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TARAGO RAIL CORRIDOR ENVIRONMENTAL DATA GAP ASSESSMENT

RAMBOLL

TARAGO RAIL CORRIDOR
ENVIRONMENTAL DATA GAP ASSESSMENT

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Description	**This report assesses data gaps in characterisation of contaminant impacts from the former Woodlawn Mines Ore Concentrate Loadout Complex in the rail corridor.**

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ABBREVIATIONS

Measures	Description
%	per cent
µg/m^2	Micrograms per square metre
km	Kilometres
m	Metre
mbgl	Metres below ground level
mg/kg	Milligrams per Kilogram
mm	Millimetre
AHD	Australian Height Datum
BaP	Benzo(a)pyrene
BTEX	Benzene, Toluene, Ethylbenzene & Xylenes (Monocyclic Aromatic Hydrocarbons)
CLM Act	NSW Contaminated Land Management Act 1997
COC	Chain of Custody
Council	Goulburn Mulwaree Council
DP	Deposited Plan
DQI	Data Quality Indicator
DQO	Data Quality Objective
EIL	Ecological Investigation Level
EPA	Environment Protection Authority (NSW)
ESL	Ecological Screening Level
HIL	Health Investigation Level
HSL	Health Screening Level
LCS	Laboratory Control Sample
LOR	Limit of Reporting
Mercury	Inorganic mercury unless noted otherwise
MS	Matrix Spike
NATA	National Association of Testing Authorities
ND	Not Detected

Measures	Description
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
NL	Non-Limiting
OCPs	Organochlorine Pesticides
OPPs	Organophosphorus Pesticides
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
pH	A measure of acidity, hydrogen ion activity
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RAP	Remediation Action Plan
RPD	Relative Percent Difference
SWL	Standing Water Level
TCLP	Toxicity Characteristic Leaching Procedure
TRHs	Total Recoverable Hydrocarbons
UCL	Upper Confidence Limit
USEPA	United States Environmental Protection Agency

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1. INTRODUCTION

Ramboll Australia Pty Ltd (Ramboll) was engaged by John Holland Rail Pty Limited (JHR) to support assessment of contaminant impacts from the former Woodlawn Mines Ore Concentrate Loadout Complex (the Loadout Complex) which was identified as having been historically located in the Goulburn – Bombala rail corridor at Tarago, New South Wales, Australia. Previous investigations of impacts from the activities of the Loadout Complex to soils within the rail corridor was undertaken to facilitate proper management of soils during the Tarago Rail Loop Project. Soil impacts within the corridor were identified along approximately 1000 lineal meters of the corridor and herein comprises the 'site'.

Environment assessments targeting site contamination

Further assessment is required to inform consideration of risks associated with site contamination to Tarago Station and offsite receptors.

1.1 Background

Ramboll has assited John Holland to date in the management of rail worker exposure to contamination during and after construction to extend the Tarago Rail Loop. Ramboll has also completed an assessment of risks to other human health receptors 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 EPA in accordance with the duty to report, described under Section 60 of the Contaminated Land Management Act 1997.

1.2 Objectives

The objective was to address data gaps that limit assessment of risks to users of Tarago Station and offsite receptors associated with site contamination from the former Loadout Complex.

1.3 Scope of Work

The assessment was carried out in general accordance with the *National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1)* (NEPM) (NEPC, 2013).

The scope of work performed to meet the objective comprised:

1. Review of existing information relating to site contamination and identification of remaining data gaps.
2. Review of site history to assess potential for localised areas of site contamination that may not have been identified including:
   - 2.1. Assessment of historic aerial photographs,
   - 2.2. Council held records and plans for historic site infrastructure
   - 2.3. Discussion with persons with knowledge of the operation and decommissioning of the historic lead ore concentrate load out complex (if available)
3. Review of regional geology and hydrogeology and completion of a groundwater usage survey to assess potential for contamination in groundwater and to improve confidence in identification of local groundwater receptors
4. Development of an SAQP to gather data to inform assessment of potential risks to users of Tarago Station and other offsite receptors
   - 4.1. Sampling of soils, dust, paint and surface waters in accordance with the SAQP
   - 4.2. Laboratory analysis of samples for contaminants of potential concern
5. Tier 1 assessment of potential off-site risk associated with contaminant impacts identified.

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6. Assessment of data quality and reliability.
7. Refinement of the conceptual site model.
8. Tier 2/3 assessment of potential risks associated with contaminant impacts identified (if warranted)
9. Preparation this report.

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2. SITE DESCRIPTION

2.1 Site Identification

The site locality is shown in **Figure 1, Appendix 1**, a site features plan is presented as **Figures 2a – 2e**, **Appendix 1**.

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

Table 2-1: Site Identification

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

2.2 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:

1. Tarago Station (onsite).
2. A residence adjacent (east of) the site and adjacent (north of) Tarago Station. This residence is here-in referred to as the Station Masters Cottage
3. A residence with a dam that receives waters from the site (during surface water flow), located adjacent (east of) the northern end of site.
4. Tarago Public School approximately 120 m east of the northern end of site.
5. Residences approximately 70 m west of the south end of site and east of Goulburn Street.
6. Tarago Recreation Area approximately 300 m east of site.

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3. SITE HISTORY

A summary of site history is shown in **Table 3-1.**

Table 3-1: 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.

Site	Description
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 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.
Historical Title Search	A historical title search was not completed based on the longstanding use of the site as a rail corridor.

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4. PREVIOUS INVESTIGATIONS

Assessment and management support provided to JHR in relation to site contamination is provided within the following documents:

1. McMahon 2015 Tarago Rail Siding Extension: Preliminary Contaminated Site Assessment
2. Ramboll 2019a Tarago Loop Extension Further Intrusive Assessment and Lead Management Plan
3. Ramboll 2019b Tarago Loop Extension Short Term Lead Management Plan
4. Ramboll 2019c Tarago Loop Extension Preliminary Human Health Risk Assessment
5. Ramboll 2019d Tarago Loop Extension August 2019 Surface Water Monitoring
6. Ramboll 2019e Tarago Loop Extension September 2019 Surface Water Monitoring
7. Ramboll 2019f Tarago Loop Extension Remedial Action Plan
8. Ramboll 2019g Tarago Rail Corridor Environmental Site Assessment

These documents are summarised in the sub-sections below.

4.1 McMahon 2015 Tarago Rail Siding Extension: Preliminary Contaminated Site Assessment

A previous preliminary site assessment found lead levels exceeding relevant human-health guideline values in certain parts of the site (McMahon 2015). Based on review of this report Ramboll concluded:

1. A siding adjacent to Tarago Station (the Woodlawn Siding) was historically used to load lead ore from the former Woodlawn mine and this practice is identified as a source of potential contamination at the site
2. Intrusive assessment included composite sampling and analyses for a broad range of contaminants and identified contamination limited to lead along approximately 870 lineal meters of rail corridor (CH: 261.980 km to CH: 262.850 km) within the site including the siding historically used to load lead ore (the Woodlawn Siding). Ramboll recommended that the results of composite sampling as described in McMahon (2015) should be used to screen the potential presence / absence of lead impacts only. Factoring required when interpreting composite sample results (i.e. multiplying reported concentrations by the number of sub-samples) can lead to conservative interpretation of the degree of impact and composite sample results (as described) should not be relied upon to assess risk associated with lead exposure
3. Further assessment of the degree and extent of lead impact between CH: 261.980 km and CH: 263.000 km was recommended
4. Further assessment of the Proposed Tarago Loop north of CH: 261.980 km was not considered warranted at the time and construction could proceed in this area without requirement for management measures associated with contamination. This included construction of the signal trench in this area
5. Construction of signal trench from CH: 263.027 km (the Goulburn Street level crossing) to CH: 265.200 km (the country end of the Crisps Creek Intermodal Facility) could occur without requirement for management measures associated with contamination.

4.2 Ramboll 2019a Tarago Loop Extension Further Intrusive Assessment and Lead Management Plan

Works completed targeted the Woodlawn Siding and surrounds within the area identified in the McMahon assessment as being lead impacted and a 2 km length of proposed signal trench south of the Goulburn Street level crossing. Works were completed in July – August 2019 and assessment of the Woodlawn Siding included:

1. Advancement of nine test pits (TP1 to TP9) on approximate 100 m lineal increments through the Woodlawn Siding rail formation along the approximate 900 m where elevated lead concentrations were considered likely to exist (based on review of historic assessment);

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1.1. Soil conditions were logged for each of the nine test pits
1.2. Discrete soil samples were collected from each of the three distinct layers of material present within each test pit. This included the top ballast layer (mostly fines), middle capping layer and bottom structural base/subgrade.
1.3. Six samples from the ballast layer were analysed for petroleum hydrocarbons (TRH), benzene, toluene, ethyl benzene, xylene (BTEXN), polycyclic aromatic hydrocarbons (PAH), 8 metals (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg) and asbestos. Remaining samples were analysed for lead

2. Collection of 51 shallow soil samples including:
   2.1. 12 samples collected adjacent (west of) the Woodlawn Siding between test pit locations to refine assessment extent of lead impacts
   2.2. Five samples collected from grassed land west of the Woodlawn Siding to assess potential presence of lead between the rail corridor access road (by which it is assumed lead ore was historically transported to the siding) and the Woodlawn Siding where loading of lead ore onto rail cars is understood to have occurred
   2.3. Five sediment samples from cess drains feeding two culverts within the area of previously identified impact
   2.4. Eight samples from within the Woodlawn Siding targeting the northern end of site and 'tie-ins' to the active loop and main line.
   2.5. Six samples from ballast fines in the loop line between CH 262.440 and CH 262.750

   All shallow soil samples were analysed for lead. Additionally, three samples where elevated total lead concentrations were observed were analysed for leachate under acidic conditions following the Toxicity Characteristic Leachate Procedure (TCLP) and three similar samples were analysed for leachate under pH neutral conditions following the Australian Standard Leachate Procedure (ASLP).
3. Field measurement of lead using a portable X-Ray Fluorescence (XRF) device in the main line on 25 m to 50 m lineal increments at 29 locations including:
   3.1. Hand removal of upper 0.1 – 0.3 m of ballast to expose fines between tracks and in the western shoulder of the main line formation
   3.2. XRF measurement of lead of exposed fines in the shoulder and between tracks
   3.3. Averaging of shoulder and in-track readings to define a representative impact at each location

Results identified site materials impacted by lead from CH: 261.950 to 262.950 including fines in ballast in the main and loop lines; ballast at the top of the Woodlawn Siding formation; and soils adjacent (west of) the Woodlawn Siding (CH: 261.980 km to CH: 262.880 km). A distinct area with much higher lead concentrations was observed between CH: 262.090 km and CH: 262.700 km. Samples from capping underlying ballast in the Woodlawn Siding from nine of nine test pits reported lead concentrations below site assessment criteria supporting conclusion that vertical migration is limited to shallow soils. Lead concentrations were observed to be highly variable over short distances and ranged from 7 mg/kg to 38,000 mg/kg within the proposed loop extension footprint. This variability was considered consistent with historical deposition of lead ore concentrate during loading of rail cars.

pH during ASLP was reported at 3.7 – 4.3 indicating rail formation soils impacted by ore concentrate are moderately to highly acidic. Lead leachate following TCLP was observed at 4.3 – 32 mg/L and following ASLP at <0.01 – 1.1 mg/L.

Assessment of the signal trench included:

1. Advancement of five test pits on 400 lineal meter increments along the 2 km signal trench alignment to a depth of approximately one meter (anticipated depth of trenching)
2. Collection of one sample from shallow soils within each test pit
3. Analyses of all samples for TRH, BTEXN, PAH, 8 metals and asbestos.

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Results from assessment of the signal trench were reported below assessment criteria with the exception of zinc reported at TP13_0.1 (300 mg/kg) which exceeded the adopted EIL of 110 mg/kg).

4.3 Ramboll 2019b Tarago Loop Extension Short Term Lead Management Plan

A short-term lead management plan (SLMP) was developed to mitigate lead exposure risks to workers associated with the proposed Tarago loop extension. Recommendations included excavation of lead impacted soils to temporary stockpile areas to remove lead exposure risk from the proposed loop extension footprint as well as work practices to mitigate exposures while completing these excavation works.

4.4 Ramboll 2019c Tarago Loop Extension Preliminary Human Health Risk Assessment

The scope of works completed under the human health risk assessment (HHRA) included derivation of management criteria for lead in soil based on targeted blood lead levels prescribed in relevant regulatory guidance and an exposure scenario specific to rail workers. An assessment of lead bio-accessibility within soils targeting the range of observed concentrations above the generic HIL D (1500 mg/kg) was commissioned through the University of South Australia.

Concentrations of lead present at the site were considered likely to present an unacceptable level of risk to site workers. Based on current SafeWork NSW lead risk work guidelines of 10 µg/dL of lead in blood, a safe lead in soil concentration was estimated at **5,300 mg/kg** for current works within the known contaminated areas at the site. As concentrations at the site exceed this criterion it was recommended that any works at the site should implement the recommendations contained within the SLMP, unless there is certainty that work is being carried out in areas where current exposure concentrations are less than the calculated safe level. A clean-up criterion based on the future blood lead guideline value of 5 µg/dL was estimated at **2,200 mg/kg** and this was recommended as a clean-up criteria protective of future rail workers.

Observations of variability in lead concentrations observed through earlier works were supported by analyses completed as part of the HHRA. Of particular note, lead in surface ballast fines adjacent remnant ore load out infrastructure (concrete in Woodlawn Siding – Ramboll ref TP4a) was reported at 184,000 mg/kg. This varied from the concentration reported at TP4 collected from 0.1 – 0.3 m depth of 38,000 mg/kg. Through correspondence with the University of South Australia and the primary laboratory engaged for this project (Eurofins MGT) it was identified that while the analytical method applied (LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS) is endorsed under the NEPM as appropriate for assessment of lead in soil, application to samples significantly impacted by lead ore concentrate may underrepresent lead concentrations. This inferred a degree of uncertainty over results from previous assessment (Ramboll 2019) however this uncertainty was considered limited to highly concentrated impacts (>10,000 mg/kg) and the analytical method applied was considered adequate for assessing concentrations against the site assessment criteria ($\leq$ 5,300 mg/kg).

4.5 Ramboll 2019d - e Tarago Loop Extension August and September Surface Water Monitoring

The scope of works completed under this assessment included:

1. Inspection of drain lines upstream and downstream of three culverts passing beneath he Woodlawn Siding (and adjacent lines).
2. Observation of surface water at one upstream location plus one downstream location during August 2019 and two upstream locations plus two downstream locations during September 2019. Surface water was not observed upstream or downstream of the northern most culvert during August or September 2019.
3. Collection of samples during August and September 2019 where water was observed

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4. Analyses of samples for TRH, BTEXN, dissolved metals (Al, Ba, Be, Co, Fe, Mn, As, Cd, Cr, Cu, Pb, Ni, Zn, Hg), total lead and physicals/inorganics (pH, conductivity, TDS, TSS, turbidity, N02, N03, NH3, total N, kjehladl N, total P).

Results from the location upstream of the southern culvert were reported below assessment criteria for receiving waters. Results from the location upstream of the middle culvert included exceedances of assessment criteria however visual assessment indicated waters were likely impacted by fines from the Woodlawn Siding.

Results from downstream locations were reported above assessment criteria for receiving waters as follows:

1. Phosphate was reported at a maximum of 30,000 ug/L, above the ANZG criteria protective of irrigation (800 – 1200 ug/L)
2. Aluminium was reported at a maximum of 380 ug/L above the ANZG freshwater ecological criteria for 95% species protection (55 ug/L)
3. Iron was reported at a maximum of 370 ug/L above the ANZG freshwater ecological criteria for 95% species protection (300 ug/L)
4. Lead was reported at a maximum of 33 ug/L above the ANZG freshwater ecological criteria for 95% species protection (3.4 ug/L)
5. Cadmium was reported at a maximum of 13 ug/L above the ANZG freshwater ecological criteria for 95% species protection (0.2 ug/L)
6. Copper was reported at a maximum of 200 ug/L above the ANZG freshwater ecological criteria for 95% species protection (1.4 ug/L) and above the ANZG criteria protective of irrigation (100 ug/L)
7. Nickel was reported at a maximum of 19 ug/L above the ANZG freshwater ecological criteria for 95% species protection (11 ug/L)
8. Zinc was reported at a maximum of 2600 ug/L above the ANZG freshwater ecological criteria for 95% species protection (8 ug/L).

4.6 Ramboll 2019f Tarago Loop Extension Remedial Action Plan

Ramboll were engaged to prepare a RAP to support appropriate management of spoil generated during extension of the Tarago Rail Loop. The RAP included:

1. Review of remedial options
2. Identification of onsite aboveground containment as the preferred remedial option
3. A remedial action works plan
4. A validation plan to assess the success of remediation.

4.7 Ramboll 2019g Tarago Loop Extension Interim Lead Management Plan

Ramboll were engaged to revise the Short Term Lead Management Plan (Ramboll 2019b) to mitigate risks to rail workers onsite from the completion of the loop extension until remediation of associated spoil could occur.

