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Addendum to the Detailed Site Investigation

Captains Flat Rail Corridor

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Addendum to the Detailed Site Investigation
Captains Flat Rail Corridor

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Contents

Appendices

Executive Summary

Ramboll Australia Pty Ltd (Ramboll) was engaged by Transport Asset Holding Entity (TAHE) on behalf of Transport for NSW (TfNSW) to complete a targeted assessment of contamination in soil in the Country Regional Network (CRN) at Captains Flat, New South Wales (NSW) (the site).

On 25 September 2020 TfNSW notified the NSW EPA of site contamination under section 60 of the CLM Act. On 22 April 2021 the NSW EPA declared the loader and surrounding rail corridor (Lot 4425 DP1217100) as significantly contaminated land (Declaration Number: 20211105) and on 25 June 2021 TfNSW submitted a Voluntary Management Proposal (VMP) describing a pathway and schedule for managing contamination from the declared site. Under the VMP TfNSW coordinated assessment and management through preparation of the following key documents:

- Captains Flat Rail Corridor Environmental Management Plan (Ramboll, March 2022 Rev 5) for contaminants at or from the Captains Flat rail corridor
- Detailed Site Investigation (DSI) completed to assess contaminant exposure risks in the context of commercial / industrial land use (ongoing non-operational rail corridor) (Ramboll, April 2022 Rev 6)
- Communications Plan (TfNSW, June 2022)
- Remediation Options Assessment (ROA) assessing remediation options to make the site suitable for alternate future land use comprising a mix of public open space (part of the Captains Flat Heritage Walking Trail and commercial / industrial land use (ongoing operation of the Captains Flat SES depot). The extent of contamination in soil adjacent the current SES presenting potential risks under future use as a public open space was identified as a data gap. Similarly, the extent of contamination within the Copper Creek rail culvert embankments was identified as a data gap. (Ramboll, November 2022 Rev 5).
- Remediation Action Plan (Ramboll November 2022 Rev 4) prepared for proposed public open space land use and including the following items:
    - Excavation of soils exceeding HILs and HSLs protective of human health under a public open space land use scenario (excluding the SES Depot).
    - Consolidation and capping of contamination within Copper Creek culvert embankment through construction of sandstone block walls
    - Importation of clean soil to construct a cap over consolidated EIL exceedances and reinstate the existing landform (excluding current rail formations)
    - Landscaping to support specific reuse under public open space land use scenario including selection of flora species endemic to the region
    - Preparation of a Long Term Environmental Management Plan (LTEMP) to manage contamination retained onsite post remediation

This report is an addendum to the DSI (Ramboll, 2022b) and presents the findings of a soil investigation targeted to address data gaps identified in the ROA.

The scope of work comprised:

- Advancement of six (6) test pits targeting the vertical extent of contamination in the culvert embankment
- Advancement of fourteen (14) hand augers targeting the extent of contamination around the SES Depot
- Field screening of lateral and vertical extent of metals through fpXRF
- Refinement of the existing Conceptual Site Model (CSM)
- Preparation of this report.

The additional data improves the site characterisation and refines the extent of soil remediation required to make the site suitable for proposed public open space land use and is intended to supplement the information contained in the DSI.

1. Introduction

Ramboll Australia Pty Ltd (Ramboll) was engaged by Transport Asset Holding Entity (TAHE) care of Transport for NSW (TfNSW) to complete a targeted assessment of contamination in soil at the Captains Flat Rail Corridor, in the Country Regional Network (CRN) at Captains Flat, New South Wales (NSW) (the site).

On 25 September 2020 TfNSW notified the NSW EPA of site contamination under section 60 of the CLM Act. On 22 April 2021 the NSW EPA declared the loader and surrounding rail corridor (Lot 4425 DP1217100) as significantly contaminated land (Declaration Number: 20211105) and on 25 June 2021 TfNSW submitted a Voluntary Management Proposal (VMP) describing a pathway and schedule for managing contamination from the declared site. Under the VMP TfNSW coordinated assessment and management through preparation of the following key documents:

- Captains Flat Rail Corridor Environmental Management Plan (Ramboll, March 2022c Rev 5) for contaminants at or from the Captains Flat rail corridor
- Detailed Site Investigation (DSI) completed to assess contaminant exposure risks in the context of commercial / industrial land use (ongoing non-operational rail corridor) (Ramboll, April 2022 Rev 6)
- Communications Plan (TfNSW, June 2022)
- Remediation Options Assessment (ROA) assessing remediation options to make the site suitable for alternate future land use comprising a mix of public open space (part of the Captains Flat Heritage Walking Trail and commercial / industrial land use (ongoing operation of the Captains Flat SES depot). The extent of contamination in soil adjacent the current SES presenting potential risks under future use as a public open space was identified as a data gap. Similarly, the extent of contamination within the Copper Creek rail culvert embankments was identified as a data gap. (Ramboll, November 2022d Rev 5).
- Remediation Action Plan (Ramboll November 2022 Rev 4) prepared for proposed public open space land use and including the following items:
    - Excavation of soils exceeding HILs and HSLs protective of human health under a recreational / public open space land use scenario (excluding the SES Depot).
    - Consolidation and capping of contamination within Copper Creek culvert embankment through construction of sandstone block walls
    - Importation of clean soil to construct a cap over consolidated EIL exceedances and reinstate the existing landform (excluding current rail formations)
    - Landscaping to support specific reuse under Recreation / Public Open Space land use scenario including selection of flora species endemic to the region that are shallow rooted to suit cap specifications
    - Preparation of a Long Term Environmental Management Plan (LTEMP) to manage contamination retained onsite post remediation

A Sampling and Analysis Quality Plan (SAQP) was prepared by Ramboll (Ramboll, 2024) to provide context, justification and details of the selected sampling and analysis approach for the addendum to the DSI. This SAQP was prepared in general accordance with Table 2.2 of the NSW Environmental Protection Authority (EPA) (2020) *Consultants reporting on contaminated land: Contaminated Land Guidelines*.

This report is an addendum to the DSI (Ramboll, 2022b) and presents the findings of a soil investigation targeted to address data gaps identified in the ROA.

1.1 Objectives

The objective of this investigation was to further assess the lateral extent of soil contamination south and east of the SES compound and the vertical extent of soil contamination within and around the Copper Creek culvert embankments to further define the extent of soil remediation required to make the site suitable for the proposed mixed public open space and commercial / industrial land use.

1.2 Scope of Work

The scope of work for preparation of this DSI included:

- Advancement of test pits and hand augers to facilitate assessment of potential contaminants associated with the general operation of the rail corridor
- Refinement of the existing CSM
- Preparation of this report.

2. Site Characterisation

2.1 Site Identification

Site details are summarised in **Table 2-1.** The site locality is presented in **Figure 1**, **Appendix 1.**

Table 2-1: Site Identification

Information	Description
Street Address:	Copper Creek Road, Captains Flat NSW
Identifier:	Lot 4425 Deposited Plan (DP) 1217100 and Lot 1 DP 572636
Site Area:	Approximately 2.05 hectares (Ha)[1]
Local Government:	Queanbeyan–Palerang Regional Council
Owner:	Owned by TAHE, managed by TfNSW under license to UGL Regional Linx as part of the CRN
Current Site Use:	Commercial / industrial – non-functioning rail corridor
Proposed Site Use:	Public open space (heritage walking trail) and commercial / industrial (SES depot)

[1] The area of assessment is a linear land parcel within the CRN. Site boundaries within this report are defined based on the area of rail corridor assessed. The CRN continues beyond the northern site boundary.

2.2 Site Details

The site forms a section of the Bungendore Junction to Captains Flat Line that operated between Bungendore and Captains Flat between 1940 and 1969 and is part of the Captains Flat Railway Precinct that is Heritage Listed under the *Palerang Local Environmental Plan LEP 2014*. The rail corridor between Captains Flat and Bungendore is not operational, and vegetation has overgrown existing rail tracks. A former residence located at 2 Copper Creek Road (Lot 1 DP 572636) has recently been acquired by TfNSW and now forms part of the site.

The former ore loadout facility located in the central portion of the site has been partially demolished and few of the existing structures remain such as remnants of a gantry crane and a rail turntable. The timber loading ramp and weighbridge shed were removed around 2013.

A filled portion of the track extends from Copper Creek Road to the former rail turntable to the north (which forms part of the heritage trail).

A fenced off portion of the site including the former railway goods shed is currently leased by the NSW State Emergency Services (SES) as the Captains Flat Depot.

Endangered ecological communities – plant type community PCT 283 (GHD, 2022) are located to the south-west of the site and in areas identified as contaminated. These areas are proposed to be fenced off and not remediated to limit access and exposure to site users.

2.3 Site History

A detailed review of historical records relevant to site contamination is presented in the Captains Flat Rail Corridor Preliminary Site Investigation (PSI) (Ramboll, 2021a). The Ramboll 2022 RAP summarised that the site was used as a section of the Bungendore Junction to Captains Flat railway line and as part of the former ore loadout facility for the adjacent Lake George (legacy) Mine between 1939 until 1969. Since then, the site has remained largely unused however it is understood that the site forms a portion of the Captains Flat Heritage Trail, a walking path which follows historic landmarks of the former mine and the associated town.

The presence of contamination associated with the Lake George mine appears to have been first formally identified in 1911 when contamination from the mine and the potential impact on downstream areas was noted in the NSW parliament. In 2018 GHD was commissioned by the NSW Department of Planning and Environment (DPE) Division of Resources and Geoscience (DRG) which hosts the Legacy Mines Program (LMP), to perform an assessment of the Lake George mine. The mine area was mostly devoid of vegetation and had large areas of sulfidic and other metalliferous waste rock and mineralisation exposed at surface, as well as accumulation of metallic sulfate salts. A very high potential for erosion and off-site transportation of dissolved and solid contamination through runoff and wind-borne dust was identified.

The adjacent Lake George mine is the primary source of contamination related to metalliferous mining and potential contamination within the surrounding area.

3. Site Condition and Surrounding Environment

A detailed review of the site condition and surrounding environment is presented in the DSI (Ramboll, 2022b). A summary is presented below in **Table 3-1**.

Table 3-1 Summary of site condition and surrounding environment

Site Aspect	Summary
Topography	Moderate north facing slope intersected by a moderate – steep gully directing Copper Creek which flows in a south-westerly direction.
Elevation	860 – 870 mAHD
Nearby sensitive receptors	Human receptors include: • Residence located approximately 150 m west of the site • Nearby township of Captains Flat Environmental receptors include: • Copper Creek which flows through the site beneath the rail corridor via a culvert
Surrounding land use	The site is primarily surrounded by land zoned RU1 Primary Production with several surrounding sites Heritage Listed under the Palerang LEP 2014. Surrounding land use includes: North: Copper Creek, Captains Flat Road, bushland, former Captains Flat Railway Station and Captains Flat to Bungendore Rail Line. East: Former goods shed Miners Road, Northern Tailings Dump of the former Lake George Mine, Captains Flat Sewage Treatment Plant, residential community of Captains Flat South: Processing area of the Former Lake George Mine adjacent and uphill from the site and known to be contaminated by historic mining practices, bushland West: Copper Creek, Roscommon, large lot residential properties
Nearby heritage	Heritage listings apply to the site and surrounds and include: The Captains Flat Railway Precinct including a Goods Shed (leased to the State Emergency Service (SES)) and other remnant rail infrastructure from the southern end of the rail corridor to the north side of the Station The Captains Flat Railway Station Group – constructed in 1939 and converted into a private home in 1974 (Pryke 1995). Former Station Master's cottage – constructed between 1939 and 1940, now owned by TAHE and vacant. Lake George Mine – including the smelter site, and several related mining and processing sites (adjacent the site) Roscommon – miners hut constructed in the 19th century (near the site)
Geology	Bumballa Formation comprising fine-grained sandstone interbedded with siltstone and mudstone, and Warbisco Shale comprising pyritic carbonaceous shale in the central portion. Captains Flat Shale and Kohinoor Volcanics (which includes rhyodacitic ignimbrite, agglomerate and minor argillaceous sediments) in the western portion.
Hydrogeology	Based on local topography and geology, local groundwater is expected to flow in an east/northeast direction in line with Copper Creek towards the Molonglo River.

Site Aspect	Summary
	The Hydrogeology Map of Australia database indicates the site is within a fractured or fissured aquifer with extensive aquifers of low to moderate productivity.
Direction of surface water runoff	The site appears mostly unsealed with rainfall expected to mostly infiltrate to ground. During moderate to high rainfall events water could be expected to flow overland, be received in rail cess drains (remnant from when the rail line was operational) and would likely to enter Copper Creek.
Extent of fill	The PSI (Ramboll, 2021a) stated that soils on the site to the west and east of the rail formation towards Copper Creek, comprised fill material containing coal and foreign materials including the observation of several fragments of fibre sheeting suspected of containing asbestos. Intrusive soil investigations completed as part of the previous DSI (Ramboll, 2022b) determined that the site comprised up to 2 m of fill in most locations on-site.

4. Previous Results

The DSI (Ramboll, 2022) was completed to assess the level of contamination at and from the site in the context of ongoing commercial / industrial land use. The results of the DSI are summarised in the following subsections.

4.1 Soil Lithology

The site was underlain by less than 2 m of fill in most locations and shallow sandstone was encountered on the north-eastern portion of the site towards the end of the rail line. Shale and dacite were observed around the middle of the site and at the southern end of the site respectively.

The soil lithology within the corridor comprised:

- SLAG Ballast: GRAVEL with Silt and Sand: dark brown, dry, fine to medium grained gravel (slag). Encountered from the surface to 0.1 -0.2 metres below ground level (mbgl). It is considered likely that slag observed as ballast in the rail formation was a waste product from smelting that historically occurred at the Lake George mine.
- FILL: Sandy CLAY/Gravelly CLAY: dry, firm, high plasticity, with shale gravel and cobbles present. Encountered below the ballast layer to 0.4 to >2 mbgl.
- Sandy/Silty CLAY: Grey-brown, moist, low to medium plasticity (dry of plastic limit). Encountered below the fill layer ranging from 0.4 - >2 mbgl.
- SANDSTONE / SHALE / DACITE. Rock types observed during drilling correlated with regional geology.

Green / grey staining indicative of ore spillage was observed around the former load-out / weigh bridge area and in shallow fill associated with the rail formation. Fibre cement sheeting fragments (ACM) were observed in rail formation fill from the Copper Creek culvert embankment north. These observations were consistent across surface soil assessment, test pitting and drilling.

Perched water was observed below the ballast layer in test pit TP16 at 0.5 mbgl perched above sandstone.

4.2 Soil Results

A summary of contaminant concentrations that exceeded adopted assessment criteria is summarised in **Table 4-1**.

Table 4-1: Summary of Soil Exceedances

Analyte	HIL C (mg/kg)	EIL/ESL Open Space (mg/kg)	Count	Minimum (mg/kg)	Maximum (mg/kg)	Average (mg/kg)	No > HIL	No > EIL
Arsenic	300	100	218	2.5	10305	296	38	67
Chromium	300	190	218	2.5	131	19	0	0
Copper	17000	220	218	2.5	5119	329	0	66
Iron	---	---	218	5.0	218530	35326	---	---
Lead	600	1100	218	2.5	315567	6659	108	86
Nickel	1200	220	218	1.0	168	9	0	0
Zinc	30000	630	218	2.5	116599	2831	4	101
B(aP)[1]		20	10	0.25	1.2	0.345	0	0
TRH >C10-C16 less Naphthalene (F2)		170	10	25	280	87.6	0	2[2]

Includes data collected during the DSI (Ramboll, 2022) and ESA (Ramboll, 2021)
Samples from the SES Depot are included in the assessment against HIL D criteria in accordance with the tiered risk assessment approach recommended in the NEPM (NEPC 2013).
Asbestos was detected through sample analyses at three locations and was also observed as visible fragments in surface soils at multiple locations.
[1]Benzo(a)Pyrene ESL derived from Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Canadian Council of Ministers of the Environment (CCME), 2010 (Residential/Parkland Land Use).
[2] Raised LOR in one sample was above the ESL for F2.

Lead, arsenic, and asbestos were identified as the primary drivers of potential risks to human health. Arsenic, copper, lead, and zinc were considered the primary drivers of potential risks to ecology.

Concentrations of Benzo(a)pyrene (B(a)P) were below the derived Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Canadian Council of Ministers of the Environment (CCME), 2010 (Residential/Parkland Land Use). One minor exceedance and one raised LOR for Total Recoverable Hydrocarbons (TRH) >C10-C16 less Naphthalene (F2) were reported. All other TRH concentrations were below the site criteria or below the LOR and the average concentration was below the ESL criteria, as such it is not considered to be a contaminant of concern.

5. Sampling and Analysis Quality Plan

5.1 Data Quality Objectives

Ramboll developed Data Quality Objectives (DQOs) and Data Quality Indicators (DQIs) for the investigation in accordance with the seven-step DQO process, endorsed in Schedule B2 of the NEPM (2013). The DQOs set quality assurance and quality control parameters for the field and laboratory program to ensure data of appropriate reliability will be used to assess site contamination.

The DQOs are outline in **Table 5-1**. The performance of field and laboratory programs against DQIs is presented in **Section 8.1**.

Table 5-1: Data Quality Objectives

DQO	Outcome
Step 1: State the Problem	The problem is the lateral extent of soil contamination south and east of the SES compound and the vertical extent of soil contamination within and around the Copper Creek culvert embankments is not understood well enough to adequately to inform remediation.
Step 2: Identify the Decisions	The following decisions are required: • Is the data collected of sufficient quality to identify impacts to meet the project objectives? • Do the results of the investigation provide understanding of the lateral and vertical extent of soil contamination? • Can a conclusion be made on site suitability or are further investigations required?
Step 3: Identify Inputs to the Decision	The following inputs to the decisions are required: • Identification of sampling locations • Visual or olfactory evidence of contamination • Field portable X-ray Fluorescence (fpXRF) field screening of lead concentrations • Laboratory analysis of soils for lead and co-located metals.
Step 4: Define the Study Boundaries	The study boundaries for the addendum to the DSI are defined as follows: • The physical boundaries of the investigation are the site boundary as defined in **Figure 1, Appendix 1**. • The vertical extent is to a maximum depth of 10 mbgl for mechanically drilled boreholes[1], 3 mbgl for test pits and 0.5 mbgl for hand drilled boreholes noting that advancement at all locations will terminate on rock. Depth to rock has been previously observed at approximately two meters though is expected to be deeper beneath the Copper Creek culvert embankment. • The temporal boundary is limited to data to be collected under this investigation. • Investigations within the study boundary are limited by accessibility issues, including: o The location of underground and overhead services o The location of materials or storage of equipment o The locations of structure on site (e.g. old load out equipment)
Step 5: Develop a Decision Rule	If it is determined that the data generated through this investigation is reliable, complete, comparable, accurate and representative then this information will be used to address the assessment objectives. • If it is determined that the data generated through this investigation is not suitable, comprehensive or reliable for use in achieving the goals of the study, then further investigations may be recommended to reduce uncertainties. • If it is determined that insufficient information is available to make conclusions on the risk to ecological receptors, then further information may be required. • If CoPC are reported above the assessment criteria, it will be considered whether further assessment or management measures are required.

[1]10mbgl mechanically drilled boreholes are for geotechnical purposes only, not contamination sampling.

<table>
<tr><th>DQO</th><th>Outcome</th></tr>
<tr><td>Step 6: Specify the Performance or Acceptance Criteria</td><td>Performance criteria are presented in the SAQP (Ramboll, 2024).</td></tr>
<tr><td>Step 7: Optimise the Design for Obtaining Data</td><td>A plan for soil sampling and analyses to address the identified data gaps is summarised below. Indicative sampling locations are presented on Figure 2, Appendix 1.
<table>
<tr><th>Method of Advancement</th><th>No. Locations</th><th>Sample Depths (mbgl)</th><th>Analytes</th></tr>
<tr><td>Soil Bore – solid flight auger</td><td>2</td><td>0 – 0.2
0.3 – 0.5
0.8 – 1
1.3 – 1.5
1.8 – 2
2.3 – 2.5
2.8 – 3
3.3 – 3.5
3.8 – 4</td><td rowspan="3">fpXRF field measurement of lead and laboratory analyses of As, Cr, Cu, Pb, Ni, Zn</td></tr>
<tr><td>Test pit</td><td>8</td><td>0 – 0.1
0.4 – 0.5
0.9 – 1
1.4 – 1.5
1.9 – 2.0
2.4 – 2.5
2.9 – 3</td></tr>
<tr><td>Hand excavation</td><td>14</td><td>0 – 0.1
0.4 – 0.5</td></tr>
</table></td></tr>
</table>

6. Assessment Criteria

The NEPM (2013) provides health-based soil investigation levels (HILs) and ecological investigation levels (EILs) for various land uses. Based on the current land use, the assessment criteria adopted for the Site that are relevant to addressing data gaps in the extent of soil contamination are:

- HIL C – HIL for public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. It does not include undeveloped public open space (such as urban bushland and reserves) which should be subject to a site-specific assessment where appropriate. The HILs are applicable for assessing human health risk via all relevant pathways of exposure. The HILs are generic to all soil types and apply generally to a depth of 3 mbgl for residential use. Site-specific conditions should determine the depth to which HILs apply for other land uses.
- EIL for urban residential/public open space - EILs depend on specific soil physio-chemical properties and generally apply to the top 2 m of soil. Site-specific EILs for public open space were calculated using pH and Cation Exchange Capacity results from samples collected onsite (Ramboll 2022) and will be adopted for this investigation.

