass	
Bolstar	mg/kg	< 0.2			0.2	Pass	
Chlorfenvinphos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos-methyl	mg/kg	< 0.2			0.2	Pass	
Coumaphos	mg/kg	< 2			2	Pass	
Demeton-S	mg/kg	< 0.2			0.2	Pass	
Demeton-O	mg/kg	< 0.2			0.2	Pass	
Diazinon	mg/kg	< 0.2			0.2	Pass	
Dichlorvos	mg/kg	< 0.2			0.2	Pass	
Dimethoate	mg/kg	< 0.2			0.2	Pass	
Disulfoton	mg/kg	< 0.2			0.2	Pass	
EPN	mg/kg	< 0.2			0.2	Pass	
Ethion	mg/kg	< 0.2			0.2	Pass	
Ethoprop	mg/kg	< 0.2			0.2	Pass	
Ethyl parathion	mg/kg	< 0.2			0.2	Pass	
Fenitrothion	mg/kg	< 0.2			0.2	Pass	
Fensulfothion	mg/kg	< 0.2			0.2	Pass	
Fenthion	mg/kg	< 0.2			0.2	Pass	
Malathion	mg/kg	< 0.2			0.2	Pass	
Merphos	mg/kg	< 0.2			0.2	Pass	
Methyl parathion	mg/kg	< 0.2			0.2	Pass	
Mevinphos	mg/kg	< 0.2			0.2	Pass	
Monocrotophos	mg/kg	< 2			2	Pass	
Naled	mg/kg	< 0.2			0.2	Pass	
Omethoate	mg/kg	< 2			2	Pass	
Phorate	mg/kg	< 0.2			0.2	Pass	
Pirimiphos-methyl	mg/kg	< 0.2			0.2	Pass	
Pyrazophos	mg/kg	< 0.2			0.2	Pass	
Ronnel	mg/kg	< 0.2			0.2	Pass	
Terbufos	mg/kg	< 0.2			0.2	Pass	
Tetrachlorvinphos	mg/kg	< 0.2			0.2	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Tokuthion	mg/kg	< 0.2			0.2	Pass	
Trichloronate	mg/kg	< 0.2			0.2	Pass	
Method Blank							
TRH - 2013 NEPM Fractions (after silica gel clean-up)							
TRH >C10-C16 (after silica gel clean-up)	mg/kg	< 50			50	Pass	
TRH >C16-C34 (after silica gel clean-up)	mg/kg	< 100			100	Pass	
TRH >C34-C40 (after silica gel clean-up)	mg/kg	< 100			100	Pass	
Method Blank							
TRH - 1999 NEPM Fractions (after silica gel clean-up)							
TRH C10-C14 (after silica gel clean-up)	mg/kg	< 50			50	Pass	
TRH C15-C28 (after silica gel clean-up)	mg/kg	< 100			100	Pass	
TRH C29-C36 (after silica gel clean-up)	mg/kg	< 100			100	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	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							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	104			70-130	Pass	
Acenaphthylene	%	113			70-130	Pass	
Anthracene	%	107			70-130	Pass	
Benz(a)anthracene	%	108			70-130	Pass	
Benzo(a)pyrene	%	102			70-130	Pass	
Benzo(b&j)fluoranthene	%	98			70-130	Pass	
Benzo(g.h.i)perylene	%	101			70-130	Pass	
Benzo(k)fluoranthene	%	118			70-130	Pass	
Chrysene	%	103			70-130	Pass	
Dibenz(a.h)anthracene	%	95			70-130	Pass	
Fluoranthene	%	110			70-130	Pass	
Fluorene	%	102			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	92			70-130	Pass	
Naphthalene	%	109			70-130	Pass	
Phenanthrene	%	108			70-130	Pass	
Pyrene	%	110			70-130	Pass	
LCS - % Recovery							
Organophosphorus Pesticides							
Diazinon	%	104			70-130	Pass	
Dimethoate	%	101			70-130	Pass	
Ethion	%	109			70-130	Pass	
Fenitrothion	%	105			70-130	Pass	
Methyl parathion	%	97			70-130	Pass	
Mevinphos	%	116			70-130	Pass	
LCS - % Recovery							
TRH - 1999 NEPM Fractions (after silica gel clean-up)							
TRH C10-C14 (after silica gel clean-up)	%	126			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	96			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Cadmium	%	99			70-130	Pass	
Chromium	%	96			70-130	Pass	
Copper	%	99			70-130	Pass	
Lead	%	100			70-130	Pass	
Mercury	%	93			70-130	Pass	
Nickel	%	99			70-130	Pass	
Zinc	%	96			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	S20-Ma24218	NCP	%	99			70-130	Pass	
Acenaphthylene	S20-Ma24218	NCP	%	121			70-130	Pass	
Anthracene	S20-Ma24218	NCP	%	109			70-130	Pass	
Benz(a)anthracene	S20-Ma24218	NCP	%	123			70-130	Pass	
Benzo(a)pyrene	S20-Ma24218	NCP	%	105			70-130	Pass	
Benzo(b&j)fluoranthene	S20-Ma24218	NCP	%	115			70-130	Pass	
Benzo(g.h.i)perylene	S20-Ma24218	NCP	%	109			70-130	Pass	
Benzo(k)fluoranthene	S20-Ma24218	NCP	%	107			70-130	Pass	
Chrysene	S20-Ma24218	NCP	%	107			70-130	Pass	
Dibenz(a.h)anthracene	S20-Ma24218	NCP	%	109			70-130	Pass	
Fluoranthene	S20-Ma24218	NCP	%	119			70-130	Pass	
Fluorene	S20-Ma24218	NCP	%	107			70-130	Pass	