4.8 Ramboll 2019h Tarago Rail Corridor Environmental Site Assessment

The scope of works completed under this assessment included:

1. Collection of 31 shallow soil samples to establish grid-based coverage across the site (integrating completed sampling locations).
2. Collection of four samples targeting the boundary shared by the house adjacent and north of Tarago Station
3. Collection of one sample from surface soils 10 m north of TP4a and one sample 10 m south of TP4a
4. Analysis of all samples for lead
5. Analysis of 20 samples for TRH, BTEXN, PAH, 8 metals and asbestos to supplement existing analyses for these COPC and to provide broad coverage across the site

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6. Analysis of 5 samples from outside the rail formation but within the corridor for pH, conductivity, particle size distribution, % Fe and organic carbon content (to facilitate consideration of site-specific ecological uptake).

Interpretation of results indicated:

1. Contaminant concentrations that may present risk to human health or the environment in soil appeared limited to lead.
2. Lead impacts did not appear to extend west outside of the corridor.
3. Lead impacts along the eastern boundary inferred potential for offsite impacts exceeding generic residential criteria of 300 mg/kg. This criterion was considered relevant to the residence north of Tarago Station only and samples SS52 – SS55 exceeded 300 mg/kg.
4. Lead impacts along the eastern boundary inferred potential for offsite impacts exceeding generic open space criteria of 600 mg/kg. This criterion was considered relevant to public open spaces including footpaths and samples SS55, SS61, SS71, SS75 and SS88 exceeded 600 mg/kg.
5. Soils outside of the rail formation are moderately acidic (pH: 4.7 – 5.9).

A conceptual site model was developed and data gaps were identified which form the basis for this data gaps assessment.[1]

4.9 Preliminary Conceptual Site Model

A Conceptual Site Model (CSM) is a site-specific qualitative description of the source(s) of contamination, the pathway(s) by which contaminants may migrate through the environmental media, and the populations (human 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 in **Table 13-1**.

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[1] The Interim Lead Management Plan (Ramboll 2019f) and the Tarago Rail Corridor ESA were completed concurrently. The preliminary CSM presented in **Section 4.9** considers management measures recommended to control worker exposure to lead until remediation can occur.

Table 4-1: Exposure Pathway Assessment

	Source-Pathway-Receptor Link? (Yes/ No/ Potential (P))				
	Onsite workers	Onsite Ecology	Offsite members of the public	Offsite Ecological Receptors including livestock	Justification
Soil					
Dermal contact with dust/soil	N	**Y**	**P**	**P**	Concentrations in soils exceed onsite assessment criteria however management measures (Ramboll 2019f) adequately mitigate risks to onsite workers. Potential remains for impacts to onsite ecology. Concentrations in soils on rail corridor boundaries and in the Tarago Station carpark were found to be above the HIL and EIL criteria for adjacent residential and open space land uses and so there is potential for impacts to offsite human health and ecological receptors. Sensitive receptors (Tarago Station, a former Station Masters Cottage, Goulburn Street pedestrians and Tarago Public School are located close to site and potential exists for public users of the station to be exposed to the lead contamination via dust emissions.
Incidental ingestion of dust/soil	N	**Y**	**P**	**P**	
Outdoor dust inhalation	N	**Y**	**P**	**P**	

	Source-Pathway-Receptor Link? (Yes/ No/ Potential (P))				
	Onsite workers	Onsite Ecology	Offsite members of the public	Offsite Ecological Receptors including livestock	Justification
Surface Water					
Dermal Contact	N	N	N	**P**	Flow was not observed in any of the drains or culverts present at the site. However, this may change upon rainfall, which can mobilise contaminated material into the local waterway where aquatic ecological receptors may become exposed.
Incidental Ingestion	N	N	N	**P**	
Potable Ingestion	NA	N	N	NA	
Irrigation Pathways	N	N	N	**P**	

Y – Yes, N – No, P – Potential, NA – not applicable

4.10 CSM Data Gaps

At completion of the Tarago Rail Corridor ESA (Ramboll 2019h) The following gaps remained in our understanding of impacts:

1. The lay-out and specific operation of the historic lead ore concentrate load-out facility remained unclear and so potential existed for localised impacts to remain and/or potential for impacts to extend deeper than the shallow soil currently identified. An example of potential deeper migration exists around the remnant infrastructure within the Woodlawn Siding around CH: 262.450 (depicted on Figure 2c, Appendix A set by a rectangular polygon from apparent survey).
2. Soil impacts outside of the Woodlawn Siding had not been vertically delineated. Impacts within the Woodlawn Siding were limited in the nine test pits to ballast fines and with lead concentrations in underlying capping reported below assessment criteria. This provides a strong line of evidence to support limited vertical migration of lead contamination however further assessment of historic operations may warrant further assessment of lead in site soils at depth
3. Soil impacts on or near eastern site boundaries inferred potential for offsite impacts. Sensitive receptors east of site were identified as follows:
   - 3.1. Rural land at the northern end of site and adjacent the eastern site boundary
   - 3.2. Tarago Station,
   - 3.3. Goulburn Street pedestrians
   - 3.4. The Station Masters Cottage
   - 3.5. Tarago Public Shool
4. Potential offsite migration of contaminants through surface water and groundwater and impacts to associated receivers remained unclear. Further consideration of regional groundwater characteristics and usage and the depth of site contamination relative to the upper aquifer was considered warranted.

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5. GEOLOGY AND HYDROGEOLOGY

A summary of the 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 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. Localised stockpiles were identified east and west of the rail formation and north of Tarago Station (presented as historic survey features on **Figure 2b**, **Appendix 1**). 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	A groundwater usage survey is being completed and will inform consideration of the scale and sensitivity of groundwater receptors.

Site	Details
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.
Background Water 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. An unnamed tributary was identified which during periods of flow could be expected to direct water east across the southern position of site to the Mulwaree River.

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6. SITE CONDITION AND SURROUNDING ENVIRONMENT

Site details are consolidated in **Table 6-1**. Site photographs are shown in **Appendix 2**.

Table 6-1: Site Condition and Surrounding Environment

Site	Description
Topography	Review of Google Earth satellite imagery identifies site elevation of approximately 688 mAHD and slopes down to the east. The rail formation, former loadout complex and unsealed access roads along the west side of the rail formation were observed to be free of vegetation. Some trees were observed west of the rail formation along Stewart Street and east of the rail line to the south of Tarago Station. Grass was generally observed across the remainder of the site. Some vegetative stress was observed though across the site and in the surrounding offsite areas of assessment (the Station Masters Cottage Goulburn Street footpaths and Tarago Public School) though appeared consistent with the surrounding environment and with stress that could be expected from recent drought conditions. Cess drains were observed adjacent the west side of the rail formation which could be expected to receive surface water from the rail line and land to the west. These drains discharge to three culverts beneath the rail line. The southern culvert directs the Mulwaree River tributary the middle culvert directs surface water across Boyd Street (both observed following snow melt) and the northern culvert could be expected to flow to a nearby dam on adjacent agricultural land.
Conditions at Site Boundary	Evidence of contamination was identified at several locations near the eastern site boundary and is described in **Section 4.5** and **Section 4.6**. The site was observed to be fenced on the western boundary and partially fenced on the eastern boundary. Access remains feasible from Tarago Station, the Goulburn Street level crossing and an unfenced area north of Tarago Station.
Visible Signs of Contamination	Visible evidence of contamination was observed as green and orange staining of silt within fouled ballast in identified areas of contamination.

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7. SAMPLING, ANALYSIS AND QUALITY PLAN

7.1 Data Quality Objectives

Ramboll developed Data Quality Objectives (DQOs) using the US EPA seven-step DQO process, endorsed in Schedule B2 of NEPM (2013). The DQOs set quality assurance and quality control parameters for the field and laboratory program to ensure data of appropriate reliability has been used to assess the environmental condition at the site.

The seven step DQOs process comprises:

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

7.1.1 Step 1: State the problem

Data gaps from previous investigations infer potential for risks associated with contamination from the former loadout complex to affect Tarago Station and the surrounding environment.

Investigations of soil onsite identified concentrations of lead that could impact on offsite receptors. Previous site investigations identified a number of data gaps limiting a comprehensive assessment of these potential risks. Further assessment to address data gaps and completion of an offsite human health and ecological risk assessment is required.

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

1. Is the data collected of sufficient quality to identify impacts to meet the project objectives?
2. What is the fate and transport of contamination onsite and offsite?
3. Does Tier 1 assessment indicate potential risks to Tarago Station and the surrounding environment are low and acceptable?
4. Is a Tier 2 / 3 risk assessment warranted?
5. Are there remaining data gaps limiting the assessment of potential risk and what are these?

7.1.3 Step 3: Identify the information inputs

Inputs to the decisions will be sourced from:

1. Review of existing site assessments, historical aerial photography, council held records, other available records and publicly available databases relevant to contamination sources, pathways and receptors at the site.
2. Assessment and sampling as summarised in **Section 0** below.
3. Assessment criteria relevant to the site receptors targeted within the surrounding environment as described in **Section** Error! Reference source not found..

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7.1.4 Step 4: Definition of the Study Boundary

The boundaries for data gap assessment works are defined as follows:

1. The site forming part Lot 1 DP 595856
2. The Station Masters Cottage defined as Lot 1 in DP 816626
3. Tarago Public School defined as Lot 1 DP 795089 and Lot 90 DP 750033
4. Pathway adjacent Goulburn Street (cadastral identifiers not determined)
5. The dam located downgradient from the site northern rail culvert forming part Lot A DP 440822
6. The vertical extent soil to one meter below ground level within the corridor and 0.1 mbgl outside the corridor. Includes the shallow unconfined aquifer and the deep confined aquifer.
7. The temporal boundary comprises the period 2015-2019 and includes data from historic reports and this assessment.

7.1.5 Step 5: Develop the decision rules

The decision rules, defined for the study program are presented in **Table 7-1.**

Table 7-1 Decision Rules

Decision Rule	Task	Compliance Indicator
1. Is all data shown to be reliable?	Comparison of all data against DQIs and DQOs outlined in **Section 0**	Data considered to be acceptable when assessed against **Section 0**
2. Does the data define clear presence or absence of unacceptable risk when assessed against Tier 1 criteria?	Assess data against Tier 1 criteria defined in **Section** Error! Reference source not found.. Where exceedances are less than 2.5 times greater than adopted assessment criteria, the 95% upper confidence limit of the mean contaminant concentration will be calculated. Assessment of the 95% UCL will then form the basis of assessing compliance.	Further risk assessment is considered to be required if concentrations are above Tier 1 criteria (including 95% UCL if / where appropriate) and a Tier 1 hazard quotient of >1 is identified
3. If Tier 1 assessment of risk is not clear then complete Tier 2 / 3 risk assessment to define presence or absence of unacceptable risk?	Assess data above Tier 1 criteria against Tier 2 / 3 criteria or conclude unacceptable risk is present.	Unacceptable risk considered to exist if data is above Tier 2 / 3 criteria.
4. Are there remaining data gaps?	Assess the assumptions and completeness of the risk assessment and if further information is required to conclude on potential risk	Unable to conclude on potential risk due to data gap.

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7.1.6 Step 6: Specify the performance or acceptance criteria

DQIs have been established to set acceptance limits on field and laboratory data collected as part of the soil, dust, paint and surface water sampling program. The DQIs are outlined in **Table 7-2.**

Table 7-2: Data Quality Indicators

DQI	Field	Laboratory
Completeness – a measure of the amount of useable data from a data collection activity	All critical locations sampled. Experienced sampler. Documentation correct.	All critical samples analysed. All analysis completed according to standard operating procedures. Appropriate methods Appropriate Practical Quantitation Limits (PQLs).
Comparability – the confidence that data may be considered to be equivalent for each sampling and analytical event	Experienced sampler. Climatic conditions noted during sampling. Same types of samples collected using approved sampling methods.	Same analytical methods used. Same sample PQLs. Same NATA accredited laboratories used. Same units.
Representativeness – the confidence that data are representative of each medium present on-site.	Appropriate media sampled.	All samples analysed according to standard operating procedures.
Precision – a quantitative measure of the variability of the data.	Collection of intra-laboratory duplicates at a rate of 1 in 10 primary samples for soil and water Collection of inter-laboratory duplicate samples at a rate of 1 in 10 primary samples for soil and water.	Analysis of field duplicate samples, relative percent difference (RPDs) to be $\leq$30%. Laboratory duplicates analysed, RPDs to be $\leq$ 30%.
Accuracy – a quantitative measure of the closeness of the reported data to the "true" value.	Sampling methodologies as described in **Table 7-2** appropriate and complied with. Collection of one rinsate samples each day of sampling for soil and groundwater.	Analysis of: Method blanks Matrix spikes Surrogate spikes Laboratory control samples Results for blank samples to be non-detect. Results for spike samples to be between 70% and 130%.

7.1.7 Step 7: Develop the plan for obtaining data

The plan for obtaining data to address data gaps outlined in **Section 4.10** is identified in **Table 7-3** below.

Table 7-3: Data Gap Assessment Summary

Data Gap	Assessment Scope
Potential for groundwater impact	Assessment of leachate data for lead in soils to inform assessment of potential migration of lead via leachate to groundwater or surface . Advancement of three soil bores within areas of lead impact outside of the rail formation to a depth of 1.0m to assess vertical migration of lead through soils onsite in areas of previously identified impact outside the rail formation. Collection of a total of 15 samples (4 from each borehole - surface, 0.25, 0.5, 0.75m and 1.0m depths).
Potential impacts to human health receptors (rural land adjacent rail corridor, Tarago Station, the Station Masters Cottage, Goulburn Street pathway and Tarago Public School)	Sampling including: a. Three samples on the eastern site boundary adjacent SS61 (where 5,000 mg/kg lead was previously identified) b. Five samples of dust from inside buildings at Tarago Public School c. Five samples of dust from outside buildings at Tarago Public School d. Ten shallow soil samples (0-0.1 mbgl) from the grounds at Tarago Public School including five samples along the western boundary of the school on 30 m approximated lineal increments and five samples to provide broad coverage across remaining accessible soils e. Five paint samples from external building surfaces at Tarago Public School f. Five dust samples from outside buildings at Tarago station g. Six shallow soil samples (0-0.1 mbgl) from the Station Masters Cottage targeting the western boundary and other accessible soils h. Three dust samples from outside the Station Maters Cottage i. Three dust samples from inside the Station Masters Cottage j. Three external paint samples from the Station Masters Cottage k. Ten shallow soil samples (0-0.1 mbgl) from the pathway adjacent Goulburn Street and Tarago Station carpark on 30 m approximated lineal increments. All of the samples above were analysed for lead. Target sampling locations are presented in **Appendix 1** figures.

7.2 Sampling Methodology

Ramboll completed the assessment works at the site in general accordance with the NEPM (2013) guidelines and the SAQP. Guidance that was adopted specific to sampling of each media is described below.

1. Soil sampling was completed 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* (Standards Australia 2005)
2. Paint sampling was completed in general accordance with *AS 4361.2-1998 Guide to lead paint management - Residential and commercial buildings* (Standards Australia 1998)
3. Dust sampling was completed in general accordance with *Lead Dust Sampling Technician Field Guide* (US EPA 2009)

8. FIELDWORK

8.1.1 Onsite Soil Bores

Soil bores were advanced by a Ramboll environmental scientist experienced in contaminated site assessments and using a hand auger. Spoil was arranged in order of excavation and sampled by hand from spoil at depths in accordance with the SAQP. An exception was location HA03, where refusal was encountered at 0.8m, which prevented the collection of 1.0m sample. Fresh disposable nitrile rubber gloves were used to collect each sample. Remnant soil was removed from the hand auger between locations by brush. Samples were stored in laboratory supplied glass sample jars, labelled with unique identifiers which were cross-referenced with on-site plans and submitted to the laboratory under chain of custody.

8.1.2 Shallow Soil Sampling

Investigation of shallow soil from the eastern site boundary, the Station Masters Cottage, the pathway adjacent Goulburn Street and Tarago Public School was completed using a shovel. Fresh disposable nitrile rubber gloves were used to collect each sample with remnant soil removed between locations by brush. Shallow soil samples were collected per frequency and locations nominated in the SAQP at 0 – 0.1 mbgl. Samples were stored in laboratory supplied glass sample jars labelled with unique identifiers which were cross-referenced with site plans and submitted to the laboratory under chain of custody.

8.1.3 Offsite Dust Sampling

Sampling of dust at the Station Masters Cottage, Tarago Station and Tarago Public School was completed in accordance with the *Lead Dust Sampling Technician Field Guide* (US EPA 2009) and included:

1. Targeted swab sampling of windowsills and floors. Internal floor sampling was not feasible based on prevalence of soft floor covers and furniture at the Station Masters Cottage and Tarago Public School.
2. Mark-out of sampling areas using masking tape. Sampling areas of 0.09 m^2 were targeted where feasible. Average sample area was 0.0825 m^2.
3. Dust sampling was completed wearing single use disposable nitrile gloves and using single use sanitary wipes. Dust was collected by making s-shaped motions through the sampling area, folding the wipe in half and repeating the process at least three times and until all visible dust was removed.