Assessment criteria for this investigation are summarised in **Table 6-1**.

Table 6-1: Soil Assessment Criteria (mg/kg)

Contaminant	HIL C (public open space)	Site-specific EIL (urban residential/public open space) – Fill
Arsenic	300	160[b]
Chromium	300[a]	190
Copper	17,000	220
Lead	600	1,100[b]
Nickel	1,200	220
Zinc	30,000	630

- Indicates no criteria available

[a]HIL for chromium (VI)

[b]The EIL for these contaminants is generic, not site specific.

7. Fieldwork

Soil investigation works were completed 17 and 18 September 2024.

A Before You Dig Australia (BYDA) underground services check was completed prior to fieldwork. Sample locations were marked out and cleared by a suitably qualified and experienced locator.

Hand augers were advanced to a maximum depth of 0.5 mbgl. Where possible, samples were collected from soil that had less contact with the hand auger.

Test pits were advanced using a 15-tonne excavator with a 0.45 m wide toothed bucket to a maximum depth of 3.0 mbgl. Test pitting of the Copper Creek culvert embankment was limited by the steep surface gradient in this area. Samples were collected directly from the excavator bucket, from undisturbed materials in the centre of the bucket where practicable.

Samples were collected from each 0.1 m for the top fill layer, then every 0.5 m into natural soils or where different soil horizons where encountered. Samples were also collected where visual or olfactory evidence of potential contamination were observed.

FpXRF measurements were used as a field screening tool to inform sample collection and completed by a suitably experienced scientist holding a NSW EPA license required for field based XRF testing. Testing was completed in accordance with relevant provisions described in US EPA method 6200 (USEPA 2007).

FpXRF readings were taken using a ThermoFisher Scientific NitonTM XL3t fpXRF metal analyser. The instrument was set to soil mode and data was collected using 60 second dwell. The analyser uses a 50kV x-ray tube which provides sufficient flux to enable separation of spectra lines for highly accurate quantification of elements of interest.

The XRF was used ex-situ and measurements were taken by placing the XRF directly on the soil sample.

Readings were recorded digitally on the XRF unit and reported as a wet weight and not directly comparable with the dry weight guideline concentration. All soil samples were collected and sent to a laboratory for analysis.

A geotechnical assessment including drilling of three boreholes with no environmental sampling was conducted on 10 October 2024.

Sample locations for test pits and boreholes (excluding TP2) were recorded by a registered surveyor and a summary of the surveyed coordinates is included in **Appendix 7**. Sample locations for hand augers and TP2 were recorded using handheld GPS. All locations are presented on **Figure 2**, **Appendix 1.**

8. Quality Assurance and Quality Control

8.1 Field and Lab Quality Assurance and Quality Control

A quality assurance/quality control (QA/QC) assessment was completed for the field investigations is presented in **Table 8-1** and **Table 8-2**. The QA/QC assessment was made of data completeness, comparability, representativeness, precision and accuracy based on field and laboratory considerations, as outlined in the NEPM (NEPC, 2013) guidelines and considered the Data Quality Indicators (DQIs) and Data Quality Objectives (DQOs) as set out in the SAQP (Ramboll, 2024) and **Section 5.1**.

Table 8-1 QA/QC – Sampling and Analysis Methodology Assessment

Sampling Methodology	Ramboll Assessment
Sampling pattern and locations	A total of 14 hand augers, 6 test pits and 2 borehole sample locations were completed as part of the sampling program. The distribution of sample locations was in accordance with the approved SAQP for the works (Ramboll, 2024) therefore the number and distribution of sample locations is considered acceptable to meet the objectives outlined in **Section 1**.
Sampling density	A total of 22 targeted soil sampling locations were completed during the investigation. A total of 61 primary soil were submitted for laboratory analysis for various metals and XRF measurements were performed on all samples. A provision for soil samples in the 2 boreholes was made in the SAQP (Ramboll, 2024). These were not collected due to the drilling contractor availability, however the test pit samples collected provide a sufficient basis for assessment of vertical extent and assessment of the vertical extent of contamination in the Copper Creek culvert embankments is considered adequate.
Decontamination procedures	Decontamination of reusable sampling equipment was completed using a solution of Alconox™ and deionised water. Dedicated nitrile gloves were used at each soil sampling location.
Sample handling and containers	Soil samples were collected in laboratory provided glass jars. Non-chemical-based ice which had been double-bagged (polyethylene plastic) and secured to avoid meltwater from contacting sample containers in the Esky™ during delivery to the analytical laboratory was used to cool the samples on route to the laboratory. No sample container breaches were noted in laboratory reports.
Chain of custody	Samples were transported to the laboratory under full chain of custody conditions. The chain of custody forms were signed by the laboratory upon receipt of the samples. All COCs for all lab reports received from the lab were checked to ensure that the correct samples were scheduled for analysis and the results received accordingly.
Sampling logs	Records of soil sample locations are included in the borehole logs provided in **Appendix 6**. The test pit and borehole logs from the geotechnical assessment have been included in **Appendix 6**.
Soil Screening	A fpXRF was used to screen soil samples in the field for the presence of metals to inform vertical extent of contamination. The fpXRF was XRF measurements indicated that elevated lead concentrations exceeded the targeted depth of the investigation. This infers some uncertainty as to the vertical extent of contamination in soil south east of the SES.

Table 8-2 QA/QC – Field and Lab Quality Assurance and Quality Control

Field and Lab QA/QC	Ramboll Assessment
Field quality control samples	Three intra-laboratory duplicate samples (split sample analysed by the same laboratory) and three inter-laboratory duplicate samples (split sample analysed by a different laboratory) were collected and analysed together with 61 primary samples at a rate of 10%. The duplicate samples were analysed for metals. Equipment rinsate blanks were collected during the fieldworks per day of work, resulting in two rinsate blanks. The rinsates were analysed for 8 metals, with all samples returning results of below LOR, indicating that decontamination procedures were effective.
Field quality control results	Relative percent difference (RPD) results for soil duplicate pairs were within acceptable limits with the exception of the following: • TP2_1.0 / D01_20240917 (duplicate): Arsenic (RPD = 45.2%), Cadmium (RPD = 30.5%), Copper (RPD = 37.8%), Lead (72.1%) and Zinc (RPD = 47.1%) • TP2_1.0 / T01_20240917 (triplicate): Cadmium (RPD = 38.1%) and Chromium (RPD = 34.8%) • HA10_0.5 / D02_20240917 (duplicate): Arsenic (RPD = 50%) • HA10_0.5 / T02_20240917 (triplicate): Lead (RPD = 41%) • TP5_0.5 / D03_20240917 (duplicate): Chromium (RPD = 50%), Copper (RPD = 33%) and Lead (RPD = 58.2%) • TP5_0.5 / T03_20240917 (triplicate): Arsenic (RPD = 48.15) Chromium (RPD = 38.7%), Copper (RPD = 46.8%), Lead (RPD = 46.4%), Nickel (RPD = 42.9%) and Zinc (57.4%) As the contaminant concentrations are generally exceed adopted assessment criteria by 5 - 10 times or greater, high RPDs do not infer data is of low quality. Soil samples collected are impacted by ore concentrate with exceptionally high contaminant concentrations. Primary samples define a widespread distribution of ore concentrate impact that is heterogeneous at local (small) scale. This is supported by high RPDs between primary and duplicate samples.
National Association of Testing Authorities (NATA) registered laboratory and NATA endorsed methods	Eurofins was used as the primary laboratory and ALS was used as the secondary laboratory. Eurofins and Envirolab laboratories are accredited by National Association of Testing Authorities, Australia (NATA) for the analyses performed for this assessment.
Analytical methods	A summary of analytical methods was included in the laboratory test certificates and the correct analytical methods were used.
Holding times	Review of the chain of custody forms and laboratory certificates indicate that holding times were met.
Limits of Reporting (LORs)	LORs for all analytes were below the adopted assessment criteria.
Laboratory quality control samples	Laboratory quality control samples including duplicates, matrix spikes, surrogate spikes and blanks were undertaken by the laboratories at appropriate frequencies.
Laboratory quality control results	All results for laboratory soil duplicates, laboratory control samples and surrogates were within acceptable limits, and no detections were made in blank samples with the following exceptions:

Field and Lab QA/QC	Ramboll Assessment
	- There were two fails in duplicates for cadmium, one fail in a duplicate for chromium and one fail in a duplicate for nickel for Eurofins where the RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of the relevant report.

8.2 Data Validation

An assessment of the data completeness, comparability, representativeness, precision and accuracy based on field and laboratory considerations, as outlined in NEPM (NEPC, 2013) guidelines is included in **Table 8-3**.

Table 8-3 QA/QC – Assessment of data validation

DQI	Ramboll Assessment
Completeness	Completeness is a measure of whether all the data necessary to meet the project objectives was collected. As noted in **Table 8-1**, A total of 14 hand augers, 6 test pits and 2 soil bores sample locations were completed as part of the sampling program, with a total of 61 samples analysed for both laboratory and XRF. The number of primary samples was less than planned in the SAQP, due to maximum depths reached in sample locations, however this is not considered to have a significant effect on results, or the decisions being made on the basis of the available data. Therefore, the work satisfies the completeness requirement.
Comparability	Comparability is a measure of confidence that the data may be considered to be equivalent for each sampling and analysis event. The fieldwork was completed by experienced Ramboll personnel using standard operating procedures. The laboratory analysis was undertaken by NATA registered laboratories using accredited analytical methods. Eurofins was chosen as the primary laboratory and ALS was chosen as the secondary laboratory.
Representativeness	Representativeness is the confidence that the data is representative of each media present at the site. In the field, representativeness was achieved by completing an adequate number of soil sampling points to characterise the targeted areas and materials on-site.
Precision	Precision is a measure of the reproducibility of the data. In the field, Ramboll achieved accuracy by using standard operating procedures for the collection of soil samples and by collecting duplicate and triplicate samples for analysis. As outlined in **Table 8-2** RPD results for duplicate samples were acceptable. At the laboratory, precision is assessed using blind replicate samples and split samples. As outlined in **Table 8-2** results for laboratory duplicates were acceptable and no detections were made in blank samples.
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 for the collection of soil samples. Rinsate blanks were collected during the soil sampling programme and concentrations of COPC in all blank samples were below the LOR.

DQI	Ramboll Assessment
	At the laboratory, accuracy is assessed using laboratory control samples, matrix spikes, surrogates and blanks. All results for laboratory control samples, matrix spikes and surrogates were considered of no concern to the overall quality of the data and no detections were made in blank samples.

Overall, the DQIs of completeness, comparability, representativeness, precision and accuracy have generally been met. It is considered that the data obtained adequately complied with the QA/QC assessment and that the data is of suitable quality to meet the project DQOs. Data Quality Objectives (DQOs) as set out in the SAQP (Ramboll 2024).

9. Results

9.1 Soil Lithology

The soil lithology for the two targeted areas is described below.

The generalised soil lithology of the copper creek culvert embankment targeted by the test pits comprised:

- FILL: Sandy Gravel – dark brown to black, dry, medium to coarse grained sand, large angular gravels (ballast). Minor potential asbestos containing material (PACM) observed. Encountered from the surface to 0.5 mbgl.
- FILL: Silty/Sandy Clay with some gravels and shale: brown-black with orange mottling, moist, low to medium plasticity, coarse grained sand (black slag). Encountered from 0.5 to 3.0 mbgl.

The generalized soil lithology of the surrounding area of the SES Facility targeted by the hand augers comprised:

- FILL: Gravelly Sand with rootlets – black/brown/orange, moist, fine grained sand, angular gravels. Minor potential asbestos containing material (PACM) observed. Encountered from the surface to 0.4 mbgl.
- FILL: Gravelly Clay: brown to orange, moist to wet, medium plasticity, angular gravels. Encountered from 0.4 - 0.5 mbgl.

9.2 Soil Results

A tabulated assessment of soil concentrations against adopted assessment criteria is presented as **Appendix 4**. A summary of laboratory analytical contaminant concentrations that exceeded adopted assessment criteria is summarised in **Table 9-1**.

Table 9-1: Summary of Laboratory Soil Exceedances

Metals	Number of Samples	Minimum (mg/kg)	Maximum (mg/kg)	Mean (mg/kg)	HIL C (mg/kg)	No > HIL C	EIL Public Open Space (mg/kg)	No > EIL Public Open Space
Arsenic	61	6	430	61.4	300	2	160	6
Copper	61	17	1,100	208.1	17,000	0	220	17
Lead	61	29	32,000	2,804.8	600	43	1,100	36
Zinc	61	75	31,000	2,811.1	30,000	1	630	39

Lead, arsenic and zinc variably exceeded the health-based criteria. As the zinc is exceedance is minor and only occurred in one sample it is not considered to be a concern for human health. Lead, and arsenic are considered the primary drivers of potential risks to human health within the context of this investigation.

Arsenic concentrations, copper, lead and zinc concentrations variably exceeded the adopted ecological assessment criteria. Within this context arsenic, copper, lead and zinc are considered the primary drivers of potential risks to ecology.

The distribution of contaminant concentrations exceeding adopted assessment criteria protective of human health and ecology are described in **Section 9.2.1** and **Section 9.2.2** below.

9.2.1 Copper Creek Culvert Embankment Assessment

Figure 2 presents a summary of the distribution of contaminants exceeding adopted assessment criteria on site. The lateral distribution of lead in soils is described by shading and the vertical distribution of lead is described by sample results presented in summary tables on the figure for each test pit advanced.

The highest lead concentrations for the test pits on the Copper Creek Culvert Embankment were in the shallow soils (0 – 0.5 mbgl) on both sides of the rail line. fpXRF measurement of metals in test pits indicates lead exceedances are generally limited to the upper 0.5 mbgl within the rail formation.

Some potential asbestos fragments were observed in the surface soil around the Copper Creek culvert embankment consistent with previous observations (Ramboll, 2022).

9.2.2 Surrounding Area of the SES Facility Assessment

Concentrations of copper, lead and zinc were reported above assessment criteria at multiple hand auger locations surrounding the SES Facility. The distribution included exceedances nearby the rail formation and along the creek line down gradient of site. Topography sloping down to the unnamed creek on both sides supports conclusion that the distribution of soil contamination related to historic rail operations is limited to the land north and west of the unnamed creek.

Some potential asbestos fragments were observed in the surface soil adjacent the northern fence line of the SES.

10. Refined Conceptual Site Model

This CSM was developed for to assess exposure risks associated with soil contamination around the Copper Creek culvert and adjacent to the SES in the context of the public open space land use proposed in these areas. It should be read as a supplement to the CSM in DSI (Ramboll, 2022).

10.1 Environmental Setting

The site is zoned for use as a rail corridor (SP2 – Infrastructure) though is located within an area zoned RU1 Primary Production and local receiving waters (Copper Creek and then the Molonglo River) are understood to form part of a drinking water catchment (GHD 2018). The Palerang local environment plan (2014) indicates the site is located within the Googong Dam drinking water Catchment. The site is also located adjacent the Lake George (legacy) mine and so is within a highly disturbed area with known contaminant issues.

10.2 Sources of the Contaminant

The main source of site contamination was from site activities including the historic loading and transport of ore concentrate and application of slag as rail ballast.

10.3 Human and Ecological Receptors

Human receptors are considered to include:

- Onsite workers including rail workers maintaining existing and future assets and third party workers maintaining above ground and underground services passing through the site
- Future recreational users of the Captains Flat Heritage Trail which passes through the site
- Users of the SES lease area.

Ecological receptors are considered to include onsite terrestrial ecology, Copper Creek as a tributary to the Molonglo River and bushland downstream from the site.

Previous assessment (GHD 2018) indicates contamination from the Lake George (legacy) mine has impacted the surrounding environment and the township of Captains Flat.

10.4 Exposure Pathways

For a receptor to be exposed to a contaminant derived from a site, there should be an exposure pathway linking the source of contamination and the exposed population. An exposure pathway describes the course a chemical or physical agent takes from the source to the exposed individual and generally includes the following elements (USEPA, 1989):

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

An assessment of the SPR linkages for the contaminant onsite (including the former loadout complex) is summarised in **Table 10-1**.

Table 10-1: Exposure Assessment Summary

Exposure Route	Complete SPR? (Y / N / P)				
	Future recreational users of the heritage trail	Onsite workers	Onsite ecology	Offsite ecological receptors	Justification
Soil					
Direct Contact	Y	Y	Y	Y	Lead concentrations in soil were observed above the adopted health and ecological criteria within the Copper Creek culvert embankment and adjacent the SES lease area. Vertical distribution of contamination within the culvert embankments appears to exceed 3 mbgl. Extent of soil contamination adjacent the SES extends to the unnamed creek. Some PACM was noted around the culvert embankment (as previously noted) and additionally adjacent the SES.
Inhalation	Y	Y	N/A	N/A	
Incidental Ingestion	Y	Y	N/A	N/A	
Root Uptake	N/A	N/A	Y	Y	

11. Site Characterisation

The additional investigation supports conclusion that lead contamination is concentrated in ballast of the rail formation and adjacent soils and presents risks to people who will use the site as a heritage walking trail. Offsite migration of lead appears to have occurred across the eastern site boundary around the loader at concentrations that may present a risk to human health. PACM was observed adjacent the SES as an addition to previously identified asbestos in and north of the Copper Creek culvert embankments. The additional data presented in this report refines assessment of the extent of soil remediation required to address contaminant exposure risks that limit site suitability for proposed public open space land use.

Risks to human health onsite including the SES lease area can be mitigated through maintenance of capping and implementation of the Captains Flat Rail Corridor EMP (Ramboll 2021b) until a long-term remedial strategy can be developed however this may not address offsite risks. Broadly the EMP comprises:

- Maintenance of capping
- Fencing and signage to prevent inadvertent access
- Controls to be implemented during earthworks
- Notification of SafeWork NSW of lead risk work prior to earthworks
- Communication of EMP requirements to site workers
- Discussion of contaminant distribution onsite

12. Conclusions and Recommendations

The key findings of this DSI addendum were:

- Contamination was identified onsite that is consistent with contamination associated with the historic transport of ore by rail.

Several potential human receptors were identified including:

- Onsite workers and workers maintaining above ground or underground services passing through the site
- Recreational users of the Captains Flat Heritage Trail which passes through the site

Potential ecological receptors were identified including on-site ecology, Copper Creek as a tributary to the Molonglo River and Bushland downgradient from the site. The Captains Flat Rail Corridor EMP (Ramboll 2021b) should continue to be implemented.

This addendum improves the site characterisation and extent of contamination, which will help inform an update to the RAP and further refine the extent of soil remediation proposed.

13. General Limitations and Reliance

This report has been prepared by Ramboll Australia Pty Ltd (“Ramboll”) exclusively for the intended use by the client Transport Asset Holding Entity (TAHE) care of Transport for NSW (TfNSW) in accordance with the agreement (proposal reference number P115932, dated 6 December 2023 and PO 4200334631, dated 26 April 2024) between Ramboll and the client defining, among others, the purpose, the scope and the terms and conditions for the services. No other warranty, expressed or implied, is made as to the professional advice included in this report or in respect of any matters outside the agreed scope of the services or the purpose for which the report and the associated agreed scope were intended or any other services provided by Ramboll.

In preparation of the report and performance of any other services, Ramboll has relied upon publicly available information, information provided by the client and information provided by third parties. Accordingly, the conclusions in this report are valid only to the extent that the information provided to Ramboll was accurate, complete and available to Ramboll within the reporting schedule.

Ramboll’s services are not intended as legal advice, nor an exhaustive review of site conditions and/or compliance. This report and accompanying documents are initial and intended solely for the use and benefit of the client for this purpose only and may not be used by or disclosed to, in whole or in part, any other person without the express written consent of Ramboll. Ramboll neither owes nor accepts any duty to any third party, unless formally agreed by Ramboll through that party entering into, at Ramboll’s sole discretion, a written reliance agreement.

Unless otherwise stated in this report, the scope of services, assessment and conclusions made assume that the site will continue to be used for its current purpose and end-use without significant changes either on-site or off-site.

The site investigation works identified in this report were undertaken during a discrete period of time. The findings and conclusions presented in this report are accordingly factually limited by these circumstances and, unless stated otherwise in the report, are preliminary. The field investigations were restricted to a level of detail necessary to meet the stated objectives of the services. The results of any measurements taken may vary spatially or with time and further confirmatory measurements should be made after any significant period of time has elapsed since the sampling took place. The interpretation of the geological and environmental quality conditions is based on extrapolation from point-source data in a heterogeneous environment. Accordingly, more detailed investigation may be appropriate dependent upon the client objectives.

Unless stated otherwise, the geological information provided is for general environmental interpretation and should not be used for geotechnical and/or design purposes.

14. References

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

NSW EPA, 2022. Sampling Design Guidelines: Contaminated Land Guidelines. (NSW EPA, 2022).

NSW EPA, 2020. Consultants reporting on contaminated land: Contaminated Land Guidelines. (NSW EPA, 2020).