Indeno(1.2.3-cd)pyrene	S20-Ma24218	NCP	%	104			70-130	Pass	
Naphthalene	S20-Ma24218	NCP	%	111			70-130	Pass	
Phenanthrene	S20-Ma24218	NCP	%	113			70-130	Pass	
Pyrene	S20-Ma24218	NCP	%	117			70-130	Pass	
Spike - % Recovery									
Organophosphorus Pesticides				Result 1					
Diazinon	S20-Ma24218	NCP	%	100			70-130	Pass	
Ethion	S20-Ma24218	NCP	%	128			70-130	Pass	
Fenitrothion	S20-Ma24218	NCP	%	127			70-130	Pass	
Methyl parathion	S20-Ma24218	NCP	%	114			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S20-Ma25156	NCP	%	86			70-130	Pass	
Cadmium	S20-Ma25156	NCP	%	95			70-130	Pass	
Chromium	S20-Ma25156	NCP	%	87			70-130	Pass	
Copper	S20-Ma25156	NCP	%	90			70-130	Pass	
Lead	S20-Ma25156	NCP	%	95			70-130	Pass	
Mercury	S20-Ma25156	NCP	%	97			70-130	Pass	
Nickel	S20-Ma25156	NCP	%	85			70-130	Pass	
Zinc	S20-Ma25156	NCP	%	92			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Chrysene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S20-Ma26439	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Azinphos-methyl	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bolstar	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorfenvinphos	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos-methyl	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Coumaphos	S20-Ma24217	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Demeton-S	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Demeton-O	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Diazinon	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dichlorvos	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dimethoate	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Disulfoton	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
EPN	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethoprop	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethyl parathion	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenitrothion	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fensulfothion	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenthion	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Malathion	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Merphos	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl parathion	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Mevinphos	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Monocrotophos	S20-Ma24217	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Naled	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Omethoate	S20-Ma24217	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Phorate	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pirimiphos-methyl	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pyrazophos	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ronnel	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbufos	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tetrachlorvinphos	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tokuthion	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Trichloronate	S20-Ma24217	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S20-Ma25147	NCP	mg/kg	4.3	4.7	9.0	30%	Pass	
Cadmium	S20-Ma25147	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S20-Ma25147	NCP	mg/kg	12	11	8.0	30%	Pass	
Copper	S20-Ma25147	NCP	mg/kg	20	18	11	30%	Pass	
Lead	S20-Ma25147	NCP	mg/kg	64	42	40	30%	Fail	Q15
Mercury	S20-Ma25147	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Nickel	S20-Ma25147	NCP	mg/kg	11	11	1.0	30%	Pass	
Zinc	S20-Ma25147	NCP	mg/kg	140	120	17	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
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
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
Andrew Sullivan	Senior Analyst-Organic (NSW)
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.