Samples were stored in single use zip lock bags labelled with unique identifiers which were cross-referenced with site plans and submitted to the laboratory under chain of custody. Sampling locations and areas were recorded on field sheets to facilitate calculation of lead concentration per unit area and assessment against appropriate criteria (further details provided in **Section** Error! Reference source not found.).

8.1.4 Offsite Paint Sampling

Sampling of paint at the Station Masters Cottage and Tarago Public School occurred in accordance with the sampling procedure for laboratory analyses presented in *AS4361.2 Guide to Lead Paint Management Part 2: Residential and Commercial Buildings* (Standards Australia 1998) and included:

1. Wiping of sample areas to remove dust. This was not feasible at the Station Masters Cottage as paint was observed to be in very poor condition such that wiping would have removed the paint.
2. Removal of targeted paint to base substrate across an area of at least 25 mm x 25 mm.
3. Collection of paint scrapings in single use zip lock bags.
4. Repeating this process at two or more locations to provide comparable results. Each sample was collected, bagged and analysed separately.

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Sampling occurred wearing disposable nitrile rubber gloves. Samples were stored in single use zip lock bags labelled with unique identifiers which were cross-referenced with site plans and submitted to the laboratory under chain of custody.

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9. QUALITY ASSURANCE / QUALITY CONTROL PROGRAM

9.1 QA/QC Data Evaluation

An assessment was made of data completeness, comparability, representativeness, precision and accuracy based on field and laboratory considerations, as outlined in NEPM 1999 Amendment (2013) guidelines. Assessment of the DQIs of completeness, comparability, representativeness, precision and accuracy, which are outlined in **Table 7-2,** is made in **Table 9-1**.

Table 9-1: QA/QC – Assessment of DQIs

DQI	Ramboll Assessment
Completeness	Completeness is a measure of whether all the data necessary to meet the project objectives was collected. Sampling of soil, dust and paint occurred in accordance with plan described in **Table 7-3**. This meets the assessment objectives.
Comparability	Comparability is a measure of confidence that the data may be considered to be equivalent for each sampling and analysis event. The field investigations were completed by experienced personnel in general accordance with sampling methodology guidance described in **Section 7.2**. The laboratory analysis was undertaken by NATA registered laboratories using accredited analytical methods.
Representativeness	Representativeness is the confidence that the data is representative of each media present at each area of assessment. In the field, representativeness was achieved by completing the sampling plan described in **Section 7.1.7** including the number and location of soil, dust and paint samples to characterise each targeted area of assessment.
Precision	Precision is a measure of the reproducibility of the data. In the field, Ramboll achieved precision by using standard operating procedures or recognised guidance documents for the collection of soil, dust and paint and by collecting duplicate and triplicate samples for analysis. At the laboratory, precision was assessed using laboratory control samples, method blanks and laboratory spikes.
Accuracy	Accuracy is a measure of the closeness of a measurement to the true parameter value. In the field, Ramboll achieved accuracy by using standard operating procedures or recognised guidance documents for the collection of soil, dust and paint and by collecting duplicate and triplicate samples for analysis. At the laboratory, accuracy was assessed by analysing blind field replicate samples (and then assessing relative percentage differences with primary samples) and laboratory duplicates.

The sampling methods implemented are described in **Section 8** and demonstrate general accordance with relevant guidance documents described in **Section 7.2**. Based on this, field quality QA is considered adequate. An assessment of field QC and laboratory QA/QC is presented in **Table 9-2**.

Table 9-2: QA/QC – Field and Laboratory Quality Assurance and Quality Control

Field and Lab QA/QC	Ramboll Comments
Field quality control samples	Intra-laboratory and inter-laboratory duplicate soil samples were analysed at a rate of 7% each. This exceeds recommendation for a minimum 5% as presented in the NEPM (NEPC 2013). Intra-laboratory and inter-laboratory duplicate results, field blanks and trip spike/blank are presented in **Table 6**, **Appendix 3**. It was not feasible to collect field duplicate dust swab samples as the sampling methodlogy targets complete removal of dust from each sampling location. One field blank swab (QA1) was submitted with primary samples for analyses. Additionally a second swab sample was collected from a sampling location to assess the degree to which primary sampling was removing all lead. No QC sampling was completed for paint samples
Field quality control results	Relative Percent Differences (RPDs) primary soil sample and duplicate pairs were all below the RPD criteria (<=30%) indicating soil sampling was representative of conditions at sampling locations. The blank swab reported lead as non-detect indicating the swabs used did not contain lead. The second swab reported lead at 1.2 mg indicating a small amount of residual lead may have remained after swab sampling. This amount of remnant lead is insignificant when calculated as a mg/m^2 loading and supports conclusion that swab sampling accurately captured lead present.
NATA registered laboratory and NATA endorsed methods	Eurofins MGT was used as the primary laboratory and Enivolab was used as the secondary laboratory. The laboratory certificates are NATA stamped.
Analytical methods	Summary analytical methods were included in the laboratory test certificates as shown in Error! Reference source not found.**.**
Holding times	Review of the COCs and laboratory certificates indicated that holding times were met,
Practical Quantitation Limits (PQLs)	PQLs for all analyses were below the site screening criteria.
Laboratory quality control samples	Laboratory quality control samples including duplicates, laboratory control samples, matrix spikes, and method blanks were undertaken by the laboratories at appropriate frequencies for soil and paint samples. Results passed acceptance criteria and support reliance on soil and paint data. Laboratory QA was not completed for swab samples as appropriate QC test methods could not be determined. This attributes some uncertainty to the swab data set though is not considered to compromise reliance on swab data.

Laboratory reports are presented as **Appendix 4**.

Overall it is considered that the completed investigation works and the data obtained adequately complied with the requirements of NEPM 1999 Amendment (2013) guidelines.

10. EXPOSURE ASSESSMENT

10.1 Outdoor Dust and Soil Exposure Scenario and Assessment Criteria

The exposure assessment considers lead as the only contaminant of potential concern. Lead exposures are known to cause elevation in blood lead concentrations, with children being most sensitive towards its adverse impacts. Increased blood lead concentrations can impact cognitive processes in children.

Data gaps associated with the preliminary CSM described in **Section 4.10** included the following sensitive receptors in offsite areas surrounding the site:

1. Rural land at the northern end of site and adjacent the eastern site boundary
2. Tarago Station
3. Goulburn Street pedestrians (eg. walking, running, bike riding etc.)
4. The Station Masters Cottage
5. Tarago Public Shool

Adult receptors are also present at the above locations; however, they are considered to be less sensitive than children. The most sensitive age groups are infants and young children, and blood lead modelling used in NEPM lead health investigation level (HIL) development has considered infants and children in these age groups.

Soil and dust ingestion are considered to be the most significant exposure pathway (NEPM 2013). Dermal absorption, inhalation, drinking water and plant uptake (exposure via consumption of vegetables) of lead are less significant than soil and dust ingestion routes (NEPM 2013; ATSRD 2007).

NEPM HIL derivation for HIL A, HIL B and HIL C considered lead exposure to children as the most sensitive receptor in those scenarios. The US EPA Integrated Exposure Uptake Biokinetic (IEUBK) model was used to develop these HILs. The model comprises separate components for exposure, absorption and the biokinetic transfer of lead to all tissues of the body and calculates age-specific blood lead concentrations for children aged between 0 and 7 years. The age group 1-2 years was the most sensitive group in the derivation of these HILs. This is because this age group has a combination of lowest body weight and high hand-to-mouth activity and crawling.

The IEUBK model estimates the intake of lead from soil, dust, water, air and food. Although it is the soil and dust intake which predominates intake of lead from other routes of exposure. The uptake of lead into the blood plasma is controlled by the bioavailability of lead in soil, water and food. NEPM adopt an oral bioavailability of lead in soil of 50% for the derivation of the HILs.

The NEPM (2013) HILs developed using generic land uses are:

1. HIL A - Residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry), also includes childcare centres, preschools and primary schools.
2. HIL B - Residential with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high-rise buildings and apartments.
3. HIL C - Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. This does not include undeveloped public open space where the potential for exposure is lower and where a site-specific assessment may be more appropriate.
4. HIL D - Commercial/industrial, includes premises such as shops, offices, factories and industrial sites.

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HIL A and HIL C may be applicable to the sensitive offsite receptors at the site. HIL D does not consider exposures to child receptors and therefore would not be applicable to the identified sensitive offsite receptors. **Table 10-1** shows the HIL values that are relevant for application to different off-site receptors. **Table 10-2** shows the main exposure parameters used in the IEUBK model for different age groups and its relevance to the off-site receptors. These parameters can be changed in the IEUBK model to produce a more site-specific HIL. However, the input parameters, as discussed, are considered to be relevant and conservative for use without any modification. An exception to this is the railway station carpark, where significant exposures to sensitive receptors are unlikely to occur. For example, soil ingestion rates for children aged 0-7 years would be much lower than those used in the HIL C derivation. This is due to short exposure duration at the carpark and presence of unsealed hardstand areas within the carpark which make the soil profile difficult to penetrate. Furthermore, significant hand-to-mouth activity and crawling within the carpark is not expected. Therefore, exposures for sensitive users of the station is expected to predominantly occur from impacted dust present within the station building.

Table 10-1: Relevant HIL applied to different offsite sensitive receptors

NEPM HIL	Lead (mg/kg)	Rural land east of the northern end of site	Tarago Railway Station	Goulburn Street	Station Masters Cottage	Tarago Public School
HIL A	300		√		√	√
HIL C	600	√		√		

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Table 10-2: HIL exposure parameter values used in HIL derivation and its relevance for exposure of offsite receptors to outdoor dust and soil

Parameter	Units	Child (0-1yrs)	Child (1-2yrs)	Child (2-3yrs)	Child (3-4yrs)	Child (4-5yrs)	Child (5-6yrs)	Child (6-7yrs)	Comments
Time outdoors	hr/d	1	2	3	4	4	4	4	Exposure duration conservative for residents at the cottage and students in primary school. Note HIL-A is based on child 1-2 years, however children older than 5 years are expected be present in primary school. They would be less sensitive than child 1-2yrs.
Time outdoors	hr/d	1	1	1	1	1	1	1	Exposure duration not conservative
Time outdoors	hr/d	1	2	2	2	2	2	2	Exposure duration is relevant and conservative for children frequenting Goulburn Street Time spent walking, running and bike riding on Goulburn Street is likely to be less than that assumed in the HIL C derivation.
Ingestion rate of soil and dust	g/d	0.032	0.1	0.1	0.1	0.1	0.1	0.1	Rate considered relevant for exposures at the cottage and primary school
Ingestion rate of dust	g/d	0.008	0.025	0.025	0.025	0.025	0.025	0.025	Rate only includes dust. However, there is possibility of soil ingestion.
Ingestion rate of soil and dust	g/d	0.016	0.05	0.05	0.05	0.05	0.05	0.05	Rate considered relevant for exposures on Goulburn St

Parameter	Units	Child (0-1yrs)	Child (1-2yrs)	Child (2-3yrs)	Child (3-4yrs)	Child (4-5yrs)	Child (5-6yrs)	Child (6-7yrs)	Comments
Soil/dust lead bioavailability	%	50	50	50	50	50	50	50	Bioavailability of the lead source material was previously measured to be 20% (Ramboll 2019c). HIL value therefore considered conservative.

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10.2 Dust Exposure Scenario and Assessment Criteria

In the absence of Australian guidance, indoor dust guideline values were adopted from US EPA (2020). US EPA (2020) defines the following levels of lead dust as hazardous:

1. 108 µg/m2 and higher for floors including carpeted floors
2. 1,076 µg/m2 and higher for interior windowsills.

The interior lead dust sampling was conducted from the windowsills and therefore the guideline value of 1,076 µg/m^2 was adopted for the assessment. Furthermore, NSW EPA (2003) provides an exterior dust guideline value (which was adopted from US EPA) for window troughs and exterior surfaces (verandahs, paths etc.) as 8,600 µg/m^2. The value for window troughs provided by NSW EPA (2003) is 4,300 µg/m^2. The outdoor dust exposures from verandahs and paths is considered to be similar (and conservative) to exposures that may be experienced while visiting the train station. Therefore, the value of 4,300 µg/m^2 was adopted as being relevant for assessing exposures to sensitive receptors at the station. This value was also adopted for assessing external dust concentrations measured at the Station Masters Cottage and Tarago Public School.

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11. RESULTS

A tabulated assessment of all results against adopted assessment criteria is presented as **Appendix 3**. Summary interpretation is presented in the sub-sections below.

11.1 Assessment of vertical migration of lead in onsite soils

Two soil bores advanced on the western side of the rail formation, inside the corridor and outside the formation, found stratigraphy to comprise silt / sand / gravel (ballast) fill from surface to depths of up to 0.5 mbgl overlying silt / sand / clay consistent with the natural soil profile. On the eastern side of the rail formation one soil bores was advanced and encountered fill to the depth of investigation (0.8 mbgl). An increasing depth of fill from west to east is consistent with regional topography falling to the east and the approximately level rail formation.[2]

Analytical results at each location show decreasing concentrations with depth. Maximum concentrations were observed at HA03 adjacent the east side of the rail formation and the east site boundary where lead at surface was reported at 2100 mg/kg and lead at 0.75 mbgl was reported at 460 mg/kg. This is consistent with lead concentrations decreasing with depth within the rail formation (Ramboll 2019a) and indicates risk associated with soil contamination is likely limited to shallow soils.

Hand auger locations and lead concentrations reported through the soil profile are presented on **Figures 2a – 2c**, **Appendix 1**.

11.2 Shallow Soil Sampling on the Eastern Site Boundary

Lead in shallow soil samples collected from adjacent the northern end of the site was reported at 220 – 360 mg/kg (average 293 mg/kg) and was below the assessment criteria relevant to adjacent rural land (600 mg/kg) at all locations.

Shallow soil sampling locations and reported lead concentrations are presented on **Figures 2a**, **Appendix 1**.

11.3 Tarago Station

Lead in dust samples collected from the Tarago Station Platform was reported at 278 – 2,875 $\mu g/m^2$ (average 1,493 $\mu g/m^2$) and below the adopted assessment criteria (4,300 $\mu g/m^2$) at all locations.

Tarago Station dust sampling locations and results are presented on **Figure 2c**, **Appendix 1**.

11.4 Goulburn Street Soil

Lead in shallow soil samples collected from Goulburn Street was reported at 70 – 880 mg/kg (95% UCL 452.3 mg/kg[3]) and below the adopted assessment criteria (600 mg/kg)[4].

Shallow soil sampling locations on Goulburn Street are presented on **Figures 2c – 2d**, **Appendix 1**.

[2] Localised soils surrounding HA03 also showed signs of significant disturbance associated with underground rail signal trenching.

[3] A 95% UCL calculation is presented in Appendix 3

[4] Noting 95% UCL was calculated to assess represnetativeness of (SS118 where 880 mg/kg lead was reported).

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11.5 The Station Masters Cottage

Shallow soils at the Station Masters Cottage were observed to include fill particularly along the western site boundary where rail ballast and refuse was observed. External paint work was observed to be in poor condition.

Lead in shallow soil samples collected at the Station Masters Cottage was reported between 210 – 1,200 mg/kg and exceeded the adopted assessment criteria (300 mg/kg) at five of six locations. Highest concentrations were observed along the western boundary (SS136 – 1,200 mg/kg and SS137 – 1,100 mg/kg).

Lead concentrations in three external dust samples collected at the Station Masters Cottage were reported between 4,556 – 20,000 $\mu g/m^2$ (average 11,519 $\mu g/m^2$) and exceeded the adopted assessment criteria (4,300 $\mu g/m^2$) at all locations.

Lead concentrations in three internal dust samples collected at the Station Masters Cottage were reported between 588 – 17,788 $\mu g/m^2$ (average 8,900 $\mu g/m^2$) and exceeded the adopted assessment criteria (1,076 $\mu g/m^2$) at all locations.

Lead concentrations in external paint samples collected at the Station Masters Cottage were reported between 0.07 – 16% (average 10.4%). An assessment criterion for lead in paint was not defined however the reported lead concentrations infer external paint at the Station Masters Cottage may contribute to lead in soil and dust at this location.

Shallow soil, internal and external dust and external paint sample locations and analytical results from the Station Masters Cottage are presented on **Figure 3**, **Appendix 1**.

11.6 Tarago Public School

Shallow soils at Tarago Public School were observed to comprise silty fill, though no evidence of rail related construction materials was observed.

Paint work was observed to be in very good condition.

Lead in shallow soil samples collected at Tarago Public School was reported at 17 – 240 mg/kg (average 89 mg/kg) and below the adopted assessment criteria (300 mg/kg) at all locations.

Lead in external dust samples collected at Tarago Public School was reported at 163 – 2,200 $\mu g/m^2$ (average 765 $\mu g/m^2$) and below the adopted assessment criteria (4,300 $\mu g/m^2$) at all locations.