Ramboll, 2021. Captains Flat Rail Corridor Preliminary Site Investigation. (Ramboll, 2021a)

Ramboll, 2022. Captains Flat Rail Corridor Detailed Site Investigation. (Ramboll, 2022b)

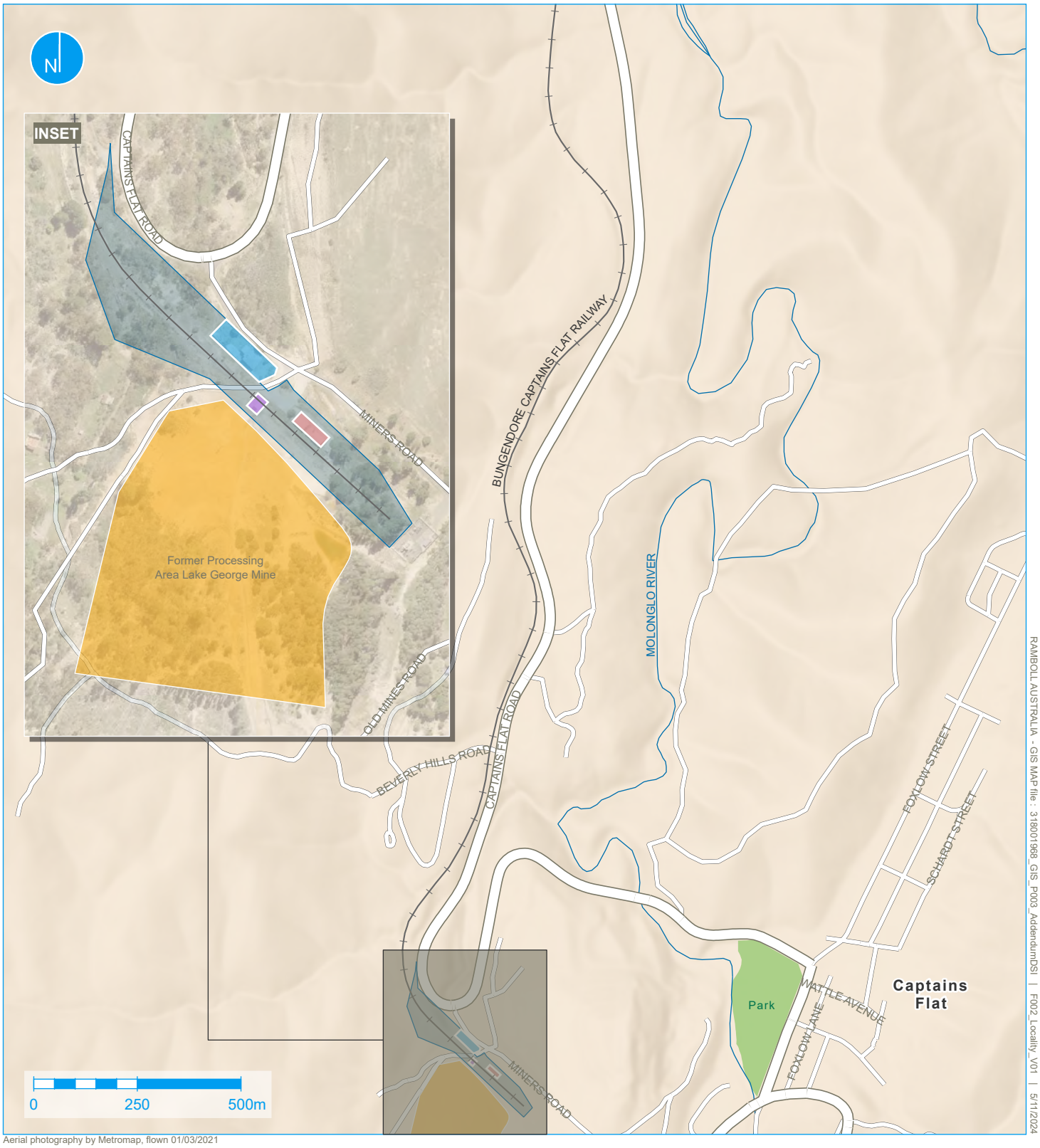
Ramboll, 2022. Captains Flat Rail Corridor Remediation Action Plan. (Ramboll, 2022a)

Ramboll, 2022. Captains Flat Rail Corridor Environmental Management Plan (Ramboll, 2022c)

Ramboll, 2022. Captains Flat Rail Corridor Remediation Options Assessment (Ramboll, 2022d).

Ramboll, 2024. Captains Flat Rail Corridor SAQP. (Ramboll, 2024)

Appendix 1
Figures



Aerial photography by Metromap, flown 01/03/2021

RAMBOLL AUSTRALIA - GIS MAP file : 318001968_GIS_P003_AddendumDSI | F002_Locality_V01 | 5/11/2024

A4
1:13,000

Key

- Declared area
- Railway
- Former Loadout Facility/Weigh Bridge
- Former Processing Area Lake George Mine
- Former Station Master's Cottage
- Captains Flat State Emergency Services

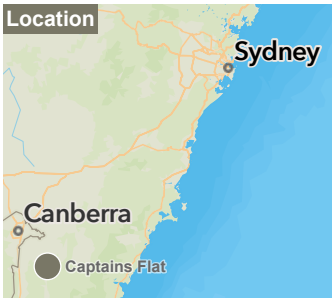
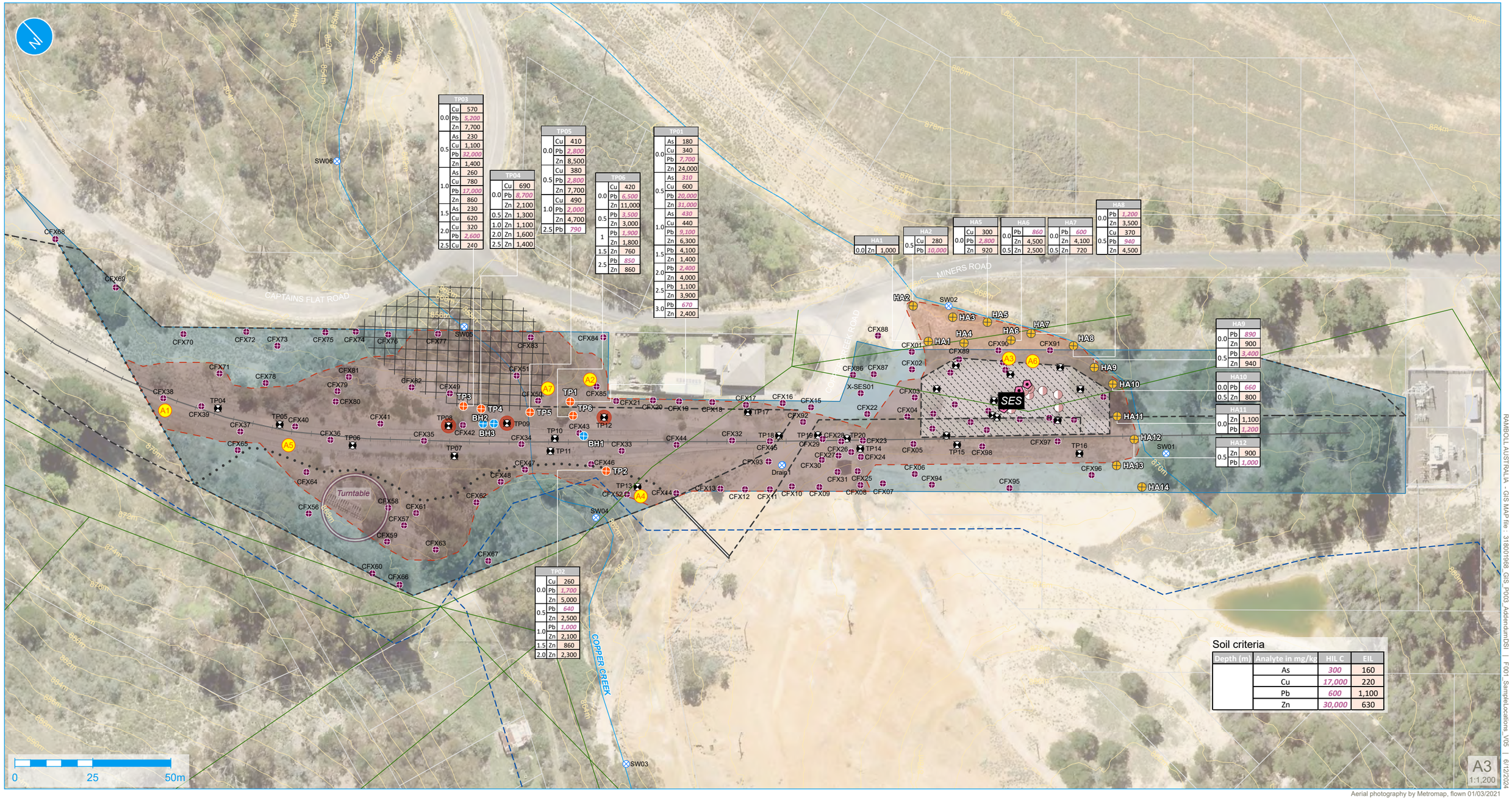


Figure 1 | Locality



Key

- Declared area
- Railway
- 2 m contour line
- Captains Flat State Emergency Services
- Extent of human health criteria exceedance and area of excavation proposed to remediate human health risks

Note: An indicative area of where exceedances to the human health criteria (HIL C) occurs is presented in this figure, for XRF sample result values refer to results table.

- Approximate location of turntable
- Existing access gate
- Existing fencing
- Proposed fencing
- Steep dip

Service lines

- Fibre optics cable
- Potable water

Data sourced from: Telstra, 2021. Queanbeyan Palerang Regional Council, 2021. Land and Property Information, 2018.

Previous sampling locations (Ramboll, 2020 and 2021)

- Dust interior sample
- Paint sample
- Surface water sample
- Test pit
- XRF sample
- Asbestos identified

Sample locations (Ramboll 2024)

- Test pit (prefix "2024_")
- Hand auger
- Borehole
- PACM (Sept 2024)

Asbestos was observed (as bonded fibre cement fragments) within the rail formation and adjacent soils from the Copper Creek culvert embankment to the northern site extent. Distribution appeared limited to the rail formation and adjacent soils however the capacity to inspect other areas was limited by vegetation, steep embankments and/or time such that extents of impact could not be accurately defined.

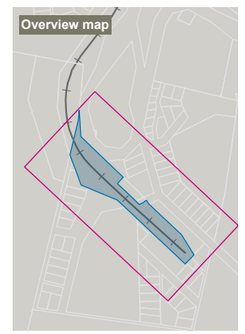


Figure 2 | Contaminant Exceedance Summary

Appendix 2
Photographic Log

1. Hand Auger Sample HA1 - Location

Photo taken 17 September 2024.

2. Hand Auger Sample HA1 - Location

Photo taken 17 September 2024.

3. Hand Auger Sample HA3 - Location

Photo taken 17 September 2024.

4. Hand Auger Sample HA3 - Location

Photo taken 17 September 2024.

5. Hand Auger Sample HA5 - Location

Photo taken 18 September 2024.

6. Hand Auger Sample HA6 - Location

Photo taken 18 September 2024.

7. Hand Auger Sample HA7 - Location

Photo taken 18 September 2024.

8. Hand Auger Sample HA8 - Location

Photo taken 18 September 2024.

9.Hand Auger Sample HA9 - Location

Photo taken 18 September 2024.

10.Hand Auger Sample HA10 - Location

Photo taken 18 September 2024.

11.Hand Auger Sample HA12 - Location

Photo taken 18 September 2024.

12. Test pit 1 (TP01) – Excavation

Photo taken 17 September 2024.

13. Test pit 1 (TP01) – Sample Piles

Photo taken 17 September 2024.

14. Test Pit 2 (TP02) – Excavation

Photo taken 17 September 2024.

15. Test Pit 2 (TP02) – Sample Piles

Photo taken 17 September 2024.

16. Test Pit 3 (TP03) – Excavation

Photo taken 17 September 2024.

17. Test Pit 4 (TP04) – Excavation

Photo taken 17 September 2024.

18. Test Pit 5 (TP05) – Excavation

Photo taken 17 September 2024.

19. Test Pit 5 (TP05) – Sample Piles

Photo taken 17 September 2024.

20. Test Pit 6 (TP06) – Excavation

Photo taken 17 September 2024.

21. Test Pit 6 (TP06) – Excavation Pit

Photo taken 17 September 2024.

22. Test Pit 6 (TP06) – Excavation Pit

Photo taken 17 September 2024.

Appendix 3
EIL Calculations

Inputs
Select contaminant from list below
Cr_III
Below needed to calculate fresh and aged ACLs
Enter % clay (values from 0 to 100%)
1
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
1.5
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Cr III soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	50	70
Urban residential and open public spaces	100	190
Commercial and industrial	150	320

Inputs
Select contaminant from list below
Cu
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
15
Enter soil pH (calcium chloride method) (values from 1 to 14)
6.4
Enter organic carbon content (%OC) (values from 0 to 50%)
8.3
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
1.5
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Cu soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	60	85
Urban residential and open public spaces	110	220
Commercial and industrial	160	310

Inputs
Select contaminant from list below
Ni
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
15
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
1.5
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Ni soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	20	40
Urban residential and open public spaces	75	220
Commercial and industrial	150	380

Inputs
Select contaminant from list below
Zn
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
15
Enter soil pH (calcium chloride method) (values from 1 to 14)
6.4
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
1.5
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Zn soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	65	200
Urban residential and open public spaces	230	630
Commercial and industrial	350	930

Inputs
Select contaminant from list below
As
Below needed to calculate fresh and aged ACLs
Below needed to calculate fresh and aged ABCs
or for fresh ABCs only
or for aged ABCs only

Outputs		
Land use	Arsenic generic EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	20	40
Urban residential and open public spaces	50	100
Commercial and industrial	80	160

Inputs
Select contaminant from list below
Pb
Below needed to calculate fresh and aged ACLs
Below needed to calculate fresh and aged ABCs
or for fresh ABCs only
or for aged ABCs only

Outputs		
Land use	Lead generic EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	110	470
Urban residential and open public spaces	270	1100
Commercial and industrial	440	1800

Appendix 4
Analytical Summary Tables

Client: Transport Asset Holding Entity
Job No:318001968
Project Name: Captains Flat Rail Corridor Detailed Remediation Design - Addendum to DSI
4/11/2024

Table 1 :
Analytical Results - Surrounding Area of SES Facility

	NEPM 2013 HIL C Public Open Space	Site Specific EIL Residential	Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Lab Sample Number		S24-Se0052813	S24-Se0052814	S24-Se0052815	S24-Se0052816	S24-Se0052817	S24-Se0052818	S24-Se0052819	S24-Se0052820	S24-Se0052821	S24-Se0052822	S24-Se0052823	S24-Se0052824
			Sample ID:		HA1_0.0	HA1_0.5	HA2_0.0	HA2_0.5	HA3_0.0	HA3_0.5	HA4_0.0	HA4_0.5	HA5_0.0	HA5_0.5	HA6_0.0	HA6_0.5
			Sample date:		17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	18/09/2024	18/09/2024	18/09/2024	18/09/2024
			Project Name:		Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat
			Sampling Method:		GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB
Analyte grouping / Analyte			**Units**	**LOR**												
Moisture Content																
Moisture Content	-	-	%	1	4.2	9.9	16	24	14	16	13	16	57	22	24	15
Heavy Metals																
Arsenic	300	160	mg/kg	2	13	13	15	71	19	8	7	10	59	6	45	71
Cadmium	90	-	mg/kg	0.4	1	< 0.4	< 0.4	1	< 0.4	< 0.4	2	1	4	1	16	1
Chromium	300	*190*	mg/kg	5	15	16	12	< 5	10	10	11	15	13	13	27	13
Copper	17,000	*220*	mg/kg	5	60	17	60	280	64	28	26	19	300	32	180	160
Lead	600	1,100	mg/kg	5	240	100	400	10000	430	61	150	97	2800	56	860	2500
Nickel	1,200	*220*	mg/kg	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	5	< 5	< 5	8	< 5
Zinc	30,000	*630*	mg/kg	5	1000	110	180	500	86	150	380	370	920	280	4500	530

Blank Cell indicates no criterion available
LOR = Limit of Reporting
<value = Less than the laboratory Limit of Reporting (LOR)
National Environment Protection Council (2013) National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) (NEPM).
Health Investigation Levels for chromium based on chromium (VI)
Concentrations in green box exceed adopted HIL C for Public Open Space

Client: Transport Asset Holding Entity
Job No:318001968
Project Name: Captains Flat Rail Corridor Detailed Remediation Design - Addendum to DSI
4/11/2024

Table 1 :
Analytical Results - Surrounding Area of SES Facility

	NEPM 2013 HIL C Public Open Space	Site Specific EIL Residential	Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Lab Sample Number		S24-Se0052825	S24-Se0052826	S24-Se0052827	S24-Se0052828	S24-Se0052829	S24-Se0052830	S24-Se0052831	S24-Se0052832	S24-Se0052833	S24-Se0052834	S24-Se0052835	S24-Se0052836	S24-Se0052837
			Sample ID:		HA7_0.0	HA7_0.5	HA8_0.0	HA8_0.5	HA9_0.0	HA9_0.5	HA10_0.0	HA10_0.5	HA11_0.0	HA12_0.0	HA12_0.5	HA13_0.0	HA14_0.0
			Sample date:		18/09/2024	18/09/2024	18/09/2024	18/09/2024	18/09/2024	18/09/2024	18/09/2024	18/09/2024	18/09/2024	18/09/2024	18/09/2024	18/09/2024	18/09/2024
			Project Name:		Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat
			Sampling Method:		GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB
Analyte grouping / Analyte			**Units**	**LOR**													
Moisture Content																	
Moisture Content	-	-	%	1	62	14	16	18	15	23	23	27	46	10	19	12	6.3
Heavy Metals																	
Arsenic	300	160	mg/kg	2	31	32	45	33	34	150	23	7	23	17	26	9	160
Cadmium	90	-	mg/kg	0.4	20	3	16	15	4	2	1	1	2	1	4	1	< 0.4
Chromium	300	*190*	mg/kg	5	8	21	28	14	13	6	13	19	26	10	11	6	7
Copper	17,000	*220*	mg/kg	5	150	34	140	370	130	140	92	66	130	46	120	63	55
Lead	600	1,100	mg/kg	5	600	160	1200	940	890	3400	660	97	1100	250	900	180	280
Nickel	1,200	*220*	mg/kg	5	9	< 5	9	12	16	< 5	< 5	7	18	< 5	< 5	< 5	< 5
Zinc	30,000	*630*	mg/kg	5	4100	720	3500	4500	900	940	380	800	1200	450	1000	180	86

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National Environment Protection Council (2013) National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) (NEPM).
Health Investigation Levels for chromium based on chromium (VI)
Concentrations in green box exceed adopted HIL C for Public Open Space

Client: Transport Asset Holding Entity
Job No:318001968
Project Name: Captains Flat Rail Corridor Detailed Remediation Design - Addendum to DSI
4/11/2024

Table 2:
fpXRF Results - Surrounding Area of SES Facility

	NEPM 2013 HIL C Public Open Space	Site Specific EIL Residential	Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Lab Sample Number		S24-Se0052813	S24-Se0052814	S24-Se0052815	S24-Se0052816	S24-Se0052817	S24-Se0052818	S24-Se0052819	S24-Se0052820	S24-Se0052821	S24-Se0052822	S24-Se0052823	S24-Se0052824
			Sample ID:		HA1_0.0	HA1_0.5	HA2_0.0	HA2_0.5	HA3_0.0	HA3_0.5	HA4_0.0	HA4_0.5	HA5_0.0	HA5_0.5	HA6_0.0	HA6_0.5
			Sample date:		17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	18/09/2024	18/09/2024	18/09/2024	18/09/2024
			Project Name:		Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat
			Sampling Method:		GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB
Analyte grouping / Analyte			**Units**	**LOR**												
Moisure Content																
Moisure Content	-	-	%	1	4.2	9.9	16	24	14	16	13	16	57	22	24	15
Heavy Metals																
Arsenic	300	160	mg/kg	2	<LOD	<LOD	<LOD	200	<LOD	8	<LOD	13	<LOD	<LOD	29	<LOD
Cadmium	90	-	mg/kg	0.4	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	300	*190*	mg/kg	5	-	-	-	-	-	-	-	-	-	-	-	-
Copper	17,000	*220*	mg/kg	5	<LOD	47	73	223	99	23	56	67	34	40	146	142
Lead	600	1,100	mg/kg	5	<LOD	60	280	7224	1589	46	144	117	195	36	374	2581
Nickel	1,200	*220*	mg/kg	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Zinc	30,000	*630*	mg/kg	5	550	13	19	21	14	10	20	20	11	14	47	20

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LOR = Limit of Reporting
LOD = Limit of Detection
- Not analysed / Not calculated
<value = Less than the Limit of Detection (LOD)
National Environment Protection Council (2013) National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) (NEPM).
Health Investigation Levels for chromium based on chromium (VI)
Concentrations in green box exceed adopted HIL C for Public Open Space
Concentrations in red box exceed exceed adopted site specific EIL for urban residential/public open space

Client: Transport Asset Holding Entity
Job No:318001968
Project Name: Captains Flat Rail Corridor Detailed Remediation Design - Addendum to DSI
4/11/2024