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

Attention: **Stephen Maxwell**

Report **708717-L**
Project name
Project ID 318000780
Received Date Mar 19, 2020

Client Sample ID			**SLE01**	**SLE02**	**SLE03**	**SLE04**
Sample Matrix			**US Leachate**	**US Leachate**	**US Leachate**	**US Leachate**
Eurofins Sample No.			**S20-Ma28580**	**S20-Ma28581**	**S20-Ma28582**	**S20-Ma28583**
Date Sampled			**Mar 18, 2020**	**Mar 18, 2020**	**Mar 18, 2020**	**Mar 18, 2020**
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Heavy Metals						
Lead	0.01	mg/L	0.14	0.90	0.97	0.79
USA Leaching Procedure						
Leachate Fluid[C01]		comment	1.0	1.0	1.0	1.0
pH (initial)	0.1	pH Units	4.0	4.2	3.9	4.2
pH (off)	0.1	pH Units	4.8	4.9	4.8	4.9
pH (USA HCl addition)	0.1	pH Units	2.0	2.0	1.7	1.8

Client Sample ID			**DO1_180320**
Sample Matrix			**US Leachate**
Eurofins Sample No.			**S20-Ma28584**
Date Sampled			**Mar 18, 2020**
Test/Reference	LOR	Unit	
Polycyclic Aromatic Hydrocarbons			
Benzo(a)pyrene	0.001	mg/L	< 0.001
Heavy Metals			
Lead	0.01	mg/L	4.2
USA Leaching Procedure			
Leachate Fluid[C01]		comment	1.0
pH (initial)	0.1	pH Units	4.0
pH (off)	0.1	pH Units	4.9
pH (USA HCl addition)	0.1	pH Units	2.0

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
Polycyclic Aromatic Hydrocarbons	Sydney	Mar 20, 2020	7 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Heavy Metals	Sydney	Mar 23, 2020	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
USA Leaching Procedure	Sydney	Mar 20, 2020	14 Days
- Method: LTM-GEN-7010 Leaching Procedure for Soils & Solid Wastes			

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IANZ # 1290

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

Project Name:
Project ID: 318000780

Order No.:
Report #: 708717
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Mar 19, 2020 6:45 AM
Due: Mar 24, 2020
Priority: 3 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Benzo(a)pyrene	Lead	Polycyclic Aromatic Hydrocarbons	Organophosphorus Pesticides	USA Leaching Procedure	Metals M8	TRH (after Silica Gel cleanup)
Melbourne Laboratory - NATA Site # 1254 & 14271												
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794												
Perth Laboratory - NATA Site # 23736												
External Laboratory												
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**							
1	SLE01	Mar 18, 2020		Woodchips	S20-Ma28575			X	X		X	X
2	SLE02	Mar 18, 2020		Woodchips	S20-Ma28576			X	X		X	X
3	SLE03	Mar 18, 2020		Woodchips	S20-Ma28577			X	X		X	X
4	SLE04	Mar 18, 2020		Woodchips	S20-Ma28578			X	X		X	X
5	D01_180320	Mar 18, 2020		Woodchips	S20-Ma28579			X	X		X	X
6	SLE01	Mar 18, 2020		US Leachate	S20-Ma28580	X	X			X		
7	SLE02	Mar 18, 2020		US Leachate	S20-Ma28581	X	X			X		
8	SLE03	Mar 18, 2020		US Leachate	S20-Ma28582	X	X			X		
9	SLE04	Mar 18, 2020		US Leachate	S20-Ma28583	X	X			X		
10	DO1_180320	Mar 18, 2020		US Leachate	S20-Ma28584	X	X			X		

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Project Name:
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Received: Mar 19, 2020 6:45 AM
Due: Mar 24, 2020
Priority: 3 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail	Benzo(a)pyrene	Lead	Polycyclic Aromatic Hydrocarbons	Organophosphorus Pesticides	USA Leaching Procedure	Metals M8	TRH (after Silica Gel cleanup)
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
Test Counts	5	5	5	5	5	5	5

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							
Polycyclic Aromatic Hydrocarbons							
Benzo(a)pyrene	mg/L	< 0.001			0.001	Pass	
Method Blank							
Heavy Metals							
Lead	mg/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Benzo(a)pyrene	%	86			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Lead	%	99			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Lead	S20-Ma32658	NCP	%	94			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Benzo(a)pyrene	S20-Ma31473	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S20-Ma32654	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
C01	Leachate Fluid Key: 1 - pH 5.0; 2 - pH 2.9; 3 - pH 9.2; 4 - Reagent (DI) water; 5 - Client sample, 6 - other

Authorised By

Andrew Black	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
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.