Lead in internal dust samples collected at Tarago Public School was reported at 12 – 49 $\mu g/m^2$ (average 35 $\mu g/m^2$) and below the adopted assessment criteria (1,076 $\mu g/m^2$) at all locations.

Lead in external paint samples collected at Tarago Public School was reported at 0.03 – 1.8% (average 0.49%). An assessment criterion for lead in paint was not defined however the reported lead concentrations and condition of the paint work infer external paints at the school are unlikely to contribute to lead in soil and dust at this location.

Shallow soil, internal and external dust and external paint sample locations and analytical results from Tarago Public School are presented on **Figure 4**, **Appendix 1**.

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12. TIER 1 RISK ASSESSMENT

A tier 1 risk assessment was conducted by comparing measured soil and dust concentrations against adopted guideline values. A threshold approach was used for the assessment where risk quotient (RQ) values were calculated using the following equation:

$$RQ = \frac{Measured\ soil\ or\ dust\ concentration}{Adopted\ guideline\ value} \ldots eq1$$

RQ values > 1 does not imply unacceptable risk but requires further investigations and/or risk management actions. RQ values ≤1 indicates that risks may be low and acceptable.

Although a threshold approach was taken, it is noted that there may be no lower threshold on the effect of lead in blood (NEPM 2013). Outdoor soil concentrations were assessed against relevant NEPM HILs. The NEPM lead HILs were developed using a blood lead goal of <10 µg/dL for 95% of the population. Since the derivation of the HILs, the blood lead goal for the Australian population has been revised. It is now recommended that for blood lead levels greater than 5 µg/dL the sources of exposure should be investigated and reduced particularly for children and pregnant women (NHMRC 2016). The average blood lead level in Australian population is now estimated to be less than 5 µg/dL (NHMRC 2016).

Table 12-1 summarises the calculated RQ values and risks identified from this assessment.

Table 12-1: Maximum soil and dust lead concentrations measured at offsite locations

Site	Sample Type	Units	Maximum Concentration	Adopted Screening Criteria	Criteria Source	Risk Quotient	Risk Conclusion
Tarago Primary School	Soil	mg/kg	240	300	NEPM HIL A	0.8	Risk is low and acceptable
	Dust Interior	µg/m^2	49	1076	USEPA (2020)	0.05	Risk is low and acceptable
	Dust Exterior	µg/m^2	2200	4300	USEPA (2020)	0.5	Risk is low and acceptable
Station Masters Cottage	Soil	mg/kg	1200	300	NEPM HIL A	4	NEPM HIL A exceeded. Further investigation required to assess extent of impacts. Risk mitigation measures to be implemented.
	Dust Interior	µg/m^2	17778	1076	USEPA (2020)	17	Interior dust guideline value exceeded. Further investigation required to assess extent of impacts. Risk

Site	Sample Type	Units	Maximum Concentration	Adopted Screening Criteria	Criteria Source	Risk Quotient	Risk Conclusion
							mitigation measures to be implemented.
	Dust Exterior	µg/m^2	20000	4300	USEPA (2020)	5	No relevant exterior dust guideline available
Tarago Station	Dust	µg/m^2	2875	4300	USEPA (2020)	0.7	Risk is low and acceptable
Goulburn Street	Soil	mg/kg	452.3[1]	600	NEPM HIL C	0.75	Risk is low and acceptable

Note: [1]The 95% UCL of mean lead concentrations reported in Goulbrun Street samples has been adopted in replacement of the maximum concentration.

The following additional advice is provided relating to impacts observed at the Station Masters Cottage:

3. Blood lead levels for receptors at the Station Masters Cottage may be elevated based on the exceedances noted in the tier 1 assessment
4. Potential risks are greatest for sensitive receptors such as babies and children and this has been considered in the risk assessment
5. Outdoor paint lead concentrations at the Station Masters Cottage are high (max 16%), the paint is in poor condition and is likely to be a co-contributor towards the lead observed in dust and soil at this location. Concentrations in soil within close proximity of the Stations Masters Cottage were the highest observed within the rail corridor (184 000 mg/kg at TP4, Ramboll 2019h).
6. It is advisable the short-term exposure to lead contaminated indoor dust, outdoor paint and outdoor dust and soils should be minimised/eliminated especially for any sensitive receptors and blood lead testing as per NHMRC (2016) should be offered to residents to provide definitive evidence of the extent of any health impacts.

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13. CONCEPTUAL SITE MODEL

A Conceptual Site Model (CSM) is a site-specific qualitative description of the source(s) of contamination, the pathway(s) by which contaminants may migrate through the environmental media, and the populations (human 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 in **Table 13-1** as a revision to the preliminary CSM presented in **Section 4.9**.

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Table 13-1: Exposure Pathway Assessment

	Source-Pathway-Receptor Link? (Yes/ No/ Potential (P))								
	Rural land owners / tenants east of the corridor	Users of Tarago Station	Goulburn Street Pedestrians	Station Masters Cottage Tenants	Tarago Public School	Onsite workers	Onsite Ecology	Offsite Ecological Receptors including livestock	Justification
Soil									
Dermal contact with dust/soil	N	N	N	**Y**	N	N	**Y**	**P**	Concentrations in soils exceed onsite assessment criteria however management measures (Ramboll 2019f) adequately mitigate risks to onsite workers. Potential remains for impacts to onsite ecology. Concentrations in soil and / or dust are below assessment criteria at the northern end of site adjacent the eastern site boundary, Taragos Station, Goulburn Street and Tarago Public School. Risks to these receptors are considered low and acceptable. Concentrations in soil and dust (internal and external) at the Station Masters Cottage exceed adopted assessment criteria and risks to the tenants are considered to exist.
Incidental ingestion of dust/soil	N	N	N	**Y**	N	N	**Y**	**P**	
Outdoor dust inhalation	N	N	N	**Y**	N	N	**Y**	**P**	

	Source-Pathway-Receptor Link? (Yes/ No/ Potential (P))								
	Rural land owners / tenants east of the corridor	Users of Tarago Station	Goulburn Street Pedestrians	Station Masters Cottage Tenants	Tarago Public School	Onsite workers	Onsite Ecology	Offsite Ecological Receptors including livestock	Justification
Surface Water									
Dermal Contact	**P**	NA	NA	NA	NA	N	N	**P**	Flow was not observed in any of the drains or culverts present at the site. However, this is likely upon rainfall, which can mobilise contaminated soils into the local waterway where aquatic ecological receptors may become exposed.
Incidental Ingestion	N	NA	NA	NA	NA	N	N	**P**	
Potable Ingestion	N	NA	NA	NA	NA	NA	N	NA	
Irrigation Pathways	N	NA	NA	NA	NA	N	N	**P**	

Y – Yes, N – No, P – Potential, NA – not applicable

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13.1 CSM Data Gaps

Data gaps remain in assessment of potential offsite impacts associated with groundwater and surface water pathways. Assessment of groundwater useage and offsite surface water impacts is currently underway.

Blood lead levels for receptors at the Station Masters Cottage may be elevated based on the exceedances noted in the tier 1 assessment and blood lead testing to provide definitive evidence of the extent of any health impacts is recommended.

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14. CONCLUSIONS AND RECOMMENDATIONS

14.1 Summary of Findings

Ramboll was engaged by JHR to complete assessment and management of lead contamination in the rail corridor and the surrounding environment at Tarago NSW, Australia.

Previous investigations of contamination within the rail corridor was completed to inform risks to workers for the Tarago Rail Loop extension. These investigations identified lead as a primary contaminant of concern in soils. The Tarago Rail Loop extension has now been completed and soils excavated during these works remain stockpiled in a secure stockpile area. Risks for this project will remain until remediation of the retained stockpile is completed though are managed under an Interim Lead Management Plan.

During the Tarago Rail Loop extension it was identified that lead impacted soils could present a potential risk to offsite human health and ecological receptors. Further investigations have therefore been undertaken to address data gaps required to inform assessment of risk to offsite receptors.

The objective of this assessment was to assess potential risks to offsite human health and ecology.

Pathways for contaminant migration were identified as movement of contaminated site soils onto adjacent land, movement of contaminated dust in air to nearby receptors, movement of soluble contaminants in groundwater and movement of soluble contaminants and contaminated soil in surface water.

Sensitive receptors within the surrounding environment with potential to be affected by contaminant migration in soil and/or dust were identified as rural land east of the rail corridor, Tarago Station, pedestrians using Goulburn Street, tenants of the Station Masters Cottage and users of Tarago Public School.

A detailed site history review was completed to inform site sampling. Sampling of dust, soil, paint and surface water was completed at targeted locations to inform a risk assessment.

Key findings of the assessment comprised:

1. Vertical migration of lead through soils appears largely limited to the upper 0.75 mbgl and while elevated lead leachate has been observed, potential for impacts to groundwater from site contamination is considered limited due to the depth to groundwater being in excess of 5.5 mbgl
2. Elevated lead concentrations identified near the northern end of the rail corridor do not appear to extend offsite
3. Risks to users of Tarago Station associated with exposure to lead dust are considered low and acceptable
4. Risks to pedestrians using Goulburn Street associated with exposure to lead in soils are considered low and acceptable
5. Risks to users of the Station Masters Cottage associated with exposure to lead in internal and external dust, and in soil have been identified with co-contribution from lead paint and site dust identified
6. Risks to users of Tarago Public School associated with exposure to lead in internal and external dust, and in soil are considered low and acceptable

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Data gaps remain in assessment of potential offsite impacts associated with groundwater and surface water pathways. Assessment of groundwater useage and offsite surface water impacts is currently underway.

14.2 Recommendations

The assessment conducted in this report identified the potential for lead related adverse effects to receptors at the Station Masters Cottage. Risks of adverse effects to receptors at other locations were considered to be low and acceptable. While the report primarily assessed exposures from impacted soils and dusts, there is potential exposures via surface and groundwater. The following recommendations relate to the identified risks and data gaps:

1. Blood lead levels for receptors at the Station Masters Cottage may be elevated based on the exceedances noted in the tier 1 assessment and therefore:
    1.1. Mitigation measures are required to minimise exposure to lead contaminated dust, paint and soil, especially for sensitive receptors
    1.2. Consider blood lead testing to provide definitive evidence of the extent of any health impacts
2. Undertake further assessment of contaminant migration through groundwater and surface water and associated risks to offsite receptors
3. Remediation of lead impacted soils onsite should be considered to mitigate ongoing risk to tenants of the Station Masters Cottage.

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15. LIMITATIONS

Ramboll Australia Pty Ltd (Ramboll) prepared this report in accordance with the scope of work as outlined in our proposal to JHR dated 12 December 2019 and in accordance with our understanding and interpretation of current regulatory standards.

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

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

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

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

15.1 User Reliance

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

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16. REFERENCES

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

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

Jododex Australia (1976) *Woodlawn Project Environmental Impact Statement.*

McMahon (2015) *Tarago Rail Siding Extension: Preliminary Contaminated Site Assessment, June 2015. DM McMahon Pty Ltd, NSW.*

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

NSW EPA (2003) *Managing Lead Contamination in Home Maintenance, Renovation and Demolition Practices. A Guide for Councils.* NSW Environment Protection Authority.

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

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

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

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

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

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

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

Ramboll (2019h) Tarago Rail Corridor Environmental Site Assessment

SRK Consulting (2015) *Technical report (NI43-101) Preliminary Economic Assessment of the Woodlawn Project, New South Wales, Australia.*

Standards Australia (1998) AS4361.2 Guide to Lead Paint Management Part 2: Residential and Commercial Buildings

Standards Australia (2005) *AS 4482.1-2005 Guide to the investigation and sampling of sites with potentially contaminated soil - Non-volatile and Semi-Volatile Compounds*

US EPA (2009) *Lead Dust Sampling Technician Field Guide*

US EPA (2020) *Protect your family from lead in your home*

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APPENDIX 1
FIGURES

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RAMBOLL AUSTRALIA - GIS MAP file : 318000780_GIS_P007_EnvDataGapAssessment_F008_Locality_V01_23/01/2020

A4
1:8,000

Legend

- Site boundary
- Rail corridor
- Rail corridor fence
- 0.1km chainage point
- Previous sample location (McMahon 2015)
- Goulburn Street level crossing
- Construction compound
- Goods shed exclusion zone

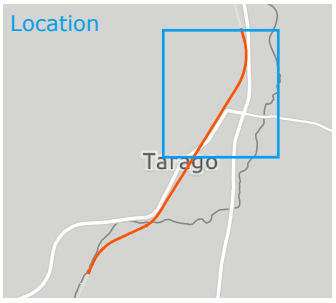
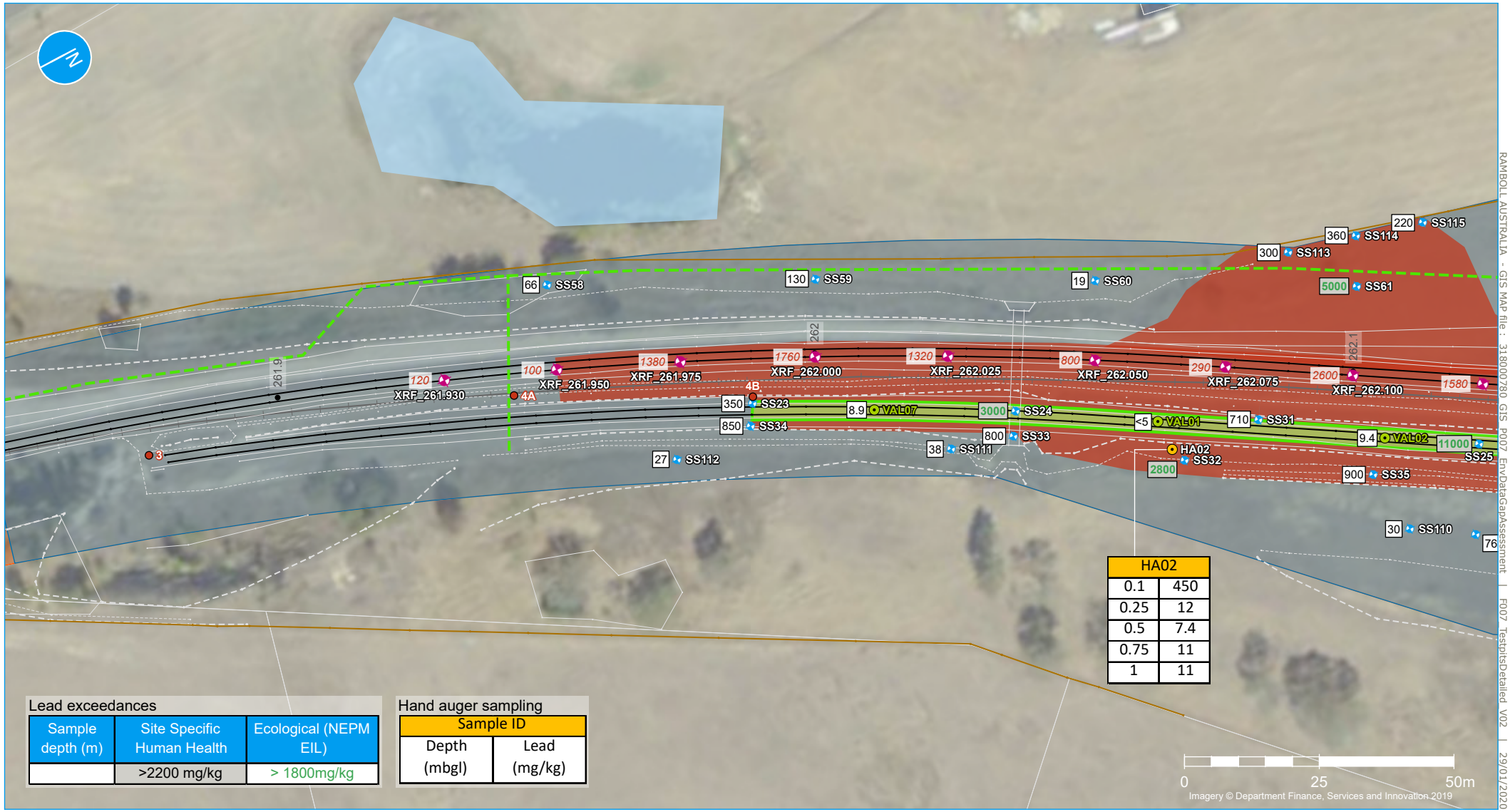


Figure 1 | Tarago Rail Corridor Environmental Site Assessment Locality Plan



HA02

0.1	450
0.25	12
0.5	7.4
0.75	11
1	11

Lead exceedances

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

Hand auger sampling

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

Legend

- Site boundary
- Rail corridor fence
- 0.1km chainage point
- Signal trench (approximate)

Survey lines

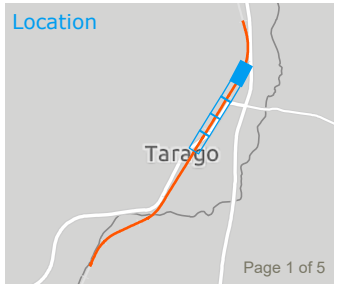
- Rail track
- Top of bank
- Bottom of bank
- Other elements