Table 2:
fpXRF Results - Surrounding Area of SES Facility

	NEPM 2013 HIL C Public Open Space	Site Specific EIL Residential	Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Lab Sample Number		S24-Se0052825	S24-Se0052826	S24-Se0052827	S24-Se0052828	S24-Se0052829	S24-Se0052830	S24-Se0052831	S24-Se0052832	S24-Se0052833	S24-Se0052834	S24-Se0052835	S24-Se0052836	S24-Se0052837
			Sample ID:		HA7_0.0	HA7_0.5	HA8_0.0	HA8_0.5	HA9_0.0	HA9_0.5	HA10_0.0	HA10_0.5	HA11_0.0	HA12_0.0	HA12_0.5	HA13_0.0	HA14_0.0
			Sample date:		18/09/2024	18/09/2024	18/09/2024	18/09/2024	18/09/2024	18/09/2024	18/09/2024	18/09/2024	18/09/2024	18/09/2024	18/09/2024	18/09/2024	18/09/2024
			Project Name:		Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat
			Sampling Method:		GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB
Analyte grouping / Analyte			**Units**	**LOR**													
Moisure Content																	
Moisure Content	-	-	%	1	62	14	16	18	15	23	23	27	46	10	19	12	6.3
Heavy Metals																	
Arsenic	300	160	mg/kg	2	15	<LOD	<LOD	77	42	54	11	<LOD	14	<LOD	<LOD	<LOD	111
Cadmium	90	-	mg/kg	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	300	*190*	mg/kg	5	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	17,000	*220*	mg/kg	5	62	50	81	195	149	111	41	73	55	68	60	54	51
Lead	600	1,100	mg/kg	5	112	42	296	733	694	1138	129	73	326	254	218	116	209
Nickel	1,200	*220*	mg/kg	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Zinc	30,000	*630*	mg/kg	5	20	24	29	39	37	42	9	18	29	17	23	11	11

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Concentrations in green box exceed adopted HIL C for Public Open Space
Concentrations in red box exceed exceed adopted site specific EIL for urban residential/public open space

Client: Transport Asset Holding Entity
Job No:318001968
Project Name: Captains Flat Rail Corridor Detailed Remediation Design - Addendum to DSI
4/11/2024

Table 3:
Analytical Results - Copper Creek Culvert Embankment

	NEPM 2013 HIL C Public Open Space	Site Specific EIL Public Open Space	Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Lab Sample Number		S24-Se0052838	S24-Se0052839	S24-Se0052840	S24-Se0052841	S24-Se0052842	S24-Se0052843	S24-Se0052844	S24-Se0052845	S24-Se0052846	S24-Se0052847	S24-Se0052848	S24-Se0052849
			Sample ID:		TP1_0.0	TP1_0.5	TP1_1.0	TP1_1.5	TP1_2.0	TP1_2.5	TP1_3.0	TP2_0.0	TP2_0.5	TP2_1.0	TP2_1.5	TP2_2.0
			Sample date:		17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024
			Project Name:		Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat
			Sampling Method:		GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB
Analyte grouping / Analyte			**Units**	**LOR**												
Moisure Content																
Moisure Content	-	-	%	1	12	13	18	17	17	17	18	13	12	12	13	12
Heavy Metals																
Arsenic	300	160	mg/kg	2	180	310	430	120	100	36	35	28	12	19	14	25
Cadmium	90	-	mg/kg	0.4	26	64	14	3	9	8	6	4	2	3	2	2
Chromium	300	*190*	mg/kg	5	9	13	12	17	16	12	16	28	17	19	18	28
Copper	17,000	*220*	mg/kg	5	340	600	440	140	150	87	72	260	150	220	170	220
Lead	600	1,100	mg/kg	5	7700	20000	9100	4100	2400	1100	670	1700	640	1000	480	490
Nickel	1,200	*220*	mg/kg	5	8	9	8	6	9	6	5	11	12	12	13	14
Zinc	30,000	*630*	mg/kg	5	24000	31000	6300	1400	4100	3900	2400	5000	2500	2100	860	2300

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National Environment Protection Council (2013) National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) (NEPM).
Health Investigation Levels for chromium based on chromium (VI)
Concentrations in green box exceed adopted HIL C for Public Open Space
Concentrations in red box exceed exceed adopted site specific EIL for urban residential/public open space

Client: Transport Asset Holding Entity
Job No:318001968
Project Name: Captains Flat Rail Corridor Detailed Remediation Design - Addendum to DSI
4/11/2024

Table 3:
Analytical Results - Copper Creek Culvert Embankment

	NEPM 2013 HIL C Public Open Space	Site Specific EIL Public Open Space																
Sample Type:					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Lab Sample Number					S24-Se0052850	S24-Se0052851	S24-Se0052852	S24-Se0052853	S24-Se0052854	S24-Se0052855	S24-Se0052856	S24-Se0052857	S24-Se0052858	S24-Se0052859	S24-Se0052860	S24-Se0052861	S24-Se0052862
Sample ID:					TP3_0.0	TP3_0.5	TP3_1.0	TP3_1.5	TP3_2.0	TP3_2.5	TP4_0.0	TP4_0.5	TP4_1.0	TP4_1.5	TP4_2.0	TP5_0.0	TP5_0.5
Sample date:					17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024
Project Name:					Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat
Sampling Method:					GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB
Analyte grouping / Analyte			**Units**	**LOR**													
Moisure Content																	
Moisure Content	-	-	%	1	7.4	13	16	17	18	16	11	15	13	21	11	17	17
Heavy Metals																	
Arsenic	300	160	mg/kg	2	61	230	260	230	81	37	69	19	8	7	12	37	49
Cadmium	90	-	mg/kg	0.4	24	3	2	< 0.4	< 0.4	< 0.4	7	4	3	3	4	24	27
Chromium	300	*190*	mg/kg	5	27	8	9	7	13	10	42	10	8	8	8	26	50
Copper	17,000	*220*	mg/kg	5	570	1100	780	220	320	240	690	170	210	89	160	410	380
Lead	600	1,100	mg/kg	5	5200	32000	17000	620	2600	400	8700	520	290	30	350	2800	2800
Nickel	1,200	*220*	mg/kg	5	27	6	7	< 5	8	5	26	12	8	6	12	24	33
Zinc	30,000	*630*	mg/kg	5	7700	1400	860	170	210	200	2100	1300	1100	1600	1400	8500	7700

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Health Investigation Levels for chromium based on chromium (VI)
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Concentrations in red box exceed exceed adopted site specific EIL for urban residential/public open space

Client: Transport Asset Holding Entity
Job No:318001968
Project Name: Captains Flat Rail Corridor Detailed Remediation Design - Addendum to DSI
4/11/2024

Table 3:
Analytical Results - Copper Creek Culvert Embankment

	NEPM 2013 HIL C Public Open Space	Site Specific EIL Public Open Space														
Sample Type:					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Lab Sample Number					S24-Se0052863	S24-Se0052864	S24-Se0052865	S24-Se0052866	S24-Se0052867	S24-Se0052868	S24-Se0052869	S24-Se0052870	S24-Se0052871	S24-Se0052872	S24-Se0052873
Sample ID:					TP5_1.0	TP5_1.5	TP5_2.0	TP5_2.5	TP6_0.0	TP6_0.5	TP6_1.0	TP6_1.5	TP6_2.0	TP6_2.5	TP6_3.0
Sample date:					17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024
Project Name:					Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat
Sampling Method:					GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB
Analyte grouping / Analyte			**Units**	**LOR**											
Moisure Content															
Moisure Content	-	-	%	1	14	16	14	15	12	13	13	16	16	16	15
Heavy Metals															
Arsenic	300	160	mg/kg	2	37	30	14	33	110	53	47	27	16	29	14
Cadmium	90	-	mg/kg	0.4	15	< 0.4	< 0.4	1	17	8	6	3	1	4	3
Chromium	300	*190*	mg/kg	5	14	12	19	17	11	17	16	14	13	14	13
Copper	17,000	*220*	mg/kg	5	490	37	32	75	420	180	120	66	86	100	140
Lead	600	1,100	mg/kg	5	2000	440	29	790	9500	3500	1900	590	300	850	150
Nickel	1,200	*220*	mg/kg	5	14	< 5	8	9	7	9	12	7	< 5	7	< 5
Zinc	30,000	*630*	mg/kg	5	4700	150	75	190	11000	3000	1800	760	480	860	600

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Client: Transport Asset Holding Entity
Job No:318001968
Project Name: Captains Flat Rail Corridor Detailed Remediation Design - Addendum to DSI
4/11/2024

Table 4:
fpXRF Results - Copper Creek Culvert Embankment

	NEPM 2013 HIL C Public Open Space	Site Specific EIL Residential	Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Lab Sample Number		S24-Se0052838	S24-Se0052839	S24-Se0052840	S24-Se0052841	S24-Se0052842	S24-Se0052843	S24-Se0052844	S24-Se0052845	S24-Se0052846	S24-Se0052847	S24-Se0052848	S24-Se0052849	S24-Se0052850
			Sample ID:		TP1_0.0	TP1_0.5	TP1_1.0	TP1_1.5	TP1_2.0	TP1_2.5	TP1_3.0	TP2_0.0	TP2_0.5	TP2_1.0	TP2_1.5	TP2_2.0	TP3_0.0
			Sample date:		17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024
			Project Name:		Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat
			Sampling Method:		GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB
Analyte grouping / Analyte			**Units**	**LOR**													
Moisure Content																	
Moisure Content	-	-	%	1													
Heavy Metals																	
Arsenic	300	160	mg/kg	2	402	351	166	201	177	256	16	71	48	62	<LOD	<LOD	<LOD
Cadmium	90	-	mg/kg	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	300	*190*	mg/kg	5	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	17,000	*220*	mg/kg	5	277	539	136	177	158	178	48	172	169	192	109	122	360
Lead	600	1,100	mg/kg	5	4084	5065	1396	2454	1449	1868	83	607	810	551	88	167	2099
Nickel	1,200	*220*	mg/kg	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Zinc	30,000	*630*	mg/kg	5	12150	16472	2339	1674	4125	5432	783	1473	1630	1297	396	583	3752

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<value = Less than the Limit of Detection (LOD)
- Not analysed / Not calculated
LOR = Limit of Reporting
LOD = Limit of Detection
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Client: Transport Asset Holding Entity
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Project Name: Captains Flat Rail Corridor Detailed Remediation Design - Addendum to DSI
4/11/2024

Table 4:
fpXRF Results - Copper Creek Culvert Embankment

	NEPM 2013 HIL C Public Open Space	Site Specific EIL Residential	Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Lab Sample Number		S24-Se0052851	S24-Se0052852	S24-Se0052853	S24-Se0052854	S24-Se0052855	S24-Se0052856	S24-Se0052857	S24-Se0052858	S24-Se0052859	S24-Se0052860	S24-Se0052861	S24-Se0052862
			Sample ID:		TP3_0.5	TP3_1.0	TP3_1.5	TP3_2.0	TP3_2.5	TP4_0.0	TP4_0.5	TP4_1.0	TP4_1.5	TP4_2.0	TP5_0.0	TP5_0.5
			Sample date:		17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024
			Project Name:		Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat
			Sampling Method:		GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB
Analyte grouping / Analyte			**Units**	**LOR**												
Moisure Content																
Moisure Content	-	-	%	1												
Heavy Metals																
Arsenic	300	160	mg/kg	2	850	277	112	345	32	339	<LOD	<LOD	<LOD	19	157	40
Cadmium	90	-	mg/kg	0.4	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	300	*190*	mg/kg	5	-	-	-	-	-	-	-	-	-	-	-	-
Copper	17,000	*220*	mg/kg	5	580	566	173	263	143	590	141	159	56	142	432	238
Lead	600	1,100	mg/kg	5	9029	7250	455	2362	356	5162	257	284	22	145	2707	1029
Nickel	1,200	*220*	mg/kg	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Zinc	30,000	*630*	mg/kg	5	770	590	148	213	150	1640	454	904	1153	850	7634	6398

Blank Cell indicates no criterion available
<value = Less than the Limit of Detection (LOD)
- Not analysed / Not calculated
LOR = Limit of Reporting
LOD = Limit of Detection
National Environment Protection Council (2013) National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) (NEPM).
Health Investigation Levels for chromium based on chromium (VI)
Concentrations in green box exceed adopted HIL C for Public Open Space
Concentrations in red box exceed exceed adopted site specific EIL for urban residential/public open space

Client: Transport Asset Holding Entity
Job No:318001968
Project Name: Captains Flat Rail Corridor Detailed Remediation Design - Addendum to DSI
4/11/2024

Table 4:
fpXRF Results - Copper Creek Culvert Embankment

	NEPM 2013 HIL C Public Open Space	Site Specific EIL Residential	Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Lab Sample Number		S24-Se0052863	S24-Se0052864	S24-Se0052865	S24-Se0052866	S24-Se0052867	S24-Se0052868	S24-Se0052869	S24-Se0052870	S24-Se0052871	S24-Se0052872	S24-Se0052873
			Sample ID:		TP5_1.0	TP5_1.5	TP5_2.0	TP5_2.5	TP6_0.0	TP6_0.5	TP6_1.0	TP6_1.5	TP6_2.0	TP6_2.5	TP6_3.0
			Sample date:		17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024
			Project Name:		Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat	Captains Flat
			Sampling Method:		GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB
Analyte grouping / Analyte			**Units**	**LOR**											
Moisure Content															
Moisure Content	-	-	%	1											
Heavy Metals															
Arsenic	300	160	mg/kg	2	159	16	<LOD	17	525	110	207	71	<LOD	37	78
Cadmium	90	-	mg/kg	0.4	-	-	-	-	-	-	-	-	-	-	-
Chromium	300	*190*	mg/kg	5	-	-	-	-	-	-	-	-	-	-	-
Copper	17,000	*220*	mg/kg	5	459	36	85	58	547	162	170	203	80	98	125
Lead	600	1,100	mg/kg	5	1938	47	28	71	8119	1856	1571	1300	130	495	482
Nickel	1,200	*220*	mg/kg	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Zinc	30,000	*630*	mg/kg	5	6303	131	70	90	3797	3277	1487	1824	193	634	556

Blank Cell indicates no criterion available
<value = Less than the Limit of Detection (LOD)
- Not analysed / Not calculated
LOR = Limit of Reporting
LOD = Limit of Detection
National Environment Protection Council (2013) National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) (NEPM).
Health Investigation Levels for chromium based on chromium (VI)
Concentrations in green box exceed adopted HIL C for Public Open Space
Concentrations in red box exceed exceed adopted site specific EIL for urban residential/public open space

Client: Transport Asset Holding Entity
Job No:318001968
Project Name: Captains Flat Rail Corridor Detailed Remediation Design - Addendum to DSI
4/11/2024

Table 5:
QA/QC - Relative Percent Differences

	Sample Type:		Soil	Soil	RPD	Soil	Soil	RPD	Soil	Soil	RPD
	Lab Sample number:		S24-Se0052847	S24-Se0052874		S24-Se0052847	ES2431034001		S24-Se0052832	S24-Se0052875	
	Sample date:		17/09/2024	17/09/2024		17/09/2024	17/09/2024		18/09/2024	18/09/2024	
	Sample ID:		TP2_1.0	D01_20240917		TP2_1.0	T01_20240917		HA10_0.5	D02_20240917	
	Sampling Method:		Grab	Grab		Grab	Grab		Grab	Grab	
	Sample Description:		PRIMARY	Duplicate		PRIMARY	Duplicate		PRIMARY	Duplicate	
Analyte grouping / Analyte	**Units**	**LOR**									
EG005(ED093)T: Total Metals by ICP-AES											
Arsenic	mg/kg	5	19	12	**45.2**	19	22	*14.6*	6.6	11	**50.0**
Cadmium	mg/kg	1	3.4	2.5	**30.5**	3.4	5	**38.1**	1.4	1.2	15.4
Chromium	mg/kg	2	19	16	*17.1*	19	27	**34.8**	19	17	11.1
Copper	mg/kg	5	220	150	**37.8**	220	247	*11.6*	66	53	21.8
Lead	mg/kg	5	1000	470	**72.1**	1000	835	*18.0*	97	120	21.2
Nickel	mg/kg	2	12	9.4	*24.3*	12	12	*0.0*	7.1	5.6	23.6
Zinc	mg/kg	5	2100	1300	**47.1**	2100	1620	*25.8*	800	670	17.7

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

Client: Transport Asset Holding Entity
Job No:318001968
Project Name: Captains Flat Rail Corridor Detailed Remediation Design - Addendum to DSI
4/11/2024

Table 5:
QA/QC - Relative Percent Differences

	Sample Type:		Soil	Soil	RPD	Soil	Soil	RPD	Soil	Soil	RPD
	Lab Sample number:		S24-Se0052832	ES2431034002		S24-Se0052862	S24-Se0052876		S24-Se0052862	ES2431034003	
	Sample date:		18/09/2024	18/09/2024		17/09/2024	17/09/2024		17/09/2024	17/09/2024	
	Sample ID:		HA10_0.5	T02_20240917		TP5_0.5	D03_20240917		TP5_0.5	T03_20240917	
	Sampling Method:		Grab	Grab		Grab	Grab		Grab	Grab	
	Sample Description:		PRIMARY	Triplicate		PRIMARY	Duplicate		PRIMARY	Triplicate	
Analyte grouping / Analyte	**Units**	**LOR**									
EG005(ED093)T: Total Metals by ICP-AES											
Arsenic	mg/kg	5	6.6	8	19.2	49	58	*16.8*	49	80	**48.1**
Cadmium	mg/kg	1	1.4	<1	--	27	26	*3.8*	27	36	*28.6*
Chromium	mg/kg	2	19	17	11.1	50	30	**50.0**	50	74	**38.7**
Copper	mg/kg	5	66	67	1.5	380	530	**33.0**	380	612	**46.8**
Lead	mg/kg	5	97	147	**41.0**	2800	5100	**58.2**	2800	4490	**46.4**
Nickel	mg/kg	2	7.1	6	16.8	33	26	*23.7*	33	51	**42.9**
Zinc	mg/kg	5	800	755	5.8	7700	9400	*19.9*	7700	13900	**57.4**

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

Client: Transport Asset Holding Entity
Job No:318001968
Project Name: Captains Flat Rail Corridor Detailed Remediation Design - Addendum to DSI
4/11/2024

Table 6:
QA/QC - Rinsates

	Sample Type:	Soil	Soil
	Lab Sample Number	S24-Se0052877	S24-Se0052878
	Sample ID:	R01_20240917	R02_20240918
	Sample date:	17/09/2024	18/09/2024
	Project Name:	Captains Flat	Captains Flat
	Sampling Method:	GRAB	GRAB
Analyte grouping / Analyte	**Units**	**LOR**	
Heavy Metals			
Arsenic	mg/L	0.001	< 0.001	< 0.001
Cadmium	mg/L	0.0002	< 0.0002	< 0.0002
Chromium	mg/L	0.001	< 0.001	< 0.001
Copper	mg/L	0.001	< 0.001	< 0.001
Lead	mg/L	0.001	< 0.001	< 0.001
Nickel	mg/L	0.001	< 0.001	< 0.001
Zinc	mg/L	0.005	< 0.005	< 0.005

Blank Cell indicates no criterion available
<value = Less than the laboratory Limit of Reporting (LOR)
mg/L = milligrams per litre
LOD = Limit of Detection
National Environment Protection Council (2013) National Environmental
Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.
Health Investigation Levels for chromium based on chromium (VI)

Appendix 5
Laboratory Reports

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

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

☐ Brisbane Laboratory
Unit 1 21 Smallwood Place 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
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Company	Ramboll	Project №	318001968	Project Manager	Stephen Maxwell
Address	3/100 Pacific Highway, North Sydney 2060, NSW	Project Name	318001968	EDD Format (ESdat, EQuIS etc)	EQuIS
Contact Name	Sam Buckley				
Phone №	0481 384 112				
Special Directions	Page 1 of 7				
Purchase Order					
Quote ID №					

Sampler(s)	Sam Buckley	
Handed over by	Sam Buckley	
Email for Invoice	jauld@ramboll.com; asiapac-accounts@ramboll.com	
Email for Results	jauld@ramboll.com; smaxwell@ramboll.com	

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

Containers
Change container type & size if necessary.

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

♦Surcharge will apply
☐ Overnight (reporting by 9am)♦
☐ Same day♦ ☐ 1 day♦
☐ 2 days♦ ☐ 3 days♦
☑ 5 days (Standard)
☐ Other( )

№		Sampled Date/Time dd/mm/yy hh:mm	Matrix Solid (S) Water (W)	Metals(As, Cr, Cu, Pb, Ni, Zn, Cd)	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Asbetos Bag	Sample Comments / Dangerous Goods Hazard Warning
1	HA1_0.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
2	HA1_0.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
3	HA2_0.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
4	HA2_0.5	17/08/24	S	X							1		Pb Conc approx > 5000mg/kg
5	HA3_0.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
6	HA3_0.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
7	HA4_0.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
8	HA4_0.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
9	HA5_0.0	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
10	HA5_0.5	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
	Total Counts			10							10		

Method of Shipment: ☐ Courier (#) ☑ Hand Delivered ☐ Postal | Name: Sam Buckley | Signature: | Date: 9/19/2024 | Time:

Laboratory Use Only

Received By	Rihan Al Smaydi	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date 19/9	Time 3:23 pm	Temperature	3.1°C
Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	Time	Report №	chill

114133
Dropped off

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

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

☐ **Brisbane Laboratory** Unit 1 21 Smallwood Place 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** 6 Monterey Road Dandenong South VIC 3175 03 8564 5000 EnviroSampleVic@eurofins.com

Company	Ramboll	Project №	318001968	Project Manager	Stephen Maxwell
Address	3/100 Pacific Highway, North Sydney 2060, NSW	Project Name	318001968	EDD Format ESdat, EQuIS etc	EQuIS
Contact Name	Sam Buckley				
Phone №	0481 384 112				
Special Directions	Page 2 of 7				
Purchase Order					
Quote ID №					

Sampler(s)	Sam Buckley	
Handed over by	Sam Buckley	
Email for Invoice	jauld@ramboll.com; asiapac-accounts@ramboll.com	
Email for Results	jauld@ramboll.com; smaxwell@ramboll.com	

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

Containers — Change container type & size if necessary.

Required Turnaround Time (TAT) — Default will be 5 days if not ticked.

♦Surcharge will apply

☐ Overnight (reporting by 9am)♦ ☐ Same day♦ ☐ 1 day♦ ☐ 2 days♦ ☐ 3 days♦ ☑ 5 days (Standard) ☐ Other( )

№		Sampled Date/Time dd/mm/yy hh:mm	Matrix Solid (S) Water (W)	Metals(As, Cr, Cu, Pb, Ni, Zn, Cd)	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Asbestos Bag	Sample Comments / Dangerous Goods Hazard Warning
1	HA6_0.0	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
2	HA6_0.5	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
3	HA7_0.0	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
4	HA7_0.5	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
5	HA8_0.0	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
6	HA8_0.5	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
7	HA9_0.0	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
8	HA9_0.5	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
9	HA10_0.0	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
10	HA10_0.5	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
	Total Counts			10							10		

Method of Shipment	☐ Courier (#)	☑ Hand Delivered	☐ Postal	Name	Sam Buckley	Signature	
Date	9/19/2024	Time					

Laboratory Use Only	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time		Temperature	
	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time		Report №	

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

☑ Sydney Laboratory
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02 9900 8400 EnviroSampleNSW@eurofins.com

☐ Brisbane Laboratory
Unit 1 21 Smallwood Place Murarrie QLD 4172
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☐ Perth Laboratory
Unit 2 91 Leach Highway Kewdale WA 6105
08 9251 9600 EnviroSampleWA@eurofins.com

☐ Melbourne Laboratory
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Company	Ramboll	Project №	318001968	Project Manager	Stephen Maxwell
Address	3/100 Pacific Highway, North Sydney 2060, NSW	Project Name	318001968	EDD Format (ESdat, EQuIS etc)	EQuIS
Contact Name	Sam Buckley				
Phone №	0481 384 112				
Special Directions	Page 3 of 7				
Purchase Order					
Quote ID №					

Sampler(s)	Sam Buckley
Handed over by	Sam Buckley
Email for Invoice	jauld@ramboll.com; asiapac-accounts@ramboll.com
Email for Results	jauld@ramboll.com; smaxwell@ramboll.com

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

Containers
Change container type & size if necessary.

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

♦Surcharge will apply
☐ Overnight (reporting by 9am)♦
☐ Same day♦ ☐ 1 day♦
☐ 2 days♦ ☐ 3 days♦
☑ 5 days (Standard)
☐ Other( )

№		Sampled Date/Time (dd mm/yy hh:mm)	Matrix Solid (S) Water (W)	Metals(As, Cr, Cu, Pb, Ni, Zn, Cd)	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Asbestos Bag	Sample Comments / Dangerous Goods Hazard Warning
1	HA11_0.0	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
2	HA12_0.0	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
3	HA12_0.5	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
4	HA13_0.0	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
5	HA14_0.0	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
6	TP1_0.0	17/09/24	S	X							1		Pb Conc approx > 5000mg/kg
7	TP1_0.5	17/09/24	S	X							1		Pb Conc approx > 5000mg/kg
8	TP1_1.0	17/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
9	TP1_1.5	17/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
10	TP1_2.0	17/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
	Total Counts			10							10		

Method of Shipment	☐ Courier (#)	☑ Hand Delivered	☐ Postal	Name	Sam Buckley	Signature	
Date	9/19/2024	Time					

Laboratory Use Only	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time		Temperature	
	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time		Report №	

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

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

☐ **Brisbane Laboratory** Unit 1 21 Smallwood Place 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** 6 Monterey Road Dandenong South VIC 3175 03 8564 5000 EnviroSampleVic@eurofins.com

Company	Ramboll	Project №	318001968	Project Manager	Stephen Maxwell
Address	3/100 Pacific Highway, North Sydney 2060, NSW	Project Name	318001968	EDD Format ESdat, EQuIS etc	EQuIS
Contact Name	Sam Buckley				
Phone №	0481 384 112				
Special Directions	Page 4 of 7				
Purchase Order					
Quote ID №					

Sampler(s)	Sam Buckley	
Handed over by	Sam Buckley	
Email for Invoice	jauld@ramboll.com; asiapac-accounts@ramboll.com	
Email for Results	jauld@ramboll.com; smaxwell@ramboll.com	

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

Containers — Change container type & size if necessary.

Required Turnaround Time (TAT) — Default will be 5 days if not ticked.

+Surcharge will apply

☐ Overnight (reporting by 9am)+ ☐ Same day+ ☐ 1 day+ ☐ 2 days+ ☐ 3 days+ ☑ 5 days (Standard) ☐ Other( )

№		Sampled Date/Time dd/mm/yy hh:mm	Matrix Solid (S) Water (W)	Metals(As, Cr, Cu, Pb, Ni, Zn, Cd)	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Asbestos Bag	Sample Comments / Dangerous Goods Hazard Warning
1	TP1_2.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
2	TP1_3.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
3	TP2_0.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
4	TP2_0.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
5	TP2_1.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
6	TP2_1.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
7	TP2_2.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
8	TP3_0.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
9	TP3_0.5	17/08/24	S	X							1		Pb Conc approx > 5000mg/kg
10	TP3_1.0	17/08/24	S	X							1		Pb Conc approx > 5000mg/kg
	Total Counts			10							10		

Method of Shipment	☐ Courier (#)	☑ Hand Delivered	☐ Postal	Name	Sam Buckley	Signature	
Date	9/19/2024	Time					

Laboratory Use Only	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time		Temperature	
	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time		Report №	

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

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

☐ Brisbane Laboratory
Unit 1 21 Smallwood Place 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
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Company	Ramboll	Project №	318001968	Project Manager	Stephen Maxwell
Address	3/100 Pacific Highway, North Sydney 2060, NSW	Project Name	318001968	EDD Format (ESdat, EQuIS etc)	EQuIS
Contact Name	Sam Buckley				
Phone №	0481 384 112				
Special Directions	Page 5 of 7				
Purchase Order					
Quote ID №					

Sampler(s)	Sam Buckley
Handed over by	Sam Buckley
Email for Invoice	jauld@ramboll.com; asiapac-accounts@ramboll.com
Email for Results	jauld@ramboll.com; smaxwell@ramboll.com

Analyses — Where metals are requested please specify "Total" or "Filtered". SUITE code must be used to attract SUITE pricing.

Containers — Change container type & size if necessary.

Required Turnaround Time (TAT) — Default will be 5 days if not ticked.

- ♦Surcharge will apply
- ☐ Overnight (reporting by 9am)♦
- ☐ Same day♦ ☐ 1 day♦
- ☐ 2 days♦ ☐ 3 days♦
- ☑ 5 days (Standard)
- ☐ Other( )

№		Sampled Date/Time (dd mm/yy hh:mm)	Matrix (Solid (S) Water (W))	Metals(As, Cr, Cu, Pb, Ni, Zn, Cd)	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Asbestos Bag	Sample Comments / Dangerous Goods Hazard Warning
1	TP3_1.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
2	TP3_2.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
3	TP3_2.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
4	TP4_0.0	17/08/24	S	X							1		Pb Conc approx > 5000mg/kg
5	TP4_0.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
6	TP4_1.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
7	TP4_1.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
8	TP4_2.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
9	TP5_0.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
10	TP5_0.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
	Total Counts			10							10		

Method of Shipment	☐ Courier (#)	☑ Hand Delivered	☐ Postal	Name	Sam Buckley	Signature	
Date	9/19/2024	Time					

Laboratory Use Only	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time		Temperature	
	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time		Report №	

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

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

☐ Brisbane Laboratory
Unit 1 21 Smallwood Place 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
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Company	Ramboll	Project №	318001968	Project Manager	Stephen Maxwell
Address	3/100 Pacific Highway, North Sydney 2060, NSW	Project Name	318001968	EDD Format (ESdat, EQuIS etc)	EQuIS
Contact Name	Sam Buckley				
Phone №	0481 384 112				
Special Directions	Page 6 of 7				
Purchase Order					
Quote ID №					

Sampler(s)	Sam Buckley	
Handed over by	Sam Buckley	
Email for Invoice	jauld@ramboll.com; asiapac-accounts@ramboll.com	
Email for Results	jauld@ramboll.com; smaxwell@ramboll.com	

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

Containers
Change container type & size if necessary.

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

♦Surcharge will apply
☐ Overnight (reporting by 9am)♦
☐ Same day♦ ☐ 1 day♦
☐ 2 days♦ ☐ 3 days♦
☑ 5 days (Standard)
☐ Other( )

№		Sampled Date/Time dd/mm/yy hh:mm	Matrix Solid (S) Water (W)	Metals(As, Cr, Cu, Pb, Ni, Zn, Cd)	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Asbestos Bag	Sample Comments / Dangerous Goods Hazard Warning
1	TP5_1.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
2	TP5_1.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
3	TP5_2.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
4	TP5_2.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
5	TP6_0.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
6	TP6_0.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
7	TP6_1.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
8	TP6_1.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
9	TP6_2.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
10	TP6_2.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
	Total Counts			10							10		

Method of Shipment	☐ Courier (#)	☑ Hand Delivered	☐ Postal	Name	Sam Buckley	Signature		Date	9/19/2024	Time	

Laboratory Use Only	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time		Temperature	
	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time		Report №	

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

☑ Sydney Laboratory
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02 9900 8400 EnviroSampleNSW@eurofins.com

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08 9251 9600 EnviroSampleWA@eurofins.com

☐ Melbourne Laboratory
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Company	Ramboll	Project №	318001968	Project Manager	Stephen Maxwell
Address	3/100 Pacific Highway, North Sydney 2060, NSW	Project Name	318001968	EDD Format (ESdat, EQuIS etc)	EQuIS
Contact Name	Sam Buckley				
Phone №	0481 384 112				
Special Directions	Page 7 of 7				
Purchase Order					
Quote ID №					

Sampler(s)	Sam Buckley
Handed over by	Sam Buckley
Email for Invoice	jauld@ramboll.com; asiapac-accounts@ramboll.com
Email for Results	jauld@ramboll.com; smaxwell@ramboll.com

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

Containers — Change container type & size if necessary.

Required Turnaround Time (TAT) — Default will be 5 days if not ticked.

♦Surcharge will apply
☐ Overnight (reporting by 9am)♦
☐ Same day♦ ☐ 1 day♦
☐ 2 days♦ ☐ 3 days♦
☑ 5 days (Standard)
☐ Other( )

№		Sampled Date/Time dd/mm/yy hh:mm	Matrix Solid (S) Water (W)	Metals(As, Cr, Cu, Pb, Ni, Zn, Cd)	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Asbetos Bag	Sample Comments / Dangerous Goods Hazard Warning
1	TP6_3.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
2	D01_20240917	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
3	D02_20240917	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
4	D03_20240917	18/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
5	T01_20240917	17/08/24	S	X							1		Please forward to ALS Pb Conc Approx < 5000mg/kg
6	T02_20240917	17/08/24	S	X							1		Please forward to ALS Pb Conc Approx < 5000mg/kg
7	T03_20240917	18/08/24	S	X							1		Please forward to ALS Pb Conc Approx < 5000mg/kg
8	R01_20240917	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
9	R02_20240918	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
10													
	Total Counts			9							9		

Method of Shipment	☐ Courier (#)	☑ Hand Delivered	☐ Postal	Name	Sam Buckley	Signature	
				Date	9/19/2024	Time	

Laboratory Use Only									
	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time		Temperature	
	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time		Report №	

eurofins | Environment Testing

www.eurofins.com.au EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd

ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road	19/8 Lewalan Street	179 Magowar Road	Unit 1,2 Dacre Street	1/21 Smallwood Place	1/2 Frost Drive
Dandenong South	Grovedale	Girraween	Mitchell	Murarrie	Mayfield West
VIC 3175	VIC 3216	NSW 2145	ACT 2911	QLD 4172	NSW 2304
+61 3 8564 5000	+61 3 8564 5000	+61 2 9900 8400	+61 2 6113 8091	T: +61 7 3902 4600	+61 2 4968 8448
NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794 & 2780	Site# 25079

Eurofins ARL Pty Ltd

ABN: 91 05 0159 898

Perth
46-48 Banksia Road
Welshpool
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+61 8 6253 4444
NATA# 2377
Site# 2370

Eurofins ProMicro Pty Ltd

ABN: 47 009 120 549

Perth ProMicro
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WA 6106
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NATA# 2561
Site# 2554

Eurofins Environment Testing NZ Ltd

NZBN: 9429046024954

Auckland	Auckland (Focus)	Christchurch	Tauranga
35 O'Rorke Road	Unit C1/4 Pacific Rise,	43 Detroit Drive	1277 Cameron Road,
Penrose,	Mount Wellington,	Rolleston,	Gate Pa,
Auckland 1061	Auckland 1061	Christchurch 7675	Tauranga 3112
+64 9 526 4551	+64 9 525 0568	+64 3 343 5201	+64 9 525 0568
IANZ# 1327	IANZ# 1308	IANZ# 1290	IANZ# 1402

Sample Receipt Advice

Company name: Ramboll Australia Pty Ltd
Contact name: Stephen Maxwell
Project name: 318001968
Project ID: 318001968
Turnaround time: 7 Day
Date/Time received Sep 19, 2024 3:23 PM
Eurofins reference 1141337

Sample Information

✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

✓ All samples have been received as described on the above COC.

✓ COC has been completed correctly.

✓ Attempt to chill was evident.

✓ Appropriately preserved sample containers have been used.

✓ All samples were received in good condition.

✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

✓ Appropriate sample containers have been used.

✓ Sample containers for volatile analysis received with zero headspace.

X Split sample sent to requested external lab.

X Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Notes

T01 T02 T03 TOP ALS

Contact

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

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

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

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

eurofins

web: www.eurofins.com.au
email: EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road	19/8 Lewalan Street	179 Magowar Road	Unit 1,2 Dacre Street	1/21 Smallwood Place	1/2 Frost Drive
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NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794 & 2780	Site# 25079

Eurofins ARL Pty Ltd
ABN: 91 05 0159 898

Perth
46-48 Banksia Road
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WA 6106
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NATA# 2377
Site# 2370

Eurofins ProMicro Pty Ltd
ABN: 47 009 120 549

Perth ProMicro
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NATA# 2561
Site# 2554

Eurofins Environment Testing NZ Ltd
NZBN: 9429046024954

Auckland	Auckland (Focus)	Christchurch	Tauranga
35 O'Rorke Road	Unit C1/4 Pacific Rise,	43 Detroit Drive	1277 Cameron Road,
Penrose,	Mount Wellington,	Rolleston,	Gate Pa,
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+64 9 526 4551	+64 9 525 0568	+64 3 343 5201	+64 9 525 0568
IANZ# 1327	IANZ# 1308	IANZ# 1290	IANZ# 1402

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

Project Name: 318001968
Project ID: 318001968

Order No.:
Report #: 1141337
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Sep 19, 2024 3:23 PM
Due: Sep 30, 2024
Priority: 7 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Moisture Set
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X	X
External Laboratory													
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**								
1	HA1_0.0	Aug 17, 2024		Soil	S24-Se0052813	X	X	X	X	X	X	X	X
2	HA1_0.5	Aug 17, 2024		Soil	S24-Se0052814	X	X	X	X	X	X	X	X
3	HA2_0.0	Aug 17, 2024		Soil	S24-Se0052815	X	X	X	X	X	X	X	X
4	HA2_0.5	Aug 17, 2024		Soil	S24-Se0052816	X	X	X	X	X	X	X	X
5	HA3_0.0	Aug 17, 2024		Soil	S24-Se0052817	X	X	X	X	X	X	X	X
6	HA3_0.5	Aug 17, 2024		Soil	S24-Se0052818	X	X	X	X	X	X	X	X
7	HA4_0.0	Aug 17, 2024		Soil	S24-Se0052819	X	X	X	X	X	X	X	X
8	HA4_0.5	Aug 17, 2024		Soil	S24-Se0052820	X	X	X	X	X	X	X	X
9	HA5_0.0	Sep 18, 2024		Soil	S24-Se0052821	X	X	X	X	X	X	X	X
10	HA5_0.5	Sep 18, 2024		Soil	S24-Se0052822	X	X	X	X	X	X	X	X
11	HA6_0.0	Sep 18, 2024		Soil	S24-Se0052823	X	X	X	X	X	X	X	X
12	HA6_0.5	Sep 18, 2024		Soil	S24-Se0052824	X	X	X	X	X	X	X	X
13	HA7_0.0	Sep 18, 2024		Soil	S24-Se0052825	X	X	X	X	X	X	X	X
14	HA7_0.5	Sep 18, 2024		Soil	S24-Se0052826	X	X	X	X	X	X	X	X

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web: www.eurofins.com.au
email: EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road	19/8 Lewalan Street	179 Magowar Road	Unit 1,2 Dacre Street	1/21 Smallwood Place	1/2 Frost Drive
Dandenong South	Grovedale	Girraween	Mitchell	Murarrie	Mayfield West
VIC 3175	VIC 3216	NSW 2145	ACT 2911	QLD 4172	NSW 2304
+61 3 8564 5000	+61 3 8564 5000	+61 2 9900 8400	+61 2 6113 8091	T: +61 7 3902 4600	+61 2 4968 8448
NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
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Eurofins ARL Pty Ltd
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Perth
46-48 Banksia Road
Welshpool
WA 6106
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NATA# 2377
Site# 2370

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46-48 Banksia Road
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Auckland	Auckland (Focus)	Christchurch	Tauranga
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IANZ# 1327	IANZ# 1308	IANZ# 1290	IANZ# 1402

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

Project Name: 318001968
Project ID: 318001968

Order No.:
Report #: 1141337
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Sep 19, 2024 3:23 PM
Due: Sep 30, 2024
Priority: 7 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Moisture Set
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X	X
15	HA8_0.0	Sep 18, 2024		Soil	S24-Se0052827	X	X	X	X	X	X	X	X
16	HA8_0.5	Sep 18, 2024		Soil	S24-Se0052828	X	X	X	X	X	X	X	X
17	HA9_0.0	Sep 18, 2024		Soil	S24-Se0052829	X	X	X	X	X	X	X	X
18	HA9_0.5	Sep 18, 2024		Soil	S24-Se0052830	X	X	X	X	X	X	X	X
19	HA10_0.0	Sep 18, 2024		Soil	S24-Se0052831	X	X	X	X	X	X	X	X
20	HA10_0.5	Sep 18, 2024		Soil	S24-Se0052832	X	X	X	X	X	X	X	X
21	HA11_0.0	Sep 18, 2024		Soil	S24-Se0052833	X	X	X	X	X	X	X	X
22	HA12_0.0	Sep 18, 2024		Soil	S24-Se0052834	X	X	X	X	X	X	X	X
23	HA12_0.5	Sep 18, 2024		Soil	S24-Se0052835	X	X	X	X	X	X	X	X
24	HA13_0.0	Sep 18, 2024		Soil	S24-Se0052836	X	X	X	X	X	X	X	X
25	HA14_0.0	Sep 18, 2024		Soil	S24-Se0052837	X	X	X	X	X	X	X	X
26	TP1_0.0	Sep 17, 2024		Soil	S24-Se0052838	X	X	X	X	X	X	X	X
27	TP1_0.5	Sep 17, 2024		Soil	S24-Se0052839	X	X	X	X	X	X	X	X
28	TP1_1.0	Sep 17, 2024		Soil	S24-Se0052840	X	X	X	X	X	X	X	X
29	TP1_1.5	Sep 17, 2024		Soil	S24-Se0052841	X	X	X	X	X	X	X	X
30	TP1_2.0	Sep 17, 2024		Soil	S24-Se0052842	X	X	X	X	X	X	X	X
31	TP1_2.5	Aug 17, 2024		Soil	S24-Se0052843	X	X	X	X	X	X	X	X

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web: www.eurofins.com.au
email: EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