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

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

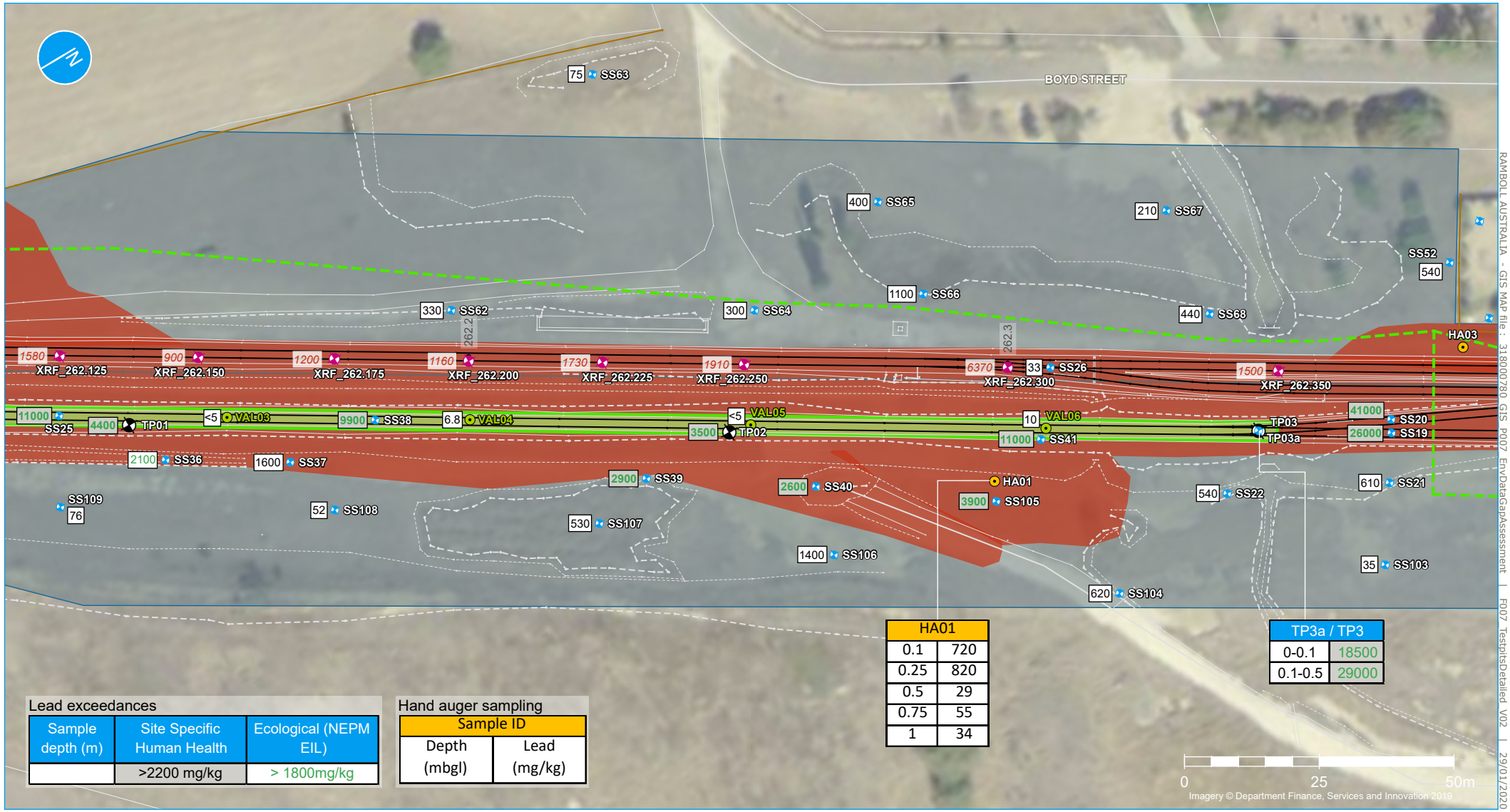
Note: X-Ray fluorescence sampling results were conservatively assessed against a management threshold of 1200 mg/kg Pb to mitigate uncertainty associated with these.

A4
1:1,000



RAMBOLL AUSTRALIA - GIS MAP file : 318000780 GIS P007 EnvDataGapAssessment | F007 TestpitsDetailed V02 | 29/01/2020

Figure 2a | Assessment of Lead in Soil in the Tarago Rail Corridor



HA01	
0.1	720
0.25	820
0.5	29
0.75	55
1	34

TP3a / TP3	
0-0.1	18500
0.1-0.5	29000

Lead exceedances

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

Hand auger sampling

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

Legend

- Site boundary
- Rail corridor fence
- 0.1km chainage point
- Signal trench (approximate)

Survey lines

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

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

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

Note: X-Ray fluorescence sampling results were conservatively assessed against a management threshold of 1200 mg/kg Pb to mitigate uncertainty associated with these.

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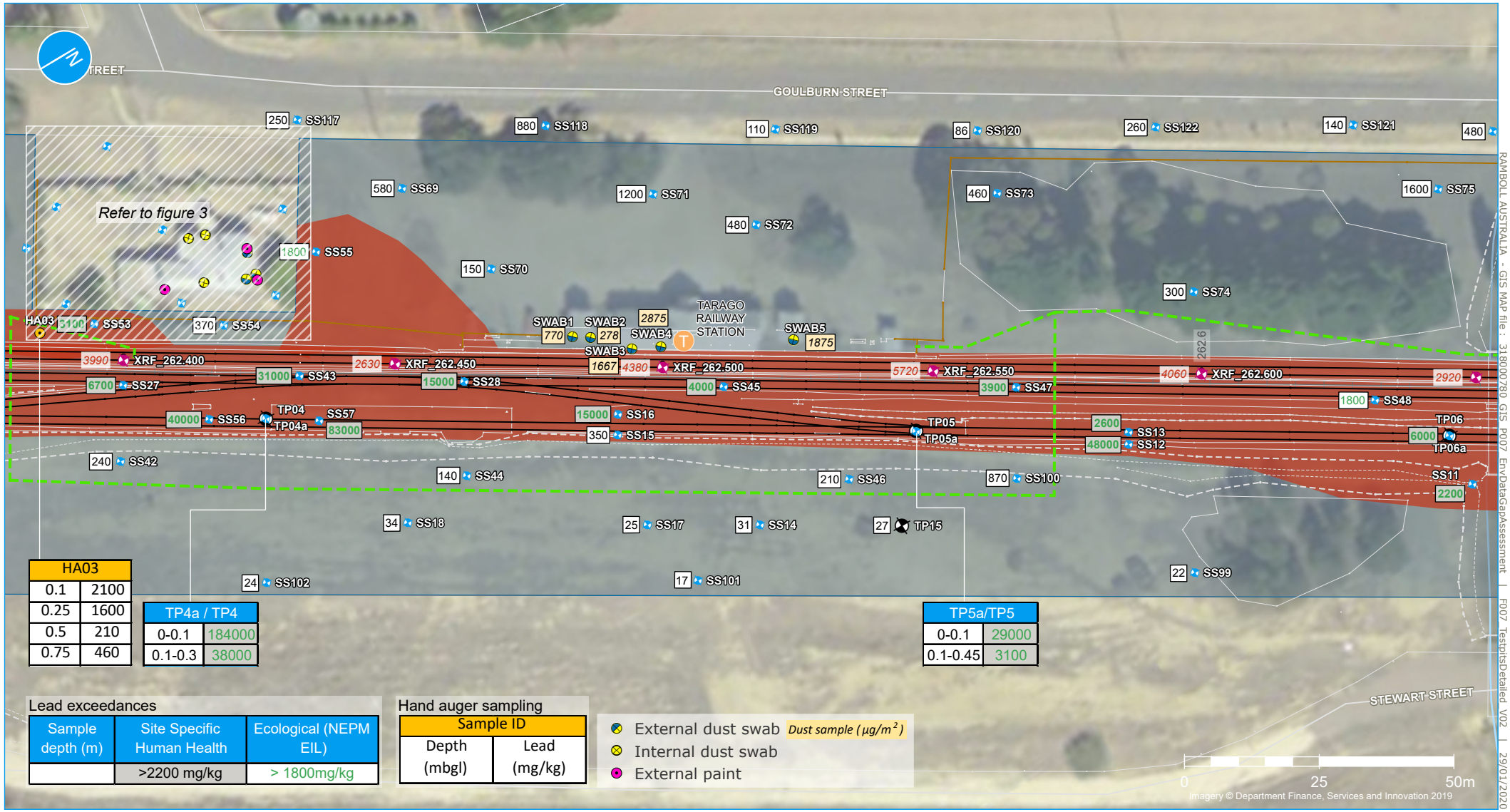
RAMBOLL AUSTRALIA - GIS MAP file : 318000780 GIS P007 EnvDataGapAssessment | F007 TestpitsDetailed V02 | 29/01/2020

Figure 2b | Assessment of Lead in Soil in the Tarago Rail Corridor



Legend

- Site boundary
- Rail corridor fence
- 0.1km chainage point
- Signal trench (approximate)

Survey lines

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

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

Lead impacted area

Note: X-Ray fluorescence sampling results were conservatively assessed against a management threshold of 1200 mg/kg Pb to mitigate uncertainty associated with these.

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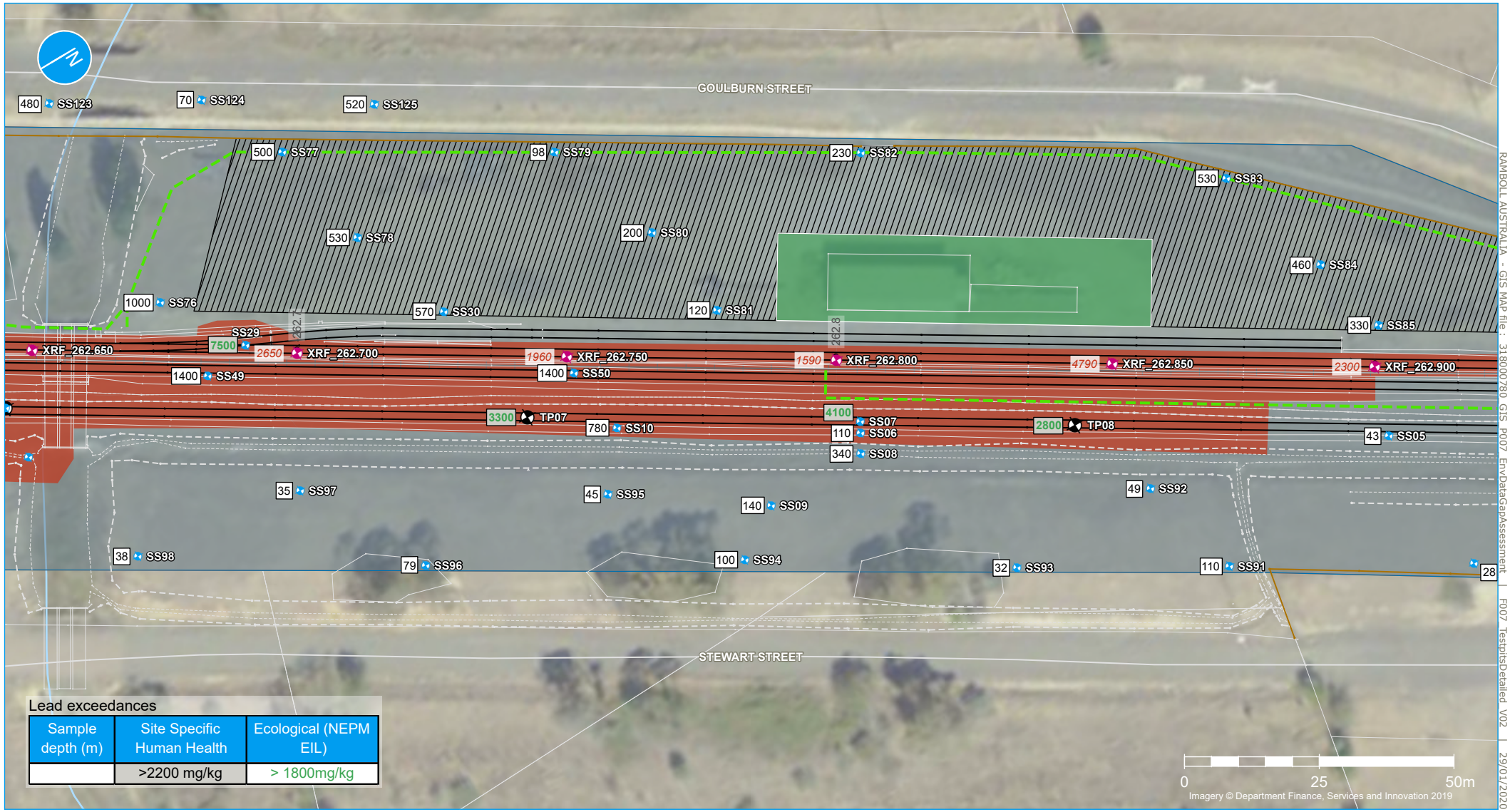
1:1,000

Figure 2c | Assessment of Lead in Soil in the Tarago Rail Corridor



Lead exceedances

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

Legend

- Site boundary
- Rail corridor fence
- 0.1km chainage point
- Signal trench (approximate)
- Construction compound
- Goods shed exclusion zone

Survey lines

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

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

- Lead impacted area

Note: X-Ray fluorescence sampling results were conservatively assessed against a management threshold of 1200 mg/kg Pb to mitigate uncertainty associated with these.

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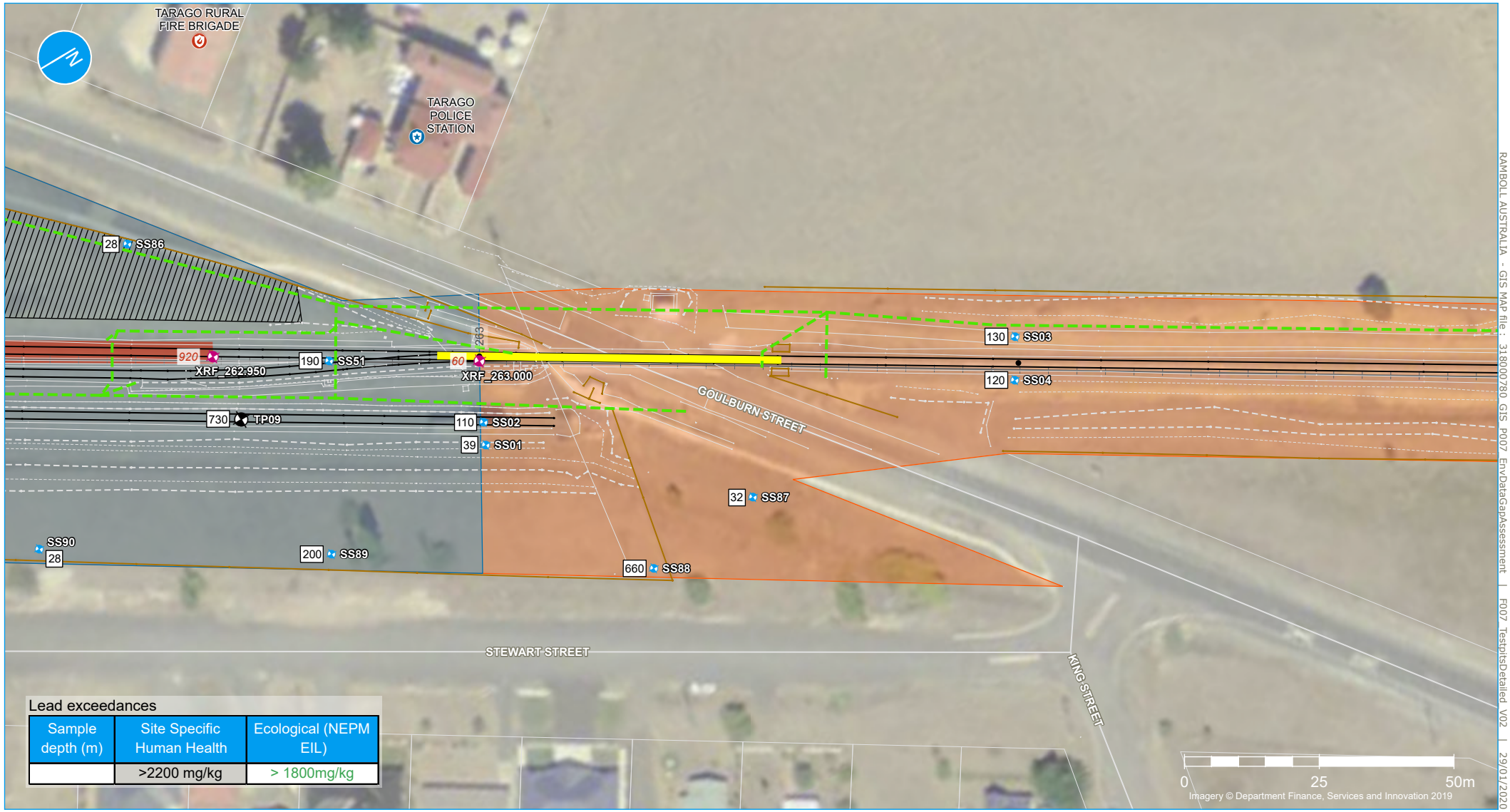
1:1,000

Location

Figure 2d | Assessment of Lead in Soil in the Tarago Rail Corridor

RAMBOLL AUSTRALIA - GIS MAP file : 318000780 GIS P007 EnvDataGapAssessment | F007 TestpitsDetailed V02 | 29/01/2020



RAMBOLL AUSTRALIA - GIS MAP file : 318000780 GIS P007 EnvDataGapAssessment | F007 TestpitsDetailed V02 | 29/01/2020

Legend

- Site boundary
- Rail corridor fence
- 0.1km chainage point
- Goulburn Street level crossing
- Signal trench (approximate)
- Construction compound

Survey lines

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

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

- Lead impacted area

Note: X-Ray fluorescence sampling results were conservatively assessed against a management threshold of 1200 mg/kg Pb to mitigate uncertainty associated with these.

A4
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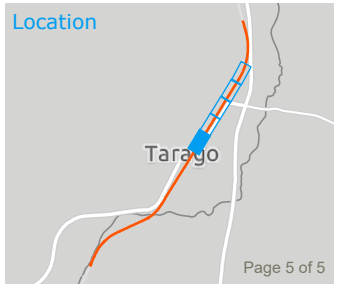
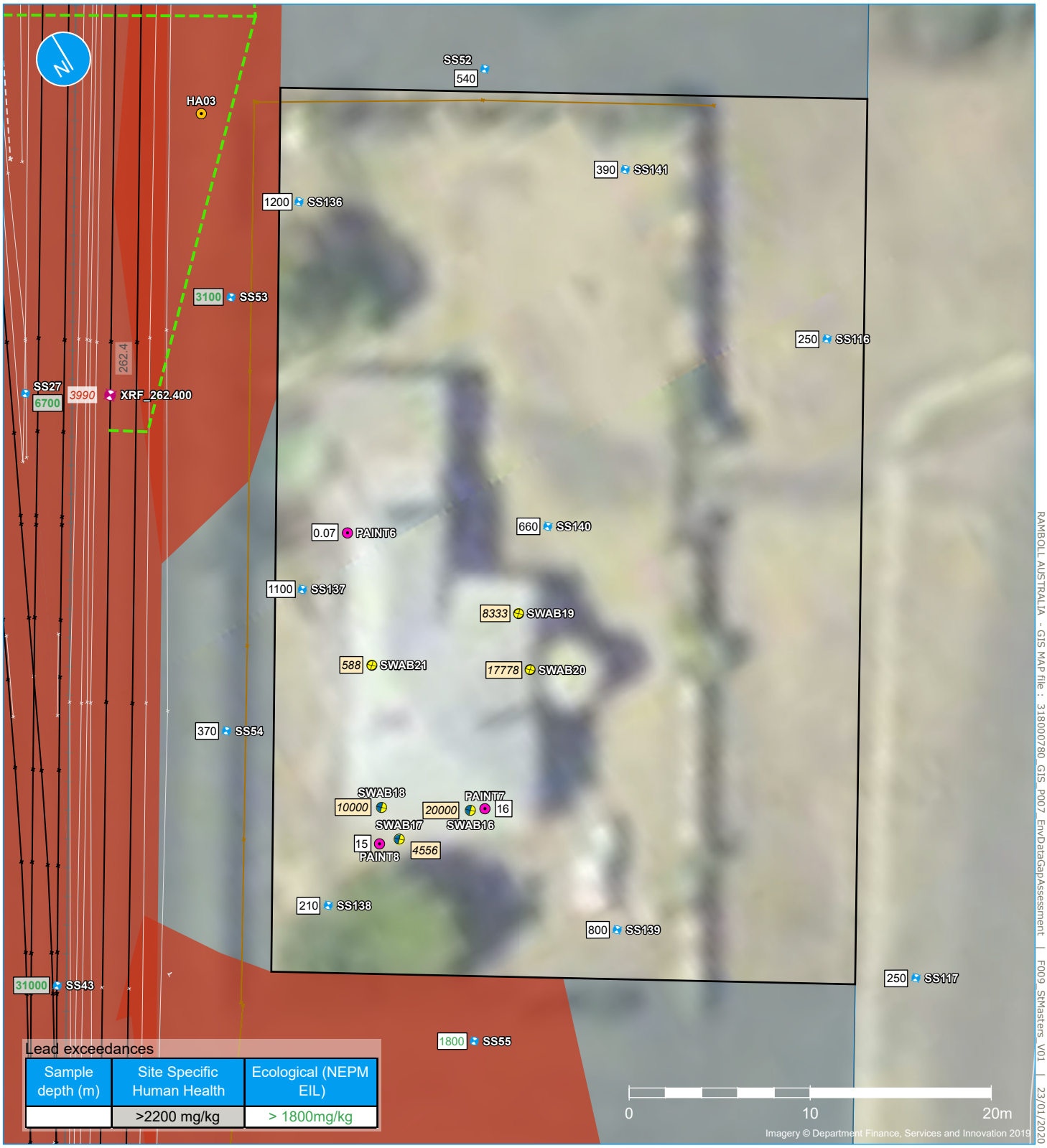


Figure 2e | Assessment of Lead in Soil in the Tarago Rail Corridor



RAMBOLL AUSTRALIA - GIS MAP file : 318000780_GIS_P007_EnvDataGapAssessment | F009_StMasters_V01 | 23/01/2020

A4
1:300

Legend

- Station Master's Cottage site
- Site boundary
- 0.1km chainage point
- Rail corridor fence
- Signal trench (approximate)
- Rail track
- Top of bank
- Other elements
- Lead impacted area

Sampling locations (Ramboll 2019)

- Shallow soil
- Hand auger
- External paint
- External dust swab — *Dust sample ($\mu g/m^2$)*
- Internal dust swab
- X-Ray fluorescence sampling

Figure 3 | Station Master's Cottage Site Features Plan

RAMBOLL AUSTRALIA - GIS MAP file : 318000780_GIS_P007_EnvDataGapAssessment | F010_TaragoPublicSchool_V01 | 23/01/2020

A4
1:900

Legend

Site boundary

Sampling locations (Ramboll 2019)

- Shallow soil
- External paint
- External dust swab — *Dust sample ($\mu g/m^2$)*
- Internal dust swab

Figure 4 | Tarago Public School Site Features Plan

RAMBOLL AUSTRALIA - GIS MAP file : 318000780_GIS_P007_EnvDataGapAssessment_F001_HL_1960_V01_23/01/2020

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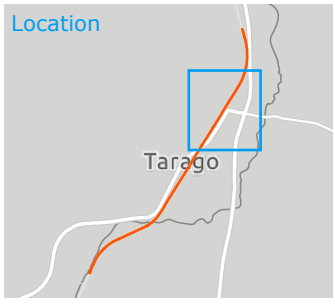

Figure 5 | 1960 Historical Imagery

RAMBOLL AUSTRALIA - GIS MAP file : 318000780_GIS_P007_EnvDataGapAssessment_F002_H1_1976_V01_23/01/2020

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1:5,000

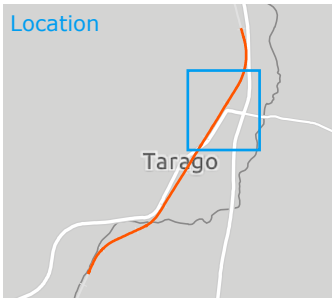

Figure 6 | 1976 Historical Imagery

RAMBOLL AUSTRALIA - GIS MAP file : 318000780_GIS_P007_EnvDataGapAssessment_F003_HI_1985_V01_23/01/2020

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1:5,000

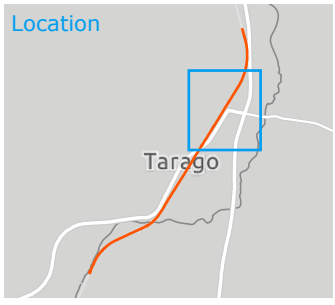

Figure 7 | 1985 Historical Imagery

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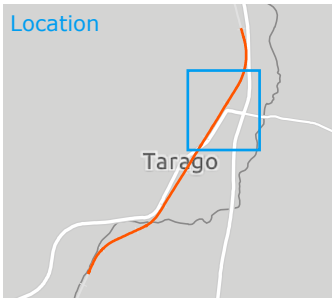

RAMBOLL AUSTRALIA - GIS MAP file : 318000780_GIS_P007_EnvDataGapAssessment_F004_H1_1991_V01_23/01/2020

Figure 8 | 1991 Historical Imagery

RAMBOLL AUSTRALIA - GIS MAP file : 318000780_GIS_P007_EnvDataGapAssessment_F005_H1_1997_V01_23/01/2020

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1:5,000

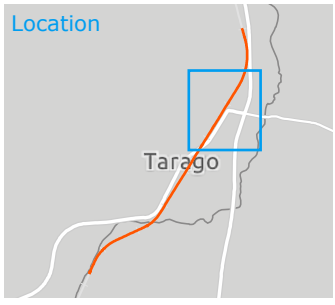
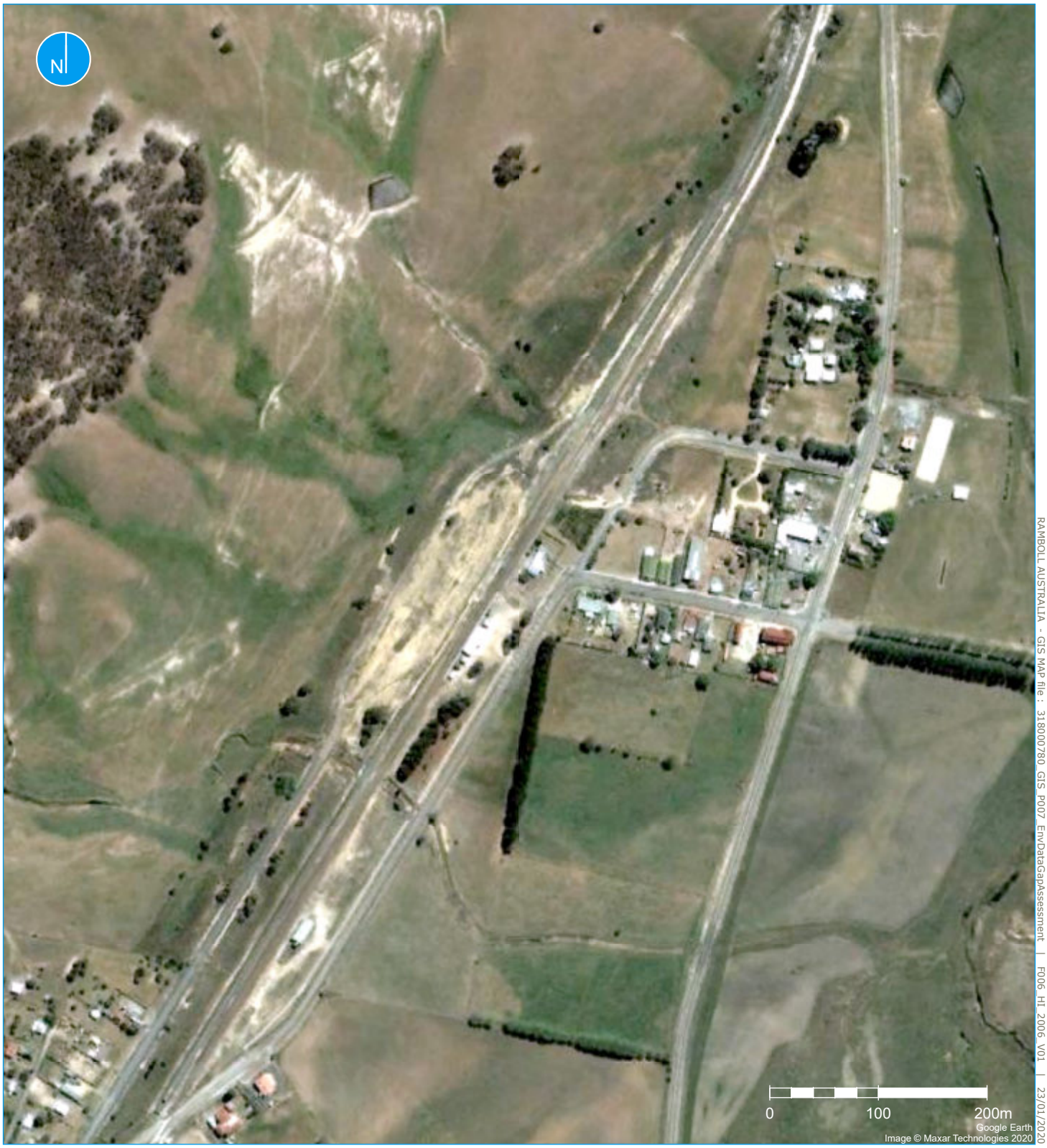


Figure 9 | 1997 Historical Imagery



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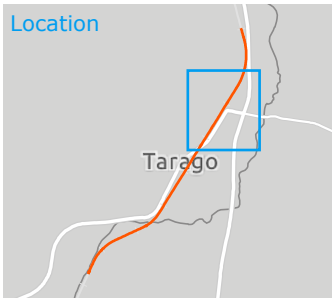

Figure 10 | 2006 Historical Imagery

APPENDIX 2
PHOTOGRAPHIC LOG

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Photo 1: Tarago Rail Corridor facing north. A concrete pad remaining from the historic ore concentrate load out visible on the LHS. The Station Masters Cottage is visible on the RHS (with sheet metal fence).

Photo 2: Soil profile observed at HA02 (west of the rail formation – see **Figure 2a**). Taken 18/12/19.

Photo 3: Eastern rail corridor boundary where lead impacts previously observed. Sampling location for SS61 and SS113 – SS115 (see **Figure 2a**). Taken 18/12/19.

Photo 4: Soil profile and samples collected at SS113. Taken 18/12/19.

Photo 5: Tarago Station platform facing south. Taken 19/12/19.

Photo 6: Tarago Station lead dust sampling location (SWAB3). Taken 19/12/19.

Photo 7: Tarago Station lead dust sampling location (SWAB4). Taken 19/12/19.

Photo 8: Goulburn Street pedestrian pathway facing south. Taken 19/12/19.

Photo 9: Goulburn Street shallow soils (SS120). Taken 19/12/19.

Photo 10: The Station Masters Cottage southern yard facing south-east. The remnant load-out complex slab is demarcated with star pickets beyond the fence. Taken 19/12/19.

Photo 11: Station Masters Cottage shallow soil (SS136). Taken 19/12/19.

Photo 12: Station Masters Cottage external dust sample location (SWAB17) facing west. Taken 19/12/19.

Photo 13: Station Masters Cottage external paint sample (PAINT8). Taken 19/12/19.

Photo 14: Station Masters Cottage internal dust sample location (SWAB19). Taken 19/12/19.

Photo 15: Tarago Public School grounds facing north-west. Taken 19/12/19.

Photo 16: Tarago Public School shallow soil (SS120). Taken 19/12/19.

Photo 17: Tarago Public School external dust (SWAB7). Taken 19/12/19.

Photo 18: Tarago Public School internal dust (SWAB15). Taken 19/12/19.

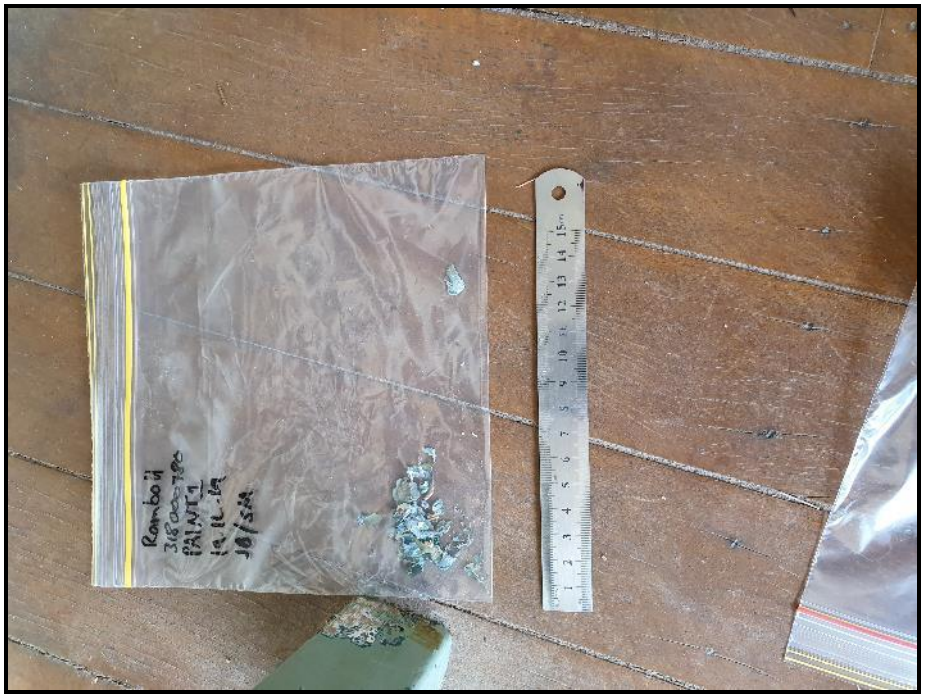

Photo 19: Tarago Public School external paint. Taken 19/12/19.