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NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
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Sample Detail						Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Moisture Set
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X	X
32	TP1_3.0	Aug 17, 2024		Soil	S24-Se0052844	X	X	X	X	X	X	X	X
33	TP2_0.0	Aug 17, 2024		Soil	S24-Se0052845	X	X	X	X	X	X	X	X
34	TP2_0.5	Aug 17, 2024		Soil	S24-Se0052846	X	X	X	X	X	X	X	X
35	TP2_1.0	Aug 17, 2024		Soil	S24-Se0052847	X	X	X	X	X	X	X	X
36	TP2_1.5	Aug 17, 2024		Soil	S24-Se0052848	X	X	X	X	X	X	X	X
37	TP2_2.0	Aug 17, 2024		Soil	S24-Se0052849	X	X	X	X	X	X	X	X
38	TP3_0.0	Aug 17, 2024		Soil	S24-Se0052850	X	X	X	X	X	X	X	X
39	TP3_0.5	Aug 17, 2024		Soil	S24-Se0052851	X	X	X	X	X	X	X	X
40	TP3_1.0	Aug 17, 2024		Soil	S24-Se0052852	X	X	X	X	X	X	X	X
41	TP3_1.5	Aug 17, 2024		Soil	S24-Se0052853	X	X	X	X	X	X	X	X
42	TP3_2.0	Aug 17, 2024		Soil	S24-Se0052854	X	X	X	X	X	X	X	X
43	TP3_2.5	Aug 17, 2024		Soil	S24-Se0052855	X	X	X	X	X	X	X	X
44	TP4_0.0	Aug 17, 2024		Soil	S24-Se0052856	X	X	X	X	X	X	X	X
45	TP4_0.5	Aug 17, 2024		Soil	S24-Se0052857	X	X	X	X	X	X	X	X
46	TP4_1.0	Aug 17, 2024		Soil	S24-Se0052858	X	X	X	X	X	X	X	X
47	TP4_1.5	Aug 17, 2024		Soil	S24-Se0052859	X	X	X	X	X	X	X	X
48	TP4_2.0	Aug 17, 2024		Soil	S24-Se0052860	X	X	X	X	X	X	X	X

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Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road	19/8 Lewalan Street	179 Magowar Road	Unit 1,2 Dacre Street	1/21 Smallwood Place	1/2 Frost Drive
Dandenong South	Grovedale	Girraween	Mitchell	Murarrie	Mayfield West
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NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794 & 2780	Site# 25079

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Penrose,	Mount Wellington,	Rolleston,	Gate Pa,
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IANZ# 1327	IANZ# 1308	IANZ# 1290	IANZ# 1402

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

Project Name: 318001968
Project ID: 318001968

Order No.:
Report #: 1141337
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Sep 19, 2024 3:23 PM
Due: Sep 30, 2024
Priority: 7 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Moisture Set
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X	X
49	TP5_0.0	Aug 17, 2024		Soil	S24-Se0052861	X	X	X	X	X	X	X	X
50	TP5_0.5	Aug 17, 2024		Soil	S24-Se0052862	X	X	X	X	X	X	X	X
51	TP5_1.0	Aug 17, 2024		Soil	S24-Se0052863	X	X	X	X	X	X	X	X
52	TP5_1.5	Aug 17, 2024		Soil	S24-Se0052864	X	X	X	X	X	X	X	X
53	TP5_2.0	Aug 17, 2024		Soil	S24-Se0052865	X	X	X	X	X	X	X	X
54	TP5_2.5	Aug 17, 2024		Soil	S24-Se0052866	X	X	X	X	X	X	X	X
55	TP6_0.0	Aug 17, 2024		Soil	S24-Se0052867	X	X	X	X	X	X	X	X
56	TP6_0.5	Aug 17, 2024		Soil	S24-Se0052868	X	X	X	X	X	X	X	X
57	TP6_1.0	Aug 17, 2024		Soil	S24-Se0052869	X	X	X	X	X	X	X	X
58	TP6_1.5	Aug 17, 2024		Soil	S24-Se0052870	X	X	X	X	X	X	X	X
59	TP6_2.0	Aug 17, 2024		Soil	S24-Se0052871	X	X	X	X	X	X	X	X
60	TP6_2.5	Aug 17, 2024		Soil	S24-Se0052872	X	X	X	X	X	X	X	X
61	TP6_3.0	Aug 17, 2024		Soil	S24-Se0052873	X	X	X	X	X	X	X	X
62	D01_20240917	Aug 17, 2024		Soil	S24-Se0052874	X	X	X	X	X	X	X	X
63	D02_20240917	Aug 17, 2024		Soil	S24-Se0052875	X	X	X	X	X	X	X	X

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IANZ# 1327	IANZ# 1308	IANZ# 1290	IANZ# 1402

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

Project Name: 318001968
Project ID: 318001968

Order No.:
Report #: 1141337
Phone: 02 9954 8118
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Received: Sep 19, 2024 3:23 PM
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Priority: 7 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Moisture Set
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X	X
64	D03_20240917	Aug 18, 2024		Soil	S24-Se0052876	X	X	X	X	X	X	X	X
65	R01_20240917	Aug 17, 2024		Water	S24-Se0052877	X	X	X	X	X	X	X	
66	R02_20240918	Sep 18, 2024		Water	S24-Se0052878	X	X	X	X	X	X	X	
Test Counts						66	66	66	66	66	66	66	64

Ramboll 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
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **Stephen Maxwell**

Report **1141337-S**
Project name 318001968
Project ID 318001968
Received Date Sep 19, 2024

Client Sample ID			**HA1_0.0**	**HA1_0.5**	**HA2_0.0**	**HA2_0.5**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S24-Se0052813**	**S24-Se0052814**	**S24-Se0052815**	**S24-Se0052816**
Date Sampled			**Aug 17, 2024**	**Aug 17, 2024**	**Aug 17, 2024**	**Aug 17, 2024**
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	13	13	15	71
Cadmium	0.4	mg/kg	0.5	< 0.4	< 0.4	0.5
Chromium	5	mg/kg	15	16	12	< 5
Copper	5	mg/kg	60	17	60	280
Lead	5	mg/kg	240	100	400	10000
Nickel	5	mg/kg	< 5	< 5	< 5	< 5
Zinc	5	mg/kg	1000	110	180	500
Sample Properties						
% Moisture	1	%	4.2	9.9	16	24

Client Sample ID			**HA3_0.0**	**HA3_0.5**	**HA4_0.0**	**HA4_0.5**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S24-Se0052817**	**S24-Se0052818**	**S24-Se0052819**	**S24-Se0052820**
Date Sampled			**Aug 17, 2024**	**Aug 17, 2024**	**Aug 17, 2024**	**Aug 17, 2024**
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	19	8.4	6.9	9.5
Cadmium	0.4	mg/kg	< 0.4	< 0.4	1.5	1.0
Chromium	5	mg/kg	10	9.9	11	15
Copper	5	mg/kg	64	28	26	19
Lead	5	mg/kg	430	61	150	97
Nickel	5	mg/kg	< 5	< 5	< 5	5.4
Zinc	5	mg/kg	86	150	380	370
Sample Properties						
% Moisture	1	%	14	16	13	16

Client Sample ID			HA5_0.0	HA5_0.5	HA6_0.0	HA6_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S24-Se0052821	S24-Se0052822	S24-Se0052823	S24-Se0052824
Date Sampled			Sep 18, 2024	Sep 18, 2024	Sep 18, 2024	Sep 18, 2024
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	59	5.6	45	71
Cadmium	0.4	mg/kg	4.2	0.5	16	0.7
Chromium	5	mg/kg	13	13	27	13
Copper	5	mg/kg	300	32	180	160
Lead	5	mg/kg	2800	56	860	2500
Nickel	5	mg/kg	< 5	< 5	8.3	< 5
Zinc	5	mg/kg	920	280	4500	530
Sample Properties						
% Moisture	1	%	57	22	24	15

Client Sample ID			HA7_0.0	HA7_0.5	HA8_0.0	HA8_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S24-Se0052825	S24-Se0052826	S24-Se0052827	S24-Se0052828
Date Sampled			Sep 18, 2024	Sep 18, 2024	Sep 18, 2024	Sep 18, 2024
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	31	32	45	33
Cadmium	0.4	mg/kg	20	2.6	16	15
Chromium	5	mg/kg	7.5	21	28	14
Copper	5	mg/kg	150	34	140	370
Lead	5	mg/kg	600	160	1200	940
Nickel	5	mg/kg	8.7	< 5	8.9	12
Zinc	5	mg/kg	4100	720	3500	4500
Sample Properties						
% Moisture	1	%	62	14	16	18

Client Sample ID			HA9_0.0	HA9_0.5	HA10_0.0	HA10_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S24-Se0052829	S24-Se0052830	S24-Se0052831	S24-Se0052832
Date Sampled			Sep 18, 2024	Sep 18, 2024	Sep 18, 2024	Sep 18, 2024
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	34	150	23	6.6
Cadmium	0.4	mg/kg	3.8	1.9	1.2	1.4
Chromium	5	mg/kg	13	5.7	13	19
Copper	5	mg/kg	130	140	92	66
Lead	5	mg/kg	890	3400	660	97
Nickel	5	mg/kg	16	< 5	< 5	7.1
Zinc	5	mg/kg	900	940	380	800
Sample Properties						
% Moisture	1	%	15	23	23	27

Client Sample ID			HA11_0.0	HA12_0.0	HA12_0.5	HA13_0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S24-Se0052833	S24-Se0052834	S24-Se0052835	S24-Se0052836
Date Sampled			Sep 18, 2024	Sep 18, 2024	Sep 18, 2024	Sep 18, 2024
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	23	17	26	8.9
Cadmium	0.4	mg/kg	2.1	1.1	3.5	0.5
Chromium	5	mg/kg	26	10	11	6.0
Copper	5	mg/kg	130	46	120	63
Lead	5	mg/kg	1100	250	900	180
Nickel	5	mg/kg	18	< 5	< 5	< 5
Zinc	5	mg/kg	1200	450	1000	180
Sample Properties						
% Moisture	1	%	46	10	19	12

Client Sample ID			HA14_0.0	TP1_0.0	TP1_0.5	TP1_1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S24-Se0052837	S24-Se0052838	S24-Se0052839	S24-Se0052840
Date Sampled			Sep 18, 2024	Sep 17, 2024	Sep 17, 2024	Sep 17, 2024
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	160	180	310	430
Cadmium	0.4	mg/kg	< 0.4	26	64	14
Chromium	5	mg/kg	6.6	8.9	13	12
Copper	5	mg/kg	55	340	600	440
Lead	5	mg/kg	280	7700	20000	9100
Nickel	5	mg/kg	< 5	8.2	9.0	7.5
Zinc	5	mg/kg	86	24000	31000	6300
Sample Properties						
% Moisture	1	%	6.3	12	13	18

Client Sample ID			TP1_1.5	TP1_2.0	TP1_2.5	TP1_3.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S24-Se0052841	S24-Se0052842	S24-Se0052843	S24-Se0052844
Date Sampled			Sep 17, 2024	Sep 17, 2024	Aug 17, 2024	Aug 17, 2024
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	120	100	36	35
Cadmium	0.4	mg/kg	2.8	9.3	8.4	5.5
Chromium	5	mg/kg	17	16	12	16
Copper	5	mg/kg	140	150	87	72
Lead	5	mg/kg	4100	2400	1100	670
Nickel	5	mg/kg	6.3	9.1	5.7	5.4
Zinc	5	mg/kg	1400	4100	3900	2400
Sample Properties						
% Moisture	1	%	17	17	17	18

Client Sample ID			TP2_0.0	TP2_0.5	TP2_1.0	TP2_1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S24-Se0052845	S24-Se0052846	S24-Se0052847	S24-Se0052848
Date Sampled			Aug 17, 2024	Aug 17, 2024	Aug 17, 2024	Aug 17, 2024
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	28	12	19	14
Cadmium	0.4	mg/kg	3.5	2.2	3.4	1.5
Chromium	5	mg/kg	28	17	19	18
Copper	5	mg/kg	260	150	220	170
Lead	5	mg/kg	1700	640	1000	480
Nickel	5	mg/kg	11	12	12	13
Zinc	5	mg/kg	5000	2500	2100	860
Sample Properties						
% Moisture	1	%	13	12	12	13

Client Sample ID			TP2_2.0	TP3_0.0	TP3_0.5	TP3_1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S24-Se0052849	S24-Se0052850	S24-Se0052851	S24-Se0052852
Date Sampled			Aug 17, 2024	Aug 17, 2024	Aug 17, 2024	Aug 17, 2024
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	25	61	230	260
Cadmium	0.4	mg/kg	2.4	24	3.2	1.6
Chromium	5	mg/kg	28	27	7.5	9.0
Copper	5	mg/kg	220	570	1100	780
Lead	5	mg/kg	490	5200	32000	17000
Nickel	5	mg/kg	14	27	5.6	6.9
Zinc	5	mg/kg	2300	7700	1400	860
Sample Properties						
% Moisture	1	%	12	7.4	13	16

Client Sample ID			TP3_1.5	TP3_2.0	TP3_2.5	TP4_0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S24-Se0052853	S24-Se0052854	S24-Se0052855	S24-Se0052856
Date Sampled			Aug 17, 2024	Aug 17, 2024	Aug 17, 2024	Aug 17, 2024
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	230	81	37	69
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	6.6
Chromium	5	mg/kg	7.0	13	9.5	42
Copper	5	mg/kg	220	320	240	690
Lead	5	mg/kg	620	2600	400	8700
Nickel	5	mg/kg	< 5	7.8	5.1	26
Zinc	5	mg/kg	170	210	200	2100
Sample Properties						
% Moisture	1	%	17	18	16	11

Client Sample ID			TP4_0.5	TP4_1.0	TP4_1.5	TP4_2.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S24-Se0052857	S24-Se0052858	S24-Se0052859	S24-Se0052860
Date Sampled			Aug 17, 2024	Aug 17, 2024	Aug 17, 2024	Aug 17, 2024
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	19	7.6	6.5	12
Cadmium	0.4	mg/kg	3.6	2.5	2.6	3.8
Chromium	5	mg/kg	9.9	7.9	8.1	7.7
Copper	5	mg/kg	170	210	89	160
Lead	5	mg/kg	520	290	30	350
Nickel	5	mg/kg	12	7.7	6.2	12
Zinc	5	mg/kg	1300	1100	1600	1400
Sample Properties						
% Moisture	1	%	15	13	21	11

Client Sample ID			TP5_0.0	TP5_0.5	TP5_1.0	TP5_1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S24-Se0052861	S24-Se0052862	S24-Se0052863	S24-Se0052864
Date Sampled			Aug 17, 2024	Aug 17, 2024	Aug 17, 2024	Aug 17, 2024
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	37	49	37	30
Cadmium	0.4	mg/kg	24	27	15	< 0.4
Chromium	5	mg/kg	26	50	14	12
Copper	5	mg/kg	410	380	490	37
Lead	5	mg/kg	2800	2800	2000	440
Nickel	5	mg/kg	24	33	14	< 5
Zinc	5	mg/kg	8500	7700	4700	150
Sample Properties						
% Moisture	1	%	17	17	14	16

Client Sample ID			TP5_2.0	TP5_2.5	TP6_0.0	TP6_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S24-Se0052865	S24-Se0052866	S24-Se0052867	S24-Se0052868
Date Sampled			Aug 17, 2024	Aug 17, 2024	Aug 17, 2024	Aug 17, 2024
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	14	33	110	53
Cadmium	0.4	mg/kg	< 0.4	0.6	17	7.9
Chromium	5	mg/kg	19	17	11	17
Copper	5	mg/kg	32	75	420	180
Lead	5	mg/kg	29	790	9500	3500
Nickel	5	mg/kg	7.5	9.0	7.2	9.1
Zinc	5	mg/kg	75	190	11000	3000
Sample Properties						
% Moisture	1	%	14	15	12	13

Client Sample ID			TP6_1.0	TP6_1.5	TP6_2.0	TP6_2.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S24-Se0052869	S24-Se0052870	S24-Se0052871	S24-Se0052872
Date Sampled			Aug 17, 2024	Aug 17, 2024	Aug 17, 2024	Aug 17, 2024
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	47	27	16	29
Cadmium	0.4	mg/kg	5.6	2.7	1.4	3.7
Chromium	5	mg/kg	16	14	13	14
Copper	5	mg/kg	120	66	86	100
Lead	5	mg/kg	1900	590	300	850
Nickel	5	mg/kg	12	7.4	< 5	6.7
Zinc	5	mg/kg	1800	760	480	860
Sample Properties						
% Moisture	1	%	13	16	16	16

Client Sample ID			TP6_3.0	D01_20240917	D02_20240917	D03_20240917
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S24-Se0052873	S24-Se0052874	S24-Se0052875	S24-Se0052876
Date Sampled			Aug 17, 2024	Aug 17, 2024	Aug 17, 2024	Aug 18, 2024
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	14	12	11	58
Cadmium	0.4	mg/kg	3.1	2.5	1.2	26
Chromium	5	mg/kg	13	16	17	30
Copper	5	mg/kg	140	150	53	530
Lead	5	mg/kg	150	470	120	5100
Nickel	5	mg/kg	< 5	9.4	5.6	26
Zinc	5	mg/kg	600	1300	670	9400
Sample Properties						
% Moisture	1	%	15	12	24	17

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Sydney	Sep 26, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Sep 20, 2024	14 Days
- Method: LTM-GEN-7080 Moisture			

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NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794 & 2780	Site# 25079

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

Project Name: 318001968
Project ID: 318001968

Order No.:
Report #: 1141337
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Sep 19, 2024 3:23 PM
Due: Sep 30, 2024
Priority: 7 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Moisture Set
Sydney Laboratory - NATA # 1261 Site # 18217	X	X	X	X	X	X	X	X
External Laboratory								

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
1	HA1_0.0	Aug 17, 2024		Soil	S24-Se0052813	X	X	X	X	X	X	X	X
2	HA1_0.5	Aug 17, 2024		Soil	S24-Se0052814	X	X	X	X	X	X	X	X
3	HA2_0.0	Aug 17, 2024		Soil	S24-Se0052815	X	X	X	X	X	X	X	X
4	HA2_0.5	Aug 17, 2024		Soil	S24-Se0052816	X	X	X	X	X	X	X	X
5	HA3_0.0	Aug 17, 2024		Soil	S24-Se0052817	X	X	X	X	X	X	X	X
6	HA3_0.5	Aug 17, 2024		Soil	S24-Se0052818	X	X	X	X	X	X	X	X
7	HA4_0.0	Aug 17, 2024		Soil	S24-Se0052819	X	X	X	X	X	X	X	X
8	HA4_0.5	Aug 17, 2024		Soil	S24-Se0052820	X	X	X	X	X	X	X	X
9	HA5_0.0	Sep 18, 2024		Soil	S24-Se0052821	X	X	X	X	X	X	X	X
10	HA5_0.5	Sep 18, 2024		Soil	S24-Se0052822	X	X	X	X	X	X	X	X
11	HA6_0.0	Sep 18, 2024		Soil	S24-Se0052823	X	X	X	X	X	X	X	X
12	HA6_0.5	Sep 18, 2024		Soil	S24-Se0052824	X	X	X	X	X	X	X	X
13	HA7_0.0	Sep 18, 2024		Soil	S24-Se0052825	X	X	X	X	X	X	X	X
14	HA7_0.5	Sep 18, 2024		Soil	S24-Se0052826	X	X	X	X	X	X	X	X

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Sample Detail						Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Moisture Set
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X	X
15	HA8_0.0	Sep 18, 2024		Soil	S24-Se0052827	X	X	X	X	X	X	X	X
16	HA8_0.5	Sep 18, 2024		Soil	S24-Se0052828	X	X	X	X	X	X	X	X
17	HA9_0.0	Sep 18, 2024		Soil	S24-Se0052829	X	X	X	X	X	X	X	X
18	HA9_0.5	Sep 18, 2024		Soil	S24-Se0052830	X	X	X	X	X	X	X	X
19	HA10_0.0	Sep 18, 2024		Soil	S24-Se0052831	X	X	X	X	X	X	X	X
20	HA10_0.5	Sep 18, 2024		Soil	S24-Se0052832	X	X	X	X	X	X	X	X
21	HA11_0.0	Sep 18, 2024		Soil	S24-Se0052833	X	X	X	X	X	X	X	X
22	HA12_0.0	Sep 18, 2024		Soil	S24-Se0052834	X	X	X	X	X	X	X	X
23	HA12_0.5	Sep 18, 2024		Soil	S24-Se0052835	X	X	X	X	X	X	X	X
24	HA13_0.0	Sep 18, 2024		Soil	S24-Se0052836	X	X	X	X	X	X	X	X
25	HA14_0.0	Sep 18, 2024		Soil	S24-Se0052837	X	X	X	X	X	X	X	X
26	TP1_0.0	Sep 17, 2024		Soil	S24-Se0052838	X	X	X	X	X	X	X	X
27	TP1_0.5	Sep 17, 2024		Soil	S24-Se0052839	X	X	X	X	X	X	X	X
28	TP1_1.0	Sep 17, 2024		Soil	S24-Se0052840	X	X	X	X	X	X	X	X
29	TP1_1.5	Sep 17, 2024		Soil	S24-Se0052841	X	X	X	X	X	X	X	X
30	TP1_2.0	Sep 17, 2024		Soil	S24-Se0052842	X	X	X	X	X	X	X	X
31	TP1_2.5	Aug 17, 2024		Soil	S24-Se0052843	X	X	X	X	X	X	X	X