APPENDIX 3
RESULTS

DRAFT

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Loop Lead Management
30-01-20

Table 1:
Site Soil Sampling Results

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial								
			Sample Type:		**Soil**	**Soil**	**Soil**	**Soil**	**Soil**
			Laboratory Sample number:		S19-De30523	S19-De30524	S19-De30525	S19-De30526	S19-De30527
			Sample date:		18-12-19	18-12-19	18-12-19	18-12-19	18-12-19
			Sample ID:		HA01_0.1	HA01_0.25	HA01_0.5	HA01_0.75	HA01_1.0
			Site:		Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor
			Sampling Method:		Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger
Analyte grouping/Analyte				**Units**	**LOR**					
EG005T: Total Metals by ICP-AES										
Lead	2,200	1,800		mg/kg	5	720	820	29	55	34

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)

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

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Loop Lead Management
30-01-20

Table 1:
Site Soil Sampling Results

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial		Sample Type:	Soil	Soil	Soil	Soil	Soil
				Laboratory Sample number:	S19-De30528	S19-De30529	S19-De30530	S19-De30531	S19-De30532
				Sample date:	18-12-19	18-12-19	18-12-19	18-12-19	18-12-19
				Sample ID:	HA02_0.1	HA02_0.25	HA02_0.5	HA02_0.75	HA02_1.0
				Site:	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor
				Sampling Method:	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger
Analyte grouping/Analyte				**Units**	**LOR**				
EG005T: Total Metals by ICP-AES									
Lead	2,200	1,800		mg/kg	5	450	12	7	11	11

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)

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

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Loop Lead Management
30-01-20

Table 1:
Site Soil Sampling Results

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial							
			Sample Type:		**Soil**	**Soil**	**Soil**	**Soil**	**Soil**
			Laboratory Sample number:		S19-De30533	S19-De30534	S19-De30535	S19-De30536	S19-De30537
			Sample date:		18-12-19	18-12-19	18-12-19	18-12-19	19-12-19
			Sample ID:		HA03_0.1	HA03_0.25	HA03_0.5	HA03_0.75	SS113
			Site:		Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor	Tarago Rail Corridor
			Sampling Method:		Hand Auger	Hand Auger	Hand Auger	Hand Auger	Discrete
Analyte grouping/Analyte				**Units**	**LOR**				
EG005T: Total Metals by ICP-AES									
Lead	2,200	1,800		mg/kg	5	*2,100*	1,600	210	460	300

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)

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

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Loop Lead Management
30-01-20

Table 1:
Site Soil Sampling Results

	HHRA (Ramboll 2019d)	NEPM 2013 EIL Commercial / Industrial		Sample Type:	Soil	Soil
				Laboratory Sample number:	S19-De30538	S19-De30539
				Sample date:	19-12-19	19-12-19
				Sample ID:	SS114	SS115
				Site:	Tarago Rail Corridor	Tarago Rail Corridor
				Sampling Method:	Discrete	Discrete
Analyte grouping/Analyte				**Units**	**LOR**		
EG005T: Total Metals by ICP-AES							
Lead	2,200	1,800		mg/kg	5	360	220

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)

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

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Loop Lead Management
30-01-20

Table 2:
Goulburn Street Soil Sampling Results

	NEPM 2013 HIL C Open Space		**Sample Type:**	**Soil**	**Soil**	**Soil**	**Soil**	**Soil**
			Laboratory Sample numbe	S19-De30540	S19-De30541	S19-De30542	S19-De30543	S19-De30544
			Sample date:	19-12-19	19-12-19	19-12-19	19-12-19	19-12-19
			Sample ID:	SS116	SS117	SS118	SS119	SS120
			Site:	Goulburn St	Goulburn St	Goulburn St	Goulburn St	Goulburn St
			Sampling Method:	Discrete	Discrete	Discrete	Discrete	Discrete
Analyte grouping/Analyte			**Units**	**LOR**				
EG005T: Total Metals by ICP-AES								
Lead	600		mg/kg	5	250	250	**880**	110	86

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)

Concentration in **red** font and grey box exceed the adopted assessment criteria

* indicates higher duplicate value adopted

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Loop Lead Management
30-01-20

Table 2:
Goulburn Street Soil Sampling Results

	NEPM 2013 HIL C Open Space		**Sample Type:**	**Soil**	**Soil**	**Soil**	**Soil**	**Soil**
			Laboratory Sample numbe	S19-De30545	S19-De30546	S19-De30547	S19-De30548	S19-De30549
			Sample date:	19-12-19	19-12-19	19-12-19	19-12-19	19-12-19
			Sample ID:	SS121	SS122	SS123	SS124	SS125
			Site:	Goulburn St	Goulburn St	Goulburn St	Goulburn St	Goulburn St
			Sampling Method:	Discrete	Discrete	Discrete	Discrete	Discrete
Analyte grouping/Analyte			**Units**	**LOR**				
EG005T: Total Metals by ICP-AES								
Lead	600		mg/kg	5	140	260	480	70	520

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)

Concentration in **red** font and grey box exceed the adopted assessment criteria

* indicates higher duplicate value adopted

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Loop Lead Management
30-01-20

Table 3:
Station Masters Cottage Soil Sampling Results

	NEPM 2013 HIL A - Low Density Residential		Sample Type:	Soil	Soil	Soil	Soil	Soil
			Laboratory Sample number:	S19-De30560	S19-De30561	S19-De30562	S19-De30563	S19-De30564
			Sample date:	19-12-19	19-12-19	19-12-19	19-12-19	19-12-19
			Sample ID:	SS136	SS137	SS138	SS139	SS140
			Site:	Station Masters Cottage	Station Masters Cottage	Station Masters Cottage	Station Masters Cottage	Station Masters Cottage
			Sampling Method:	Discrete	Discrete	Discrete	Discrete	Discrete
Analyte grouping/Analyte			**Units**	**LOR**				
EG005T: Total Metals by ICP-AES								
Lead	300		mg/kg	5	**1,200**	**1,100**	210	**800**	**660**

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).

Concentration in **red** font and grey box exceed the adopted assessment criteria

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

* indicates higher duplicate value adopted

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Loop Lead Management
30-01-20

Table 3:
Station Masters Cottage Soil Sampling Results

	NEPM 2013 HIL A - Low Density Residential		Sample Type:	Soil
			Laboratory Sample number:	S19-De30565
			Sample date:	19-12-19
			Sample ID:	SS141
			Site:	Station Masters Cottage
			Sampling Method:	Discrete

Analyte grouping/Analyte		Units	LOR	
EG005T: Total Metals by ICP-AES				
Lead	300	mg/kg	5	**390**

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).

Concentration in **red** font and grey box exceed the adopted assessment criteria

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

* indicates higher duplicate value adopted

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Loop Lead Management
30-01-20

Table 4:
Tarago Public School Soil Sampling Results

	NEPM 2013 HIL A - Low Density Residential								
		Sample Type:			**Soil**	**Soil**	**Soil**	**Soil**	**Soil**
		Laboratory Sample numbe			S19-De30550	S19-De30551	S19-De30552	S19-De30553	S19-De30554
		Sample date:			19-12-19	19-12-19	19-12-19	19-12-19	19-12-19
		Sample ID:			SS126	SS127	SS128	SS129	SS130
		Site:			Tarago Public School	Tarago Public School	Tarago Public School	Tarago Public School	Tarago Public School
		Sampling Method:			Discrete	Discrete	Discrete	Discrete	Discrete
Analyte grouping/Analyte		**Units**	**LOR**						
EG005T: Total Metals by ICP-AES									
Lead	300	mg/kg	5		110	89	39	61	190

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).

Concentration in **red** font and grey box exceed the adopted assessment criteria

* indicates higher duplicate value adopted

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 Loop Lead Management
30-01-20

Table 4:
Tarago Public School Soil Sampling Results

	NEPM 2013 HIL A - Low Density Residential								
		Sample Type:		**Soil**	**Soil**	**Soil**	**Soil**	**Soil**
		Laboratory Sample numbe		S19-De30555	S19-De30556	S19-De30557	S19-De30558	S19-De30559
		Sample date:		19-12-19	19-12-19	19-12-19	19-12-19	19-12-19
		Sample ID:		SS131	SS132	SS133	SS134	SS135
		Site:		Tarago Public School	Tarago Public School	Tarago Public School	Tarago Public School	Tarago Public School
		Sampling Method:		Discrete	Discrete	Discrete	Discrete	Discrete
Analyte grouping/Analyte		**Units**	**LOR**					
EG005T: Total Metals by ICP-AES								
Lead	300	mg/kg	5	240	17	46	42	59

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).

Concentration in **red** font and grey box exceed the adopted assessment criteria

* indicates higher duplicate value adopted

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 Loop Lead Management
30-01-20

Table 5:
Tarago Station Dust Swab Sampling Results

	NSW EPA (2003)		**Sample Type:**		**SWAB**	**SWAB**	**SWAB**	**SWAB**	**SWAB**
			Laboratory Sample number:		S19-De30566	S19-De30567	S19-De30568	S19-De30569	S19-De30570
			Sample date:		19-12-19	19-12-19	19-12-19	19-12-19	19-12-19
			Sample ID:		SWAB1	SWAB2	SWAB3	SWAB4	SWAB5
			Site:		Tarago Station	Tarago Station	Tarago Station	Tarago Station	Tarago Station
			Sampling Method:		Grid Swab	Grid Swab	Grid Swab	Grid Swab	Grid Swab
Analyte grouping/Analyte			**Units**	**LOR**					
E022.5 -: Acid Extractable metals in paint by ICP-AES									
Total Lead			µg	1	52	25	150	230	150
Surface Area			m²	--	0.0675	0.09	0.09	0.08	0.08
Lead	4,300		µg/m²	--	770	278	1667	2875	1875

Blank Cell indicates no criterion available

LOR = Limit of Reporting

Concentration in **red** font and grey box exceed the adopted criteria

NSW EPA (2003) Managing Lead Contamination in Home Maintenance, Renovation and Demolition Practices. A Guide for Councils. NSW Environment Protection Authority.

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Loop Lead Management
30-01-20

Table 6:
Station Masters Cottage Dust Swab Sampling Results

	NSW EPA (2003)	US EPA (2020)								
				Sample Type:			**SWAB**	**SWAB**	**SWAB**	**SWAB**
				Laboratory Sample number:			S19-De30581	S19-De30582	S19-De30583	S19-De30584
				Sample date:			19-12-19	19-12-19	19-12-19	19-12-19
				Sample ID:			SWAB16	SWAB17	SWAB18	SWAB19
				Site:			Station Masters Cottage Exterior	Station Masters Cottage Exterior	Station Masters Cottage Exterior	Station Masters Cottage Interior
				Sampling Method:			Grid Swab	Grid Swab	Grid Swab	Grid Swab
Analyte grouping/Analyte				**Units**	**LOR**					
External Dust										
E022.5 -: Acid Extractable metals in paint by ICP-AES										
Total Lead	--	--		µg	1		1200	410	900	--
Surface Area	--	--		m²	--		0.06	0.09	0.09	--
Lead	4,300			µg/m²	--		**20000**	**4556**	**10000**	--
Internal Dust										
paint by ICP-AES										
Total Lead	--	--		µg	1		--	--	--	750
Surface Area	--	--		m²	--		--	--	--	0.09
Lead	NA	1,076		µg/m²	--		--	--	--	**8333**

Blank Cell indicates no criterion available

LOR = Limit of Reporting

Concentration in **red** font and grey box exceed the adopted criteria

Concentrations in box exceed the screening value >2.5 times

NSW EPA (2003) Managing Lead Contamination in Home Maintenance, Renovation and Demolition Practices. A Guide for Councils. NSW Environment Protection Authority.

US EPA (2020) Protect your family from lead in your home

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Loop Lead Management
30-01-20

Table 6:
Station Masters Cottage Dust Swab Sampling Results

	NSW EPA (2003)	US EPA (2020)					SWAB	SWAB
				Sample Type:			**SWAB**	**SWAB**
				Laboratory Sample number:			S19-De30585	S19-De30586
				Sample date:			19-12-19	19-12-19
				Sample ID:			SWAB20	SWAB21
				Site:			Station Masters Cottage Interior	Station Masters Cottage Interior
				Sampling Method:			Grid Swab	Grid Swab
Analyte grouping/Analyte				**Units**	**LOR**			
External Dust								
E022.5 -: Acid Extractable metals in paint by ICP-AES								
Total Lead	--	--		µg	1		--	--
Surface Area	--	--		m²	--		--	--
Lead	4,300			µg/m²	--		--	--
Internal Dust								
paint by ICP-AES								
Total Lead	--	--		µg	1		1600	47
Surface Area	--	--		m²	--		0.09	0.08
Lead	NA	1,076		µg/m²	--		**17778**	**588**

Blank Cell indicates no criterion available

LOR = Limit of Reporting

Concentration in **red** font and grey box exceed the adopted criteria

Concentrations in box exceed the screening value >2.5 times

NSW EPA (2003) Managing Lead Contamination in Home Maintenance, Renovation and Demolition Practices. A Guide for Councils. NSW Environment Protection Authority.

US EPA (2020) Protect your family from lead in your home

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Loop Lead Management
30-01-20

Table 7:
Tarago Public School Dust Swab Sampling Results

	NSW EPA (2003)	US EPA (2020)		Sample Type:		SWAB	SWAB	SWAB	SWAB
				Laboratory Sample number:		S19-De30571	S19-De30572	S19-De30573	S19-De30574
				Sample date:		19-12-19	19-12-19	19-12-19	19-12-19
				Sample ID:		SWAB6	SWAB7	SWAB8	SWAB9
				Site:		Tarago P.S. Exterior	Tarago P.S. Exterior	Tarago P.S. Exterior	Tarago P.S. Exterior
				Sampling Method:		Grid Swab	Grid Swab	Grid Swab	Grid Swab

Analyte grouping/Analyte	Units	LOR

External

E022.5 -: Acid Extractable metals in paint by ICP-AES										
Total Lead	--	--		µg	1		13	24	110	29
Surface Area	--	--		m²	--		0.08	0.09	0.05	0.09
Lead	4,300			µg/m²	--		163	267	2200	322

Internal

E022.5 -: Acid Extractable metals in paint by ICP-AES										
Total Lead	--	--		µg	1		--	--	--	--
Surface Area	--	--		m²	--		--	--	--	--
Lead	NA	1,076		µg/m²	--		--	--	--	--

Blank Cell indicates no criterion available

LOR = Limit of Reporting

Concentration in **red** font and grey box exceed the adopted criteria

Concentrations in box exceed the screening value >2.5 times

NSW EPA (2003) Managing Lead Contamination in Home Maintenance, Renovation and Demolition Practices. A Guide for Councils. NSW Environment Protection Authority.

US EPA (2020) Protect your family from lead in your home

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Loop Lead Management
30-01-20

Table 7:
Tarago Public School Dust Swab Sampling Results

	NSW EPA (2003)	US EPA (2020)		Sample Type:		SWAB	SWAB	SWAB	SWAB
				Laboratory Sample number:		S19-De30575	S19-De30576	S19-De30577	S19-De30578
				Sample date:		19-12-19	19-12-19	19-12-19	19-12-19
				Sample ID:		SWAB10	SWAB11	SWAB12	SWAB13
				Site:		Tarago P.S. Exterior	Tarago P.S. Interior	Tarago P.S. Interior	Tarago P.S. Interior
				Sampling Method:		Grid Swab	Grid Swab	Grid Swab	Grid Swab

Analyte grouping/Analyte	Units	LOR

External

E022.5 -: Acid Extractable metals in paint by ICP-AES										
Total Lead	--	--		µg	1		70	--	--	--
Surface Area	--	--		m²	--		0.08	--	--	--
Lead	4,300			µg/m²	--		875	--	--	--

Internal

E022.5 -: Acid Extractable metals in paint by ICP-AES										
Total Lead	--	--		µg	1		--	4	4	3
Surface Area	--	--		m²	--		--	0.09	0.075	0.09
Lead	NA	1,076		µg/m²	--		--	44	49	37

Blank Cell indicates no criterion available

LOR = Limit of Reporting

Concentration in **red** font and grey box exceed the adopted criteria

Concentrations in box exceed the screening value >2.5 times

NSW EPA (2003) Managing Lead Contamination in Home Maintenance, Renovation and Demolition Practices. A Guide for Councils. NSW Environment Protection Authority.