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Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Moisture Set
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X	X
32	TP1_3.0	Aug 17, 2024		Soil	S24-Se0052844	X	X	X	X	X	X	X	X
33	TP2_0.0	Aug 17, 2024		Soil	S24-Se0052845	X	X	X	X	X	X	X	X
34	TP2_0.5	Aug 17, 2024		Soil	S24-Se0052846	X	X	X	X	X	X	X	X
35	TP2_1.0	Aug 17, 2024		Soil	S24-Se0052847	X	X	X	X	X	X	X	X
36	TP2_1.5	Aug 17, 2024		Soil	S24-Se0052848	X	X	X	X	X	X	X	X
37	TP2_2.0	Aug 17, 2024		Soil	S24-Se0052849	X	X	X	X	X	X	X	X
38	TP3_0.0	Aug 17, 2024		Soil	S24-Se0052850	X	X	X	X	X	X	X	X
39	TP3_0.5	Aug 17, 2024		Soil	S24-Se0052851	X	X	X	X	X	X	X	X
40	TP3_1.0	Aug 17, 2024		Soil	S24-Se0052852	X	X	X	X	X	X	X	X
41	TP3_1.5	Aug 17, 2024		Soil	S24-Se0052853	X	X	X	X	X	X	X	X
42	TP3_2.0	Aug 17, 2024		Soil	S24-Se0052854	X	X	X	X	X	X	X	X
43	TP3_2.5	Aug 17, 2024		Soil	S24-Se0052855	X	X	X	X	X	X	X	X
44	TP4_0.0	Aug 17, 2024		Soil	S24-Se0052856	X	X	X	X	X	X	X	X
45	TP4_0.5	Aug 17, 2024		Soil	S24-Se0052857	X	X	X	X	X	X	X	X
46	TP4_1.0	Aug 17, 2024		Soil	S24-Se0052858	X	X	X	X	X	X	X	X
47	TP4_1.5	Aug 17, 2024		Soil	S24-Se0052859	X	X	X	X	X	X	X	X
48	TP4_2.0	Aug 17, 2024		Soil	S24-Se0052860	X	X	X	X	X	X	X	X

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Phone: 02 9954 8118
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Received: Sep 19, 2024 3:23 PM
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Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Moisture Set
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X	X
49	TP5_0.0	Aug 17, 2024		Soil	S24-Se0052861	X	X	X	X	X	X	X	X
50	TP5_0.5	Aug 17, 2024		Soil	S24-Se0052862	X	X	X	X	X	X	X	X
51	TP5_1.0	Aug 17, 2024		Soil	S24-Se0052863	X	X	X	X	X	X	X	X
52	TP5_1.5	Aug 17, 2024		Soil	S24-Se0052864	X	X	X	X	X	X	X	X
53	TP5_2.0	Aug 17, 2024		Soil	S24-Se0052865	X	X	X	X	X	X	X	X
54	TP5_2.5	Aug 17, 2024		Soil	S24-Se0052866	X	X	X	X	X	X	X	X
55	TP6_0.0	Aug 17, 2024		Soil	S24-Se0052867	X	X	X	X	X	X	X	X
56	TP6_0.5	Aug 17, 2024		Soil	S24-Se0052868	X	X	X	X	X	X	X	X
57	TP6_1.0	Aug 17, 2024		Soil	S24-Se0052869	X	X	X	X	X	X	X	X
58	TP6_1.5	Aug 17, 2024		Soil	S24-Se0052870	X	X	X	X	X	X	X	X
59	TP6_2.0	Aug 17, 2024		Soil	S24-Se0052871	X	X	X	X	X	X	X	X
60	TP6_2.5	Aug 17, 2024		Soil	S24-Se0052872	X	X	X	X	X	X	X	X
61	TP6_3.0	Aug 17, 2024		Soil	S24-Se0052873	X	X	X	X	X	X	X	X
62	D01_20240917	Aug 17, 2024		Soil	S24-Se0052874	X	X	X	X	X	X	X	X
63	D02_20240917	Aug 17, 2024		Soil	S24-Se0052875	X	X	X	X	X	X	X	X

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Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X	X
64	D03_20240917	Aug 18, 2024		Soil	S24-Se0052876	X	X	X	X	X	X	X	X
65	R01_20240917	Aug 17, 2024		Water	S24-Se0052877	X	X	X	X	X	X	X	
66	R02_20240918	Sep 18, 2024		Water	S24-Se0052878	X	X	X	X	X	X	X	
Test Counts						66	66	66	66	66	66	66	64

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Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follow guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013. They are included in this QC report where applicable. Additional QC data may be available on request.
2. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
4. For CEC results where the sample's origin is unknown or environmentally contaminated, the results should be used advisedly.
5. Actual LORs are matrix dependent. Quoted LORs may be raised where sample extracts are diluted due to interferences.
6. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds where annotated.
7. SVOC analysis on waters is performed on homogenised, unfiltered samples unless noted otherwise.
8. Samples were analysed on an 'as received' basis.
9. Information identified in this report with **blue** colour indicates data provided by customers that may have an impact on the results.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to the '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 before sample receipt deadlines as stated on the SRA.

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

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

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ppm:** parts per million
µg/L: micrograms per litre	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony Forming Unit	**Colour:** Pt-Co Units (CU)	

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - 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.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a similar compound to the analyte target is reported as percentage recovery. See below for acceptance criteria.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however, free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 6.0
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should only be used as a guide and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

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%

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%, VOC recoveries 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, where no positive PFAS results have been reported or reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as 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 are not data from your samples.
3. 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.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

Environment Testing

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	99			80-120	Pass	
Cadmium	%	97			80-120	Pass	
Chromium	%	97			80-120	Pass	
Copper	%	96			80-120	Pass	
Lead	%	94			80-120	Pass	
Nickel	%	97			80-120	Pass	
Zinc	%	95			80-120	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	97			80-120	Pass	
Cadmium	%	97			80-120	Pass	
Chromium	%	96			80-120	Pass	
Copper	%	97			80-120	Pass	
Lead	%	93			80-120	Pass	
Nickel	%	97			80-120	Pass	
Zinc	%	96			80-120	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	94			80-120	Pass	
Cadmium	%	95			80-120	Pass	
Chromium	%	94			80-120	Pass	
Copper	%	94			80-120	Pass	
Lead	%	91			80-120	Pass	
Nickel	%	93			80-120	Pass	
Zinc	%	90			80-120	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	96			80-120	Pass	
Cadmium	%	97			80-120	Pass	
Chromium	%	95			80-120	Pass	
Copper	%	94			80-120	Pass	
Lead	%	91			80-120	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Nickel	%	93			80-120	Pass	
Zinc	%	93			80-120	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	93			80-120	Pass	
Cadmium	%	93			80-120	Pass	
Chromium	%	90			80-120	Pass	
Copper	%	89			80-120	Pass	
Lead	%	88			80-120	Pass	
Nickel	%	89			80-120	Pass	
Zinc	%	91			80-120	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	93			80-120	Pass	
Cadmium	%	99			80-120	Pass	
Chromium	%	104			80-120	Pass	
Copper	%	111			80-120	Pass	
Lead	%	115			80-120	Pass	
Nickel	%	105			80-120	Pass	
Zinc	%	113			80-120	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	93			80-120	Pass	
Cadmium	%	93			80-120	Pass	
Chromium	%	92			80-120	Pass	
Copper	%	91			80-120	Pass	
Lead	%	89			80-120	Pass	
Nickel	%	92			80-120	Pass	
Zinc	%	92			80-120	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	101			80-120	Pass	
Cadmium	%	111			80-120	Pass	
Chromium	%	110			80-120	Pass	
Copper	%	113			80-120	Pass	
Lead	%	111			80-120	Pass	
Nickel	%	112			80-120	Pass	
Zinc	%	111			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	S24-Se0054977	NCP	%	80			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S24-Se0052815	CP	%	104			75-125	Pass	
Cadmium	S24-Se0052815	CP	%	93			75-125	Pass	
Chromium	S24-Se0052815	CP	%	97			75-125	Pass	
Nickel	S24-Se0052815	CP	%	103			75-125	Pass	
Zinc	S24-Se0052815	CP	%	122			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Chromium	S24-Se0052823	CP	%	81			75-125	Pass	
Copper	S24-Se0052823	CP	%	123			75-125	Pass	
Nickel	S24-Se0052823	CP	%	84			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S24-Se0052843	CP	%	108			75-125	Pass	
Copper	S24-Se0052843	CP	%	94			75-125	Pass	
Nickel	S24-Se0052843	CP	%	95			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S24-Se0052822	CP	mg/kg	5.6	4.6	18	30%	Pass	
Cadmium	S24-Se0052822	CP	mg/kg	0.5	0.7	36	30%	Fail	Q15
Chromium	S24-Se0052822	CP	mg/kg	13	13	4.0	30%	Pass	
Copper	S24-Se0052822	CP	mg/kg	32	36	13	30%	Pass	
Lead	S24-Se0052822	CP	mg/kg	56	49	14	30%	Pass	
Nickel	S24-Se0052822	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Zinc	S24-Se0052822	CP	mg/kg	280	290	5.0	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	S24-Se0052822	CP	%	22	21	1.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S24-Se0052832	CP	mg/kg	6.6	7.9	18	30%	Pass	
Cadmium	S24-Se0052832	CP	mg/kg	1.4	0.9	44	30%	Fail	Q15
Chromium	S24-Se0052832	CP	mg/kg	19	21	7.0	30%	Pass	
Copper	S24-Se0052832	CP	mg/kg	66	62	6.0	30%	Pass	
Lead	S24-Se0052832	CP	mg/kg	97	88	9.0	30%	Pass	
Nickel	S24-Se0052832	CP	mg/kg	7.1	8.9	22	30%	Pass	
Zinc	S24-Se0052832	CP	mg/kg	800	770	4.0	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	S24-Se0052832	CP	%	27	25	9.0	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	S24-Se0052842	CP	%	17	17	3.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S24-Se0052862	CP	mg/kg	49	45	9.0	30%	Pass	
Cadmium	S24-Se0052862	CP	mg/kg	27	25	8.0	30%	Pass	
Chromium	S24-Se0052862	CP	mg/kg	50	24	71	30%	Fail	Q15
Copper	S24-Se0052862	CP	mg/kg	380	460	20	30%	Pass	
Lead	S24-Se0052862	CP	mg/kg	2800	2500	13	30%	Pass	
Nickel	S24-Se0052862	CP	mg/kg	33	19	53	30%	Fail	Q15
Zinc	S24-Se0052862	CP	mg/kg	7700	7400	5.0	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	S24-Se0052862	CP	%	17	17	2.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S24-Se0052872	CP	mg/kg	29	28	4.0	30%	Pass	
Cadmium	S24-Se0052872	CP	mg/kg	3.7	2.9	23	30%	Pass	
Chromium	S24-Se0052872	CP	mg/kg	14	12	12	30%	Pass	
Copper	S24-Se0052872	CP	mg/kg	100	99	5.0	30%	Pass	
Lead	S24-Se0052872	CP	mg/kg	850	670	24	30%	Pass	
Nickel	S24-Se0052872	CP	mg/kg	6.7	5.6	17	30%	Pass	
Zinc	S24-Se0052872	CP	mg/kg	860	970	12	30%	Pass	

Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	S24-Se0052872	CP	%	16	13	20	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

Andrew Black	Analytical Services Manager
Mickael Ros	Senior Analyst-Metal
Roopesh Rangarajan	Senior Analyst-Sample Properties

Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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

Attention: **Stephen Maxwell**

Report **1141337-W**
Project name 318001968
Project ID 318001968
Received Date Sep 19, 2024

Client Sample ID			**R01_20240917**	**R02_20240918**
Sample Matrix			**Water**	**Water**
Eurofins Sample No.			**S24-Se0052877**	**S24-Se0052878**
Date Sampled			**Aug 17, 2024**	**Sep 18, 2024**
Test/Reference	LOR	Unit		
Heavy Metals				
Arsenic	0.001	mg/L	< 0.001	< 0.001
Cadmium	0.0002	mg/L	< 0.0002	< 0.0002
Chromium	0.001	mg/L	< 0.001	< 0.001
Copper	0.001	mg/L	< 0.001	< 0.001
Lead	0.001	mg/L	< 0.001	< 0.001
Nickel	0.001	mg/L	< 0.001	< 0.001
Zinc	0.005	mg/L	< 0.005	< 0.005

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Sydney	Sep 25, 2024	28 Days

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

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NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794 & 2780	Site# 25079

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IANZ# 1327	IANZ# 1308	IANZ# 1290	IANZ# 1402

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

Project Name: 318001968
Project ID: 318001968

Order No.:
Report #: 1141337
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Sep 19, 2024 3:23 PM
Due: Sep 30, 2024
Priority: 7 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Moisture Set
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X	X
External Laboratory													
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**								
1	HA1_0.0	Aug 17, 2024		Soil	S24-Se0052813	X	X	X	X	X	X	X	X
2	HA1_0.5	Aug 17, 2024		Soil	S24-Se0052814	X	X	X	X	X	X	X	X
3	HA2_0.0	Aug 17, 2024		Soil	S24-Se0052815	X	X	X	X	X	X	X	X
4	HA2_0.5	Aug 17, 2024		Soil	S24-Se0052816	X	X	X	X	X	X	X	X
5	HA3_0.0	Aug 17, 2024		Soil	S24-Se0052817	X	X	X	X	X	X	X	X
6	HA3_0.5	Aug 17, 2024		Soil	S24-Se0052818	X	X	X	X	X	X	X	X
7	HA4_0.0	Aug 17, 2024		Soil	S24-Se0052819	X	X	X	X	X	X	X	X
8	HA4_0.5	Aug 17, 2024		Soil	S24-Se0052820	X	X	X	X	X	X	X	X
9	HA5_0.0	Sep 18, 2024		Soil	S24-Se0052821	X	X	X	X	X	X	X	X
10	HA5_0.5	Sep 18, 2024		Soil	S24-Se0052822	X	X	X	X	X	X	X	X
11	HA6_0.0	Sep 18, 2024		Soil	S24-Se0052823	X	X	X	X	X	X	X	X
12	HA6_0.5	Sep 18, 2024		Soil	S24-Se0052824	X	X	X	X	X	X	X	X
13	HA7_0.0	Sep 18, 2024		Soil	S24-Se0052825	X	X	X	X	X	X	X	X
14	HA7_0.5	Sep 18, 2024		Soil	S24-Se0052826	X	X	X	X	X	X	X	X

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Project ID: 318001968

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Fax: 02 9954 8150

Received: Sep 19, 2024 3:23 PM
Due: Sep 30, 2024
Priority: 7 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Moisture Set
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X	X
15	HA8_0.0	Sep 18, 2024		Soil	S24-Se0052827	X	X	X	X	X	X	X	X
16	HA8_0.5	Sep 18, 2024		Soil	S24-Se0052828	X	X	X	X	X	X	X	X
17	HA9_0.0	Sep 18, 2024		Soil	S24-Se0052829	X	X	X	X	X	X	X	X
18	HA9_0.5	Sep 18, 2024		Soil	S24-Se0052830	X	X	X	X	X	X	X	X
19	HA10_0.0	Sep 18, 2024		Soil	S24-Se0052831	X	X	X	X	X	X	X	X
20	HA10_0.5	Sep 18, 2024		Soil	S24-Se0052832	X	X	X	X	X	X	X	X
21	HA11_0.0	Sep 18, 2024		Soil	S24-Se0052833	X	X	X	X	X	X	X	X
22	HA12_0.0	Sep 18, 2024		Soil	S24-Se0052834	X	X	X	X	X	X	X	X
23	HA12_0.5	Sep 18, 2024		Soil	S24-Se0052835	X	X	X	X	X	X	X	X
24	HA13_0.0	Sep 18, 2024		Soil	S24-Se0052836	X	X	X	X	X	X	X	X
25	HA14_0.0	Sep 18, 2024		Soil	S24-Se0052837	X	X	X	X	X	X	X	X
26	TP1_0.0	Sep 17, 2024		Soil	S24-Se0052838	X	X	X	X	X	X	X	X
27	TP1_0.5	Sep 17, 2024		Soil	S24-Se0052839	X	X	X	X	X	X	X	X
28	TP1_1.0	Sep 17, 2024		Soil	S24-Se0052840	X	X	X	X	X	X	X	X
29	TP1_1.5	Sep 17, 2024		Soil	S24-Se0052841	X	X	X	X	X	X	X	X
30	TP1_2.0	Sep 17, 2024		Soil	S24-Se0052842	X	X	X	X	X	X	X	X
31	TP1_2.5	Aug 17, 2024		Soil	S24-Se0052843	X	X	X	X	X	X	X	X

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Penrose,	Mount Wellington,	Rolleston,	Gate Pa,
Auckland 1061	Auckland 1061	Christchurch 7675	Tauranga 3112
+64 9 526 4551	+64 9 525 0568	+64 3 343 5201	+64 9 525 0568
IANZ# 1327	IANZ# 1308	IANZ# 1290	IANZ# 1402

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

Project Name: 318001968
Project ID: 318001968

Order No.:
Report #: 1141337
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Sep 19, 2024 3:23 PM
Due: Sep 30, 2024
Priority: 7 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Moisture Set
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X	X
32	TP1_3.0	Aug 17, 2024		Soil	S24-Se0052844	X	X	X	X	X	X	X	X
33	TP2_0.0	Aug 17, 2024		Soil	S24-Se0052845	X	X	X	X	X	X	X	X
34	TP2_0.5	Aug 17, 2024		Soil	S24-Se0052846	X	X	X	X	X	X	X	X
35	TP2_1.0	Aug 17, 2024		Soil	S24-Se0052847	X	X	X	X	X	X	X	X
36	TP2_1.5	Aug 17, 2024		Soil	S24-Se0052848	X	X	X	X	X	X	X	X
37	TP2_2.0	Aug 17, 2024		Soil	S24-Se0052849	X	X	X	X	X	X	X	X
38	TP3_0.0	Aug 17, 2024		Soil	S24-Se0052850	X	X	X	X	X	X	X	X
39	TP3_0.5	Aug 17, 2024		Soil	S24-Se0052851	X	X	X	X	X	X	X	X
40	TP3_1.0	Aug 17, 2024		Soil	S24-Se0052852	X	X	X	X	X	X	X	X
41	TP3_1.5	Aug 17, 2024		Soil	S24-Se0052853	X	X	X	X	X	X	X	X
42	TP3_2.0	Aug 17, 2024		Soil	S24-Se0052854	X	X	X	X	X	X	X	X
43	TP3_2.5	Aug 17, 2024		Soil	S24-Se0052855	X	X	X	X	X	X	X	X
44	TP4_0.0	Aug 17, 2024		Soil	S24-Se0052856	X	X	X	X	X	X	X	X
45	TP4_0.5	Aug 17, 2024		Soil	S24-Se0052857	X	X	X	X	X	X	X	X
46	TP4_1.0	Aug 17, 2024		Soil	S24-Se0052858	X	X	X	X	X	X	X	X
47	TP4_1.5	Aug 17, 2024		Soil	S24-Se0052859	X	X	X	X	X	X	X	X
48	TP4_2.0	Aug 17, 2024		Soil	S24-Se0052860	X	X	X	X	X	X	X	X

eurofins

web: www.eurofins.com.au
email: EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road	19/8 Lewalan Street	179 Magowar Road	Unit 1,2 Dacre Street	1/21 Smallwood Place	1/2 Frost Drive
Dandenong South	Grovedale	Girraween	Mitchell	Murarrie	Mayfield West
VIC 3175	VIC 3216	NSW 2145	ACT 2911	QLD 4172	NSW 2304
+61 3 8564 5000	+61 3 8564 5000	+61 2 9900 8400	+61 2 6113 8091	T: +61 7 3902 4600	+61 2 4968 8448
NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794 & 2780	Site# 25079

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NATA# 2377
Site# 2370

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NATA# 2561
Site# 2554

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NZBN: 9429046024954

Auckland	Auckland (Focus)	Christchurch	Tauranga
35 O'Rorke Road	Unit C1/4 Pacific Rise,	43 Detroit Drive	1277 Cameron Road,
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Sample Detail						Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Moisture Set
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X	X
49	TP5_0.0	Aug 17, 2024		Soil	S24-Se0052861	X	X	X	X	X	X	X	X
50	TP5_0.5	Aug 17, 2024		Soil	S24-Se0052862	X	X	X	X	X	X	X	X
51	TP5_1.0	Aug 17, 2024		Soil	S24-Se0052863	X	X	X	X	X	X	X	X
52	TP5_1.5	Aug 17, 2024		Soil	S24-Se0052864	X	X	X	X	X	X	X	X
53	TP5_2.0	Aug 17, 2024		Soil	S24-Se0052865	X	X	X	X	X	X	X	X
54	TP5_2.5	Aug 17, 2024		Soil	S24-Se0052866	X	X	X	X	X	X	X	X
55	TP6_0.0	Aug 17, 2024		Soil	S24-Se0052867	X	X	X	X	X	X	X	X
56	TP6_0.5	Aug 17, 2024		Soil	S24-Se0052868	X	X	X	X	X	X	X	X
57	TP6_1.0	Aug 17, 2024		Soil	S24-Se0052869	X	X	X	X	X	X	X	X
58	TP6_1.5	Aug 17, 2024		Soil	S24-Se0052870	X	X	X	X	X	X	X	X
59	TP6_2.0	Aug 17, 2024		Soil	S24-Se0052871	X	X	X	X	X	X	X	X
60	TP6_2.5	Aug 17, 2024		Soil	S24-Se0052872	X	X	X	X	X	X	X	X
61	TP6_3.0	Aug 17, 2024		Soil	S24-Se0052873	X	X	X	X	X	X	X	X
62	D01_20240917	Aug 17, 2024		Soil	S24-Se0052874	X	X	X	X	X	X	X	X
63	D02_20240917	Aug 17, 2024		Soil	S24-Se0052875	X	X	X	X	X	X	X	X

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Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X	X
64	D03_20240917	Aug 18, 2024		Soil	S24-Se0052876	X	X	X	X	X	X	X	X
65	R01_20240917	Aug 17, 2024		Water	S24-Se0052877	X	X	X	X	X	X	X	
66	R02_20240918	Sep 18, 2024		Water	S24-Se0052878	X	X	X	X	X	X	X	
Test Counts						66	66	66	66	66	66	66	64

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follow guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013. They are included in this QC report where applicable. Additional QC data may be available on request.
2. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
4. For CEC results where the sample's origin is unknown or environmentally contaminated, the results should be used advisedly.
5. Actual LORs are matrix dependent. Quoted LORs may be raised where sample extracts are diluted due to interferences.
6. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds where annotated.
7. SVOC analysis on waters is performed on homogenised, unfiltered samples unless noted otherwise.
8. Samples were analysed on an 'as received' basis.
9. Information identified in this report with **blue** colour indicates data provided by customers that may have an impact on the results.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to the '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 before sample receipt deadlines as stated on the SRA.