US EPA (2020) Protect your family from lead in your home

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Loop Lead Management
30-01-20

Table 7:
Tarago Public School Dust Swab Sampling Results

	NSW EPA (2003)	US EPA (2020)					SWAB	SWAB
				Sample Type:			**SWAB**	**SWAB**
				Laboratory Sample number:			S19-De30579	S19-De30580
				Sample date:			19-12-19	19-12-19
				Sample ID:			SWAB14	SWAB15
				Site:			Tarago P.S. Interior	Tarago P.S. Interior
				Sampling Method:			Grid Swab	Grid Swab
Analyte grouping/Analyte				**Units**	**LOR**			
External								
E022.5 -: Acid Extractable metals in paint by ICP-AES								
Total Lead	--	--		µg	1		--	--
Surface Area	--	--		m²	--		--	--
Lead	4,300			µg/m²	--		--	--
Internal								
E022.5 -: Acid Extractable metals in paint by ICP-AES								
Total Lead	--	--		µg	1		3	1
Surface Area	--	--		m²	--		0.09	0.09
Lead	NA	1,076		µg/m²	--		31	12

Blank Cell indicates no criterion available

LOR = Limit of Reporting

Concentration in **red** font and grey box exceed the adopted criteria

Concentrations in box exceed the screening value >2.5 times

NSW EPA (2003) Managing Lead Contamination in Home Maintenance, Renovation and Demolition Practices. A Guide for Councils. NSW Environment Protection Authority.

US EPA (2020) Protect your family from lead in your home

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Loop Lead Management
30-01-20

Table 8:
Paint Resu

		Sample Type:			**Paint**	**Paint**	**Paint**	**Paint**
		Laboratory Sample number:			S19-De30587	S19-De30588	S19-De30589	S19-De30590
		Sample date:			19-12-19	19-12-19	19-12-19	19-12-19
		Sample ID:			PAINT1	PAINT2	PAINT3	PAINT4
		Site:			Tarago P.S.	Tarago P.S.	Tarago P.S.	Tarago P.S.
		Sampling Method:			Grab Sample	Grab Sample	Grab Sample	Grab Sample
Analyte grouping/Analyt		**Units**	**LOR**					
Extractable metals in paint by ICP-AES								
Lead		%	0.01		0.09	0.25	1.8	0.29

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Loop Lead Management
30-01-20

Table 8:
Paint Resu

		Sample Type:			**Paint**	**Paint**	**Paint**	**Paint**
		Laboratory Sample number:			S19-De30591	S19-De30592	S19-De30593	S19-De30594
		Sample date:			19-12-19	19-12-19	19-12-19	19-12-19
		Sample ID:			PAINT5	PAINT6	PAINT7	PAINT8
		Site:			Tarago P.S.	Station Masters Cottage	Station Masters Cottage	Station Masters Cottage
		Sampling Method:			Grab Sample	Grab Sample	Grab Sample	Grab Sample
Analyte grouping/Analyt		**Units**	**LOR**					
Extractable metals in paint by ICP-AES								
Lead		%	0.01		0.03	0.07	16	15

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Loop Lead Management
30-01-20

Table 9:
Soil Duplicate Results

	Laboratory Sample number:		S19-De30537	S19-De30595	RPD (%)	S19-De30537	233720-1	RPD (%)
	Sample date:		19-12-19	19-12-19		19-12-19	19-12-19	
	Sample ID:		SS113	D01_191219		SS113	T01_191219	
	Project Name:		Tarago Lead Managament	Tarago Lead Managament		Tarago Lead Managament	Tarago Lead Managament	
	Sample Type:		Primary	Duplicate		Primary	Triplicate	
Total Metals by ICP-AES								
Lead	mg/kg	5	300	320	6.5	300	260	14.3

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Loop Lead Management
30-01-20

Table 9:
Soil Duplicate Results

S19-De30544	S19-De30596		S19-De30544	233720-2		S19-De30560	S19-De30597	
19-12-19	19-12-19		19-12-19	19-12-19		19-12-19	19-12-19	
SS120	D02_191219	RPD (%)	SS120	T02_191219	RPD (%)	SS136	D03_191219	RPD (%)
Tarago Lead Managament	Tarago Lead Managament		Tarago Lead Managament	Tarago Lead Managament		Tarago Lead Managament	Tarago Lead Managament	
Primary	Duplicate		Primary	Triplicate		Primary	Duplicate	
86	98	13.0	86	85	1.2	1200	1100	8.7

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Loop Lead Management
30-01-20

Table 9:
Soil Duplicate Results

S19-De30560	233720-3	RPD (%)	S19-De30598	S19-De30599
19-12-19	19-12-19		19-12-19	19-12-19
SS136	T03_191219		QA1	QA2
Tarago Lead Managament	Tarago Lead Managament		Tarago Lead Managament	Tarago Lead Managament
Primary	Triplicate		Field Blank	2nd Swab
1200	1400	15.4	<1	1.2

Client: John Holland Rail
Job No: 318000780
Project Name: Tarago Loop Lead Management
30-01-20

Table 10:
Dust QC Sample Results

	Laboratory Sample number:			S19-De30598	S19-De30599
	Sample date:			19-12-19	19-12-19
	Sample ID:			QA1	QA2
	Project Name:			Tarago Lead Managament	Tarago Lead Managament
	Sample Type:			Field Blank	2nd Swab
Total Metals by ICP-AES					
Lead	µg	5		<1	1.2

APPENDIX 4
LABORATORY REPORTS

DRAFT

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Melbourne
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Site # 1254 & 14271

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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 name:	318000780
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Dec 20, 2019 11:00 AM
Eurofins reference:	**694957**

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).

Notes

T01_191219, T02_191219, T03_191219 forwarded to ENVIROLAB.

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.

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Company Name: Ramboll Australia Pty Ltd
Address: Level 3/100 Pacific Highway
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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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									
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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Project Name: 318000780

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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									
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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Project Name: 318000780

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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									
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

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 **694957-A**
Project name 318000780
Received Date Dec 20, 2019

Client Sample ID			**SWAB1**	**SWAB2**	**SWAB3**	**SWAB4**
Sample Matrix			**Wipes**	**Wipes**	**Wipes**	**Wipes**
Eurofins Sample No.			**S19-De30566**	**S19-De30567**	**S19-De30568**	**S19-De30569**
Date Sampled			**Dec 19, 2019**	**Dec 19, 2019**	**Dec 19, 2019**	**Dec 19, 2019**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	1	Total ug	52	25	150	230

Client Sample ID			**SWAB5**	**SWAB6**	**SWAB7**	**SWAB8**
Sample Matrix			**Wipes**	**Wipes**	**Wipes**	**Wipes**
Eurofins Sample No.			**S19-De30570**	**S19-De30571**	**S19-De30572**	**S19-De30573**
Date Sampled			**Dec 19, 2019**	**Dec 19, 2019**	**Dec 19, 2019**	**Dec 19, 2019**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	1	Total ug	150	13	24	110

Client Sample ID			**SWAB9**	**SWAB10**	**SWAB11**	**SWAB12**
Sample Matrix			**Wipes**	**Wipes**	**Wipes**	**Wipes**
Eurofins Sample No.			**S19-De30574**	**S19-De30575**	**S19-De30576**	**S19-De30577**
Date Sampled			**Dec 19, 2019**	**Dec 19, 2019**	**Dec 19, 2019**	**Dec 19, 2019**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	1	Total ug	29	70	4.0	3.7

Client Sample ID			**SWAB13**	**SWAB14**	**SWAB15**	**SWAB16**
Sample Matrix			**Wipes**	**Wipes**	**Wipes**	**Wipes**
Eurofins Sample No.			**S19-De30578**	**S19-De30579**	**S19-De30580**	**S19-De30581**
Date Sampled			**Dec 19, 2019**	**Dec 19, 2019**	**Dec 19, 2019**	**Dec 19, 2019**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	1	Total ug	3.3	2.8	1.1	1200

Client Sample ID			SWAB17	SWAB18	SWAB19	SWAB20
Sample Matrix			Wipes	Wipes	Wipes	Wipes
Eurofins Sample No.			S19-De30582	S19-De30583	S19-De30584	S19-De30585
Date Sampled			Dec 19, 2019	Dec 19, 2019	Dec 19, 2019	Dec 19, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	1	Total ug	410	900	750	1600

Client Sample ID			SWAB21	QA1	QA2
Sample Matrix			Wipes	Wipes	Wipes
Eurofins Sample No.			S19-De30586	S19-De30598	S19-De30599
Date Sampled			Dec 19, 2019	Dec 19, 2019	Dec 19, 2019
Test/Reference	LOR	Unit			
Heavy Metals					
Lead	1	Total ug	47	< 1	1.2

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Sydney	Dec 23, 2019	180 Days

- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS

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Australia

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Site # 1254 & 14271

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Company Name: Ramboll Australia Pty Ltd
Address: Level 3/100 Pacific Highway
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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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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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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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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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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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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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

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

Comments

Sample Integrity

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

Authorised By

Andrew Black	Analytical Services Manager
Gabriele Cordero	Senior Analyst-Metal (NSW)

Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

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

Measurement uncertainty of test data is available on request or please click here.

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Ramboll Environ Australia Pty Ltd
Level 3/100 Pacific Highway
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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 **694957-S**
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				
% Moisture	1	%	2.2	7.0	18	17
Heavy Metals						
Lead	5	mg/kg	720	820	29	55

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				
% Moisture	1	%	15	2.3	13	10
Heavy Metals						
Lead	5	mg/kg	34	450	12	7.4

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				
% Moisture	1	%	14	13	4.2	8.0
Heavy Metals						
Lead	5	mg/kg	11	11	2100	1600

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				
% Moisture	1	%	11	12	3.5	2.2
Heavy Metals						
Lead	5	mg/kg	210	460	300	360

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				
% Moisture	1	%	3.4	< 1	3.1	2.3
Heavy Metals						
Lead	5	mg/kg	220	250	250	880

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				
% Moisture	1	%	3.4	3.0	1.1	2.3
Heavy Metals						
Lead	5	mg/kg	110	86	140	260

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				
% Moisture	1	%	1.2	3.9	2.6	2.4
Heavy Metals						
Lead	5	mg/kg	480	70	520	110

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				
% Moisture	1	%	3.6	2.5	3.2	1.1
Heavy Metals						
Lead	5	mg/kg	89	39	61	190

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				
% Moisture	1	%	1.3	< 1	< 1	1.0
Heavy Metals						
Lead	5	mg/kg	240	17	46	42

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				
% Moisture	1	%	3.2	2.1	< 1	1.1
Heavy Metals						
Lead	5	mg/kg	59	1200	1100	210

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				
Lead (% w/w)	0.01	%	-	-	-	0.09
% Moisture	1	%	1.1	1.6	1.5	-
Heavy Metals						
Lead	5	mg/kg	800	660	390	-

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				
Lead (% w/w)	0.01	%	0.07	16	15	-
% Moisture	1	%	-	-	-	3.5
Heavy Metals						
Lead	5	mg/kg	-	-	-	320

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		
% Moisture	1	%	2.6	2.6
Heavy Metals				
Lead	5	mg/kg	98	1100

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
Lead (% w/w)	Sydney	Dec 23, 2019	6 Month
- Method: E022.5 - ACID EXTRACTABLE METALS IN PAINT IN LIQUID AND POWDERED FORM BY ICP-MS ANALYSIS			
Heavy Metals	Melbourne	Dec 30, 2019	180 Days
- 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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Company Name: Ramboll Australia Pty Ltd
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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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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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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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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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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

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			%	117			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	S19-De30544	CP	%	91			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-De30523	CP	mg/kg	720	650	11	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S19-De30524	CP	mg/kg	820	830	1.0	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			
Lead	S19-De30533	CP	mg/kg	2100	1900	5.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S19-De30534	CP	mg/kg	1600	1600	1.0	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			
Lead	S19-De30553	CP	mg/kg	61	64	6.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S19-De30554	CP	mg/kg	190	190	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			
Lead	S19-De30563	CP	mg/kg	800	790	2.0	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S19-De30564	CP	mg/kg	660	670	2.0	30%	Pass	

Comments

Sample Integrity

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

Authorised By

Andrew Black	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
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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Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 233720

Client Details

Client	Ramboll Australia Pty Ltd
Attention	Steve Maxwell
Address	PO Box 560, North Sydney, NSW, 2060

Sample Details

Your Reference	**318000780**
Number of Samples	3 Soil
Date samples received	23/12/2019
Date completed instructions received	06/01/2020

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	13/01/2020
Date of Issue	09/01/2020

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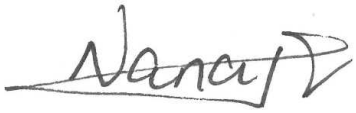
Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Jaimie Loa-Kum-Cheung, Metals Supervisor
Loren Bardwell, Senior Chemist

Authorised By



Nancy Zhang, Laboratory Manager

Acid Extractable metals in soil				
Our Reference		233720-1	233720-2	233720-3
Your Reference	UNITS	T01_191219	T02_191219	T03_191219
Date Sampled		19/12/2019	19/12/2019	19/12/2019
Type of sample		Soil	Soil	Soil
Date prepared	-	07/01/2020	07/01/2020	07/01/2020
Date analysed	-	07/01/2020	07/01/2020	07/01/2020
Lead	mg/kg	260	85	1,400

Moisture				
Our Reference		233720-1	233720-2	233720-3
Your Reference	UNITS	T01_191219	T02_191219	T03_191219
Date Sampled		19/12/2019	19/12/2019	19/12/2019
Type of sample		Soil	Soil	Soil
Date prepared	-	07/01/2020	07/01/2020	07/01/2020
Date analysed	-	08/01/2020	08/01/2020	08/01/2020
Moisture	%	3.4	3.1	2.5

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date prepared	-			07/01/2020	1	07/01/2020	07/01/2020		07/01/2020	[NT]
Date analysed	-			07/01/2020	1	07/01/2020	07/01/2020		07/01/2020	[NT]
Lead	mg/kg	1	Metals-020	<1	1	260	260	0	122	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

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 No	318000760	Project Manager	Stephen Maxwell
Address	50 Glebe Road the Junction	Project Name		EDD Format (ESdat, EQuIS, Custom)	Excel and PDF
Contact Name	Stephen Maxwell			Sampler(s)	SM and JB
Phone No	0478 658 194			Handed over by	Stephen Maxwell
Special Directions				Email for Invoice	smaxwell@ramboll.com asiapac-accounts@ramboll.com
Purchase Order				Email for Results	smaxwell@ramboll.com cgoodbody@ramboll.com
Quote ID No	180813RAMN_1				

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

Containers

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

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

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	Lead	Trace Lead	1L Plastic	250mL Plastic	125mL Amber Glass	200mL VOA vial	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	PAINT7	19/12/19	S	X								1		
2	PAINT8	19/12/19	S	X								1		
3	D01_191219	19/12/19	S	X								1		
4	D02_191219	19/12/19	S	X								1		
5	D03_191219	19/12/19	S	X								1		
6	T01_191219	19/12/19	S									1		Please send to envirolab for analysis
7	T02_191219	19/12/19	S									1		Please send to envirolab for analysis
8	T03_191219	19/12/19	S									1		Please send to envirolab for analysis
9	QA1	19/12/19	S		X							1		
10	QA2	19/12/19	S		X							1		
	Total Counts			5	2							6	4	

ENVIROLAB

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 233720
Date Received: 23/12/19
Time Received: 11:20
Received by:
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

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

Eurofins | mgt Laboratory Use Only	Received By		SYD BNE MEL PER ADL NTL DRW	Signature		Date	23/12/19	Time	11:20AM	Temperature	24.1°C
	Received By		SYD BNE MEL PER ADL NTL DRW	Signature		Date	23/12/19	Time	11:20AM	Report No	

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | mgt Standard Terms and Conditions unless agreed otherwise. A copy of Eurofins | mgt Standard Terms and Conditions is available on request.

Eurofins Environment Testing Australia Pty Ltd trading as Eurofins | mgt

CS3009_R7 Modified by: Dr. R Symons Approved by: T. Lakeland Approved on: 17 August 2017

Andrew (Fitzy) Fitzsimons

From: Stephen Maxwell <SMAXWELL@ramboll.com>
Sent: Monday, 6 January 2020 9:15 AM
To: Andrew (Fitzy) Fitzsimons
Subject: RE: 318000780 (233720)

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Andrew

Please analyse for lead.

Kind regards
Stephen Maxwell
Lead Consultant

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

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

From: Andrew (Fitzy) Fitzsimons <AFitzsimons@envirolab.com.au>
Sent: 23 December, 2019 12:42 PM
To: Stephen Maxwell <SMAXWELL@ramboll.com>
Cc: Craig Goodbody <cgoodbody@ramboll.com>
Subject: 318000780 (233720)

Hi Steve

For the attached job, did you want us to analyse these samples for anything, or just keep them on hold for the moment?

Cheers,

Kind Regards,

Andrew (Fitzy) Fitzsimons | Customer Service | Envirolab Services Pty Ltd

Great Science. Great Service.
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