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

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

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ppm:** parts per million
µg/L: micrograms per litre	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony Forming Unit	**Colour:** Pt-Co Units (CU)	

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - 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.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a similar compound to the analyte target is reported as percentage recovery. See below for acceptance criteria.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however, free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 6.0
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should only be used as a guide and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

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%

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%, VOC recoveries 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, where no positive PFAS results have been reported or reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as 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 are not data from your samples.
3. 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.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Heavy Metals							
Arsenic	mg/L	< 0.001			0.001	Pass	
Cadmium	mg/L	< 0.0002			0.0002	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
Zinc	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	99			80-120	Pass	
Cadmium	%	91			80-120	Pass	
Chromium	%	93			80-120	Pass	
Copper	%	91			80-120	Pass	
Lead	%	92			80-120	Pass	
Nickel	%	92			80-120	Pass	
Zinc	%	89			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S24-Se0058666	NCP	%	102			75-125	Pass	
Cadmium	S24-Se0058666	NCP	%	93			75-125	Pass	
Chromium	S24-Se0058666	NCP	%	94			75-125	Pass	
Copper	S24-Se0058666	NCP	%	91			75-125	Pass	
Lead	S24-Se0058666	NCP	%	92			75-125	Pass	
Nickel	S24-Se0058666	NCP	%	91			75-125	Pass	
Zinc	S24-Se0058666	NCP	%	89			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S24-Se0052877	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium	S24-Se0052877	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	S24-Se0052877	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper	S24-Se0052877	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lead	S24-Se0052877	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Nickel	S24-Se0052877	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Zinc	S24-Se0052877	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S24-Se0052878	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium	S24-Se0052878	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	S24-Se0052878	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper	S24-Se0052878	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lead	S24-Se0052878	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Nickel	S24-Se0052878	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Zinc	S24-Se0052878	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	

Comments

Sample Integrity

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

Authorised by:

Andrew Black	Analytical Services Manager
Mickael Ros	Senior Analyst-Metal

Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

- ☑ **Sydney Laboratory** Unit F3 Bld.F 16 Mars Road Lane Cove West NSW 2066 02 9900 8400 EnviroSampleNSW@eurofins.com
- ☐ **Brisbane Laboratory** Unit 1 21 Smallwood Place 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** 6 Monterey Road Dandenong South VIC 3175 03 8564 5000 EnviroSampleVic@eurofins.com

Company	Ramboll
Address	3/100 Pacific Highway, North Sydney 2060, NSW
Contact Name	Sam Buckley
Phone №	0481 384 112
Special Directions	Page 1 of 7
Purchase Order	
Quote ID №	
Project №	318001968
Project Name	318001968
Project Manager	Stephen Maxwell
EDD Format (ESdat, EQuIS etc)	EQuIS
Sampler(s)	Sam Buckley
Handed over by	Sam Buckley
Email for Invoice	jauld@ramboll.com; asiapac-accounts@ramboll.com
Email for Results	jauld@ramboll.com; smaxwell@ramboll.com

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

Containers: Change container type & size if necessary.

Required Turnaround Time (TAT): Default will be 5 days if not ticked. ♦Surcharge will apply
- ☐ Overnight (reporting by 9am)♦
- ☐ Same day♦ ☐ 1 day♦
- ☐ 2 days♦ ☐ 3 days♦
- ☑ 5 days (Standard)
- ☐ Other( )

№	Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix Solid (S) Water (W)	Metals(As, Cr, Cu, Pb, Ni, Zn, Cd)	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Asbetos Bag	Sample Comments / Dangerous Goods Hazard Warning
1	HA1_0.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
2	HA1_0.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
3	HA2_0.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
4	HA2_0.5	17/08/24	S	X							1		Pb Conc approx > 5000mg/kg
5	HA3_0.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
6	HA3_0.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
7	HA4_0.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
8	HA4_0.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
9	HA5_0.0	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
10	HA5_0.5	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
			Total Counts	10							10		

Environmental Division
Sydney
Work Order Reference
ES2431034
Telephone : + 61-2-8784 8555

Method of Shipment	☐ Courier (#) ☑ Hand Delivered ☐ Postal	Name	Sam Buckley	Signature		Date	9/19/2024	Time
Laboratory Use Only	Received By Pilon A	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date 19/9	Time 3:23	Temperature 3.1°C	
	Received By Smay	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	Time	Report №	

Eurofins Environment Testing Australia Pty Ltd

Thank L 20/9/24 1330 Dropped off

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Company	Ramboll	Project №	318001968	Project Manager	Stephen Maxwell	Sampler(s)	Sam Buckley
Address	3/100 Pacific Highway, North Sydney 2060, NSW	Project Name	318001968	EDD Format (ESdat, EQuIS etc)	EQuIS	Handed over by	Sam Buckley
						Email for Invoice	jauld@ramboll.com; asiapac-accounts@ramboll.com
Contact Name	Sam Buckley					Email for Results	jauld@ramboll.com; smaxwell@ramboll.com
Phone №	0481 384 112						
Special Directions	Page 2 of 7						
Purchase Order							
Quote ID №							

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- ☐ 3 days♦
- ☑ 5 days (Standard)
- ☐ Other( )

№	Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix Solid (S) Water (W)	Metals(As, Cr, Cu, Pb, Ni, Zn, Cd)	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Asbestos Bag	Sample Comments / Dangerous Goods Hazard Warning
1	HA6_0.0	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
2	HA6_0.5	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
3	HA7_0.0	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
4	HA7_0.5	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
5	HA8_0.0	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
6	HA8_0.5	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
7	HA9_0.0	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
8	HA9_0.5	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
9	HA10_0.0	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
10	HA10_0.5	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
	Total Counts			10							10		

Method of Shipment	☐ Courier (#) ☑ Hand Delivered ☐ Postal	Name	Sam Buckley	Signature		Date	9/19/2024	Time
Laboratory Use Only	Received By	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time	Temperature
	Received By	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time	Report №

Eurofins Environment Testing Australia Pty Ltd

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

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

☐ Brisbane Laboratory
Unit 1 21 Smallwood Place 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
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Company	Ramboll	Project №	318001968	Project Manager	Stephen Maxwell	Sampler(s)	Sam Buckley
Address	3/100 Pacific Highway, North Sydney 2060, NSW	Project Name	318001968	EDD Format (ESdat, EQuIS, etc)	EQuIS	Handed over by	Sam Buckley
Contact Name	Sam Buckley					Email for Invoice	jauld@ramboll.com; asiapac-accounts@ramboll.com
Phone №	0481 384 112					Email for Results	jauld@ramboll.com; smaxwell@ramboll.com
Special Directions	Page 3 of 7						
Purchase Order							
Quote ID №							

Analyses — Where metals are requested, please specify "Total" or "Filtered". SUITE codes must be used to attract SUITE pricing.

Containers — Change container type & size if necessary.

Required Turnaround Time (TAT) — Default will be 5 days if not ticked. ♦Surcharge will apply
☐ Overnight (reporting by 9am)♦
☐ Same day♦ ☐ 1 day♦
☐ 2 days♦ ☐ 3 days♦
☑ 5 days (Standard)
☐ Other( )

№	Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix Solid (S) Water (W)	Metals(As, Cr, Cu, Pb, Ni, Zn, Cd)	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Asbestos Bag	Sample Comments / Dangerous Goods Hazard Warning
1	HA11_0.0	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
2	HA12_0.0	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
3	HA12_0.5	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
4	HA13_0.0	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
5	HA14_0.0	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
6	TP1_0.0	17/09/24	S	X							1		Pb Conc approx > 5000mg/kg
7	TP1_0.5	17/09/24	S	X							1		Pb Conc approx > 5000mg/kg
8	TP1_1.0	17/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
9	TP1_1.5	17/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
10	TP1_2.0	17/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
	Total Counts			10							10		

Method of Shipment	☐ Courier (#)	☑ Hand Delivered	☐ Postal	Name	Sam Buckley	Signature	Date 9/19/2024	Time
Laboratory Use Only	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature	Date	Time	Temperature	
	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature	Date	Time	Report №	

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

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

☐ Brisbane Laboratory
Unit 1 21 Smallwood Place 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
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Company	Ramboll	Project №	318001968	Project Manager	Stephen Maxwell
Address	3/100 Pacific Highway, North Sydney 2060, NSW	Project Name	318001968	EDD Format (Excel, EQuIS etc)	EQuIS
Contact Name	Sam Buckley				
Phone №	0481 384 112				
Special Directions	Page 4 of 7				
Purchase Order					
Quote ID №					

Sampler(s)	Sam Buckley				
Handed over by	Sam Buckley				
Email for Invoice	jauld@ramboll.com; asiapac-accounts@ramboll.com				
Email for Results	jauld@ramboll.com; smaxwell@ramboll.com				

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

♦Surcharge will apply
☐ Overnight (reporting by 9am)♦
☐ Same day♦ ☐ 1 day♦
☐ 2 days♦ ☐ 3 days♦
☑ 5 days (Standard)
☐ Other( )

№	Sample ID	Sampled Date/Time dd/mm/yy hh:mm	Matrix Solid (S) Water (W)	Analyses: Metals(As, Cr, Cu, Pb, Ni, Zn, Cd)	Containers: 500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Asbestos Bag	Sample Comments / Dangerous Goods Hazard Warning
1	TP1_2.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
2	TP1_3.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
3	TP2_0.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
4	TP2_0.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
5	TP2_1.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
6	TP2_1.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
7	TP2_2.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
8	TP3_0.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
9	TP3_0.5	17/08/24	S	X							1		Pb Conc approx > 5000mg/kg
10	TP3_1.0	17/08/24	S	X							1		Pb Conc approx > 5000mg/kg
	Total Counts			10							10		

Method of Shipment	☐ Courier (#)	☑ Hand Delivered	☐ Postal	Name	Sam Buckley	Signature	Date	9/19/2024	Time
Laboratory Use Only	Received By	SYD | 8NE | MEL | PER | ADL | NTL | DRW		Signature		Date	Time	Temperature
	Received By	SYD | 8NE | MEL | PER | ADL | NTL | DRW		Signature		Date	Time	Report №

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

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

☐ Brisbane Laboratory
Unit 1 21 Smallwood Place 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
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Company	Ramboll
Address	3/100 Pacific Highway, North Sydney 2060, NSW
Contact Name	Sam Buckley
Phone №	0481 384 112
Special Directions	Page 5 of 7
Purchase Order	
Quote ID №	
Project №	318001968
Project Name	318001968
Project Manager	Stephen Maxwell
EDD Format (ESdat, EQuIS, etc)	EQuIS
Sampler(s)	Sam Buckley
Handed over by	Sam Buckley
Email for Invoice	jauld@ramboll.com; asiapac-accounts@ramboll.com
Email for Results	jauld@ramboll.com; smaxwell@ramboll.com

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

Containers: Change container type & size if necessary. 500mL Plastic, 250mL Plastic, 125mL Plastic, 200mL Amber Glass, 40mL VOA vial, 500mL PFAS Bottle, Jar (Glass or HDPE), Asbestos Bag

Required Turnaround Time (TAT): Default will be 5 days if not ticked. ♦Surcharge will apply
☐ Overnight (reporting by 9am)♦
☐ Same day♦ ☐ 1 day♦
☐ 2 days♦ ☐ 3 days♦
☑ 5 days (Standard)
☐ Other( )

№	Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix Solid (S) Water (W)	Metals(As, Cr, Cu, Pb, Ni, Zn, Cd)	Jar (Glass or HDPE)	Sample Comments / Dangerous Goods Hazard Warning
1	TP3_1.5	17/08/24	S	X	1	Pb Conc Approx < 5000mg/kg
2	TP3_2.0	17/08/24	S	X	1	Pb Conc Approx < 5000mg/kg
3	TP3_2.5	17/08/24	S	X	1	Pb Conc Approx < 5000mg/kg
4	TP4_0.0	17/08/24	S	X	1	Pb Conc approx > 5000mg/kg
5	TP4_0.5	17/08/24	S	X	1	Pb Conc Approx < 5000mg/kg
6	TP4_1.0	17/08/24	S	X	1	Pb Conc Approx < 5000mg/kg
7	TP4_1.5	17/08/24	S	X	1	Pb Conc Approx < 5000mg/kg
8	TP4_2.0	17/08/24	S	X	1	Pb Conc Approx < 5000mg/kg
9	TP5_0.0	17/08/24	S	X	1	Pb Conc Approx < 5000mg/kg
10	TP5_0.5	17/08/24	S	X	1	Pb Conc Approx < 5000mg/kg
	Total Counts			10	10	

Method of Shipment: ☐ Courier (#) ☑ Hand Delivered ☐ Postal | Name: Sam Buckley | Signature | Date: 9/19/2024 | Time

Laboratory Use Only					
Received By	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature	Date	Time	Temperature
Received By	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature	Date	Time	Report №

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

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

☐ **Brisbane Laboratory** Unit 1 21 Smallwood Place 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** 6 Monterey Road Dandenong South VIC 3175, 03 8564 5000 EnviroSampleVic@eurofins.com

Company	Ramboll
Address	3/100 Pacific Highway, North Sydney 2060, NSW
Contact Name	Sam Buckley
Phone №	0481 384 112
Special Directions	Page 6 of 7
Purchase Order	
Quote ID №	
Project №	318001968
Project Name	318001968
Project Manager	Stephon Maxwell
EDD Format (ESdat, EQuIS, etc)	EQuIS
Sampler(s)	Sam Buckley
Handed over by	Sam Buckley
Email for Invoice	jauld@ramboll.com; asiapac-accounts@ramboll.com
Email for Results	jauld@ramboll.com; smaxwell@ramboll.com

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

Containers: Change container type & size if necessary.

№	Sample ID	Sampled Date/Time	Matrix (Solid (S), Water (W))	Metals(As, Cr, Cu, Pb, Ni, Zn, Cd)	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Asbestos Bag	Sample Comments / Dangerous Goods Hazard Warning
1	TP5_1.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
2	TP5_1.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
3	TP5_2.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
4	TP5_2.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
5	TP6_0.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
6	TP6_0.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
7	TP6_1.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
8	TP6_1.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
9	TP6_2.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
10	TP6_2.5	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
	Total Counts			10							10		

Required Turnaround Time (TAT) — Default will be 5 days if not ticked. ♦Surcharge will apply

- ☐ Overnight (reporting by 9am)♦
- ☐ Same day♦ ☐ 1 day♦
- ☐ 2 days♦ ☐ 3 days♦
- ☑ 5 days (Standard)
- ☐ Other( )

Method of Shipment	☐ Courier (#)	☑ Hand Delivered	☐ Postal	Name	Sam Buckley	Signature	Date 9/19/2024	Time
Laboratory Use Only	Received By	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	Time	Temperature	
	Received By	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	Time	Report №	

Eurofins Environment Testing Australia Pty Ltd

CHAIN OF COUNTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

- ☑ **Sydney Laboratory** Unit F3 Bld.F 16 Mars Road Lane Cove West NSW 2066 02 9900 8400 EnviroSampleNSW@eurofins.com
- ☐ **Brisbane Laboratory** Unit 1 21 Smallwood Place 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** 6 Monterey Road Dandenong South VIC 3175 03 8564 5000 EnviroSampleVic@eurofins.com

Company	Ramboll	Project №	318001968	Project Manager	Stephen Maxwell
Address	3/100 Pacific Highway, North Sydney 2060, NSW	Project Name	318001968	EDD Format (ESdat, EQuIS, etc)	EQuIS
Contact Name	Sam Buckley	Sampler(s)	Sam Buckley	Handed over by	Sam Buckley
Phone №	0481 384 112	Email for Invoice	jauld@ramboll.com; asiapac-accounts@ramboll.com	Email for Results	jauld@ramboll.com; smaxwell@ramboll.com
Special Directions	Page 7 of 7				
Purchase Order					
Quote ID №					

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

Containers: Change container type & size if necessary.

Required Turnaround Time (TAT): Default will be 5 days if not ticked. ♦Surcharge will apply

- ☐ Overnight (reporting by 9am)♦
- ☐ Same day♦ ☐ 1 day♦
- ☐ 2 days♦ ☐ 3 days♦
- ☑ 5 days (Standard)
- ☐ Other( )

№	Sample ID	Sampled Date/Time dd/mm/yy hh:mm	Matrix Solid (S) Water (W)	Metals(As, Cr, Cu, Pb, Ni, Zn, Cd)	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Asbetos Bag	Sample Comments / Dangerous Goods Hazard Warning
1	TP6_3.0	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
2	D01_20240917	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
3	D02_20240917	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
4	D03_20240917	18/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
5	1 T01_20240917	17/08/24	S	X							1		Please forward to ALS Pb Conc Approx < 5000mg/kg
6	2 T02_20240917	17/08/24	S	X							1		Please forward to ALS Pb Conc Approx < 5000mg/kg
7	3 T03_20240917	18/08/24	S	X							1		Please forward to ALS Pb Conc Approx < 5000mg/kg
8	R01_20240917	17/08/24	S	X							1		Pb Conc Approx < 5000mg/kg
9	R02_20240918	18/09/24	S	X							1		Pb Conc Approx < 5000mg/kg
10													
	Total Counts			9							9		

Method of Shipment: ☐ Courier (#) ☑ Hand Delivered ☐ Postal | Name: Sam Buckley | Signature: | Date: 9/19/2024 | Time:

Laboratory Use Only						
Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature	Date	Time	Temperature
Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature	Date	Time	Report №

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES2431034**

Client	: **RAMBOLL AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR STEPHEN MAXWELL	Contact	: Customer Services ES
Address	: PO BOX 560 NORTH SYDNEY NSW, AUSTRALIA 2060	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: smaxwell@ramboll.com	E-mail	: ALSEnviro.Sydney@ALSGlobal.com
Telephone	: ----	Telephone	: +61 2 8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 318001968	Page	: 1 of 2
Order number	: ----	Quote number	: EB2017ENVIAUS0001 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Sam Buckley		

Dates

Date Samples Received	: 20-Sep-2024 13:30	Issue Date	: 23-Sep-2024
Client Requested Due Date	: 27-Sep-2024	Scheduled Reporting Date	: **27-Sep-2024**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: 12.3, 11.5, 11.8'C - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 3 / 3

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Unless otherwise stated, analytical work for this work order will be conducted at ALS Sydney, NATA accreditation no. 825, site no. 10911.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	SOIL - EA055-103 Moisture Content	SOIL - S-01 7 Metals (incl. Digestion)
ES2431034-001	17-Sep-2024 00:00	T01_20240917	✓	✓
ES2431034-002	17-Sep-2024 00:00	T02_20240917	✓	✓
ES2431034-003	18-Sep-2024 00:00	T03_20240917	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	AsiaPac-Accounts@Ramboll.com

JENNY AULD

- *AU Certificate of Analysis - NATA (COA)	Email	jauld@ramboll.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jauld@ramboll.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jauld@ramboll.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jauld@ramboll.com
- A4 - AU Tax Invoice (INV)	Email	jauld@ramboll.com
- Chain of Custody (CoC) (COC)	Email	jauld@ramboll.com
- EDI Format - EQUIS_RAMBOLL_APAC (EQUIS_RAMBOLL_APAC)	Email	jauld@ramboll.com
- EDI Format - XTab (XTAB)	Email	jauld@ramboll.com

STEPHEN MAXWELL

- *AU Certificate of Analysis - NATA (COA)	Email	smaxwell@ramboll.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	smaxwell@ramboll.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	smaxwell@ramboll.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	smaxwell@ramboll.com
- Chain of Custody (CoC) (COC)	Email	smaxwell@ramboll.com
- EDI Format - EQUIS_RAMBOLL_APAC (EQUIS_RAMBOLL_APAC)	Email	smaxwell@ramboll.com
- EDI Format - XTab (XTAB)	Email	smaxwell@ramboll.com

CERTIFICATE OF ANALYSIS

Work Order	: **ES2431034**	Page	: 1 of 2
Client	: **RAMBOLL AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR STEPHEN MAXWELL	Contact	: Customer Services ES
Address	: PO BOX 560 NORTH SYDNEY NSW, AUSTRALIA 2060	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61 2 8784 8555
Project	: 318001968	Date Samples Received	: 20-Sep-2024 13:30
Order number	: ----	Date Analysis Commenced	: 26-Sep-2024
C-O-C number	: ----	Issue Date	: 27-Sep-2024 17:59
Sampler	: Sam Buckley		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 3		
No. of samples analysed	: 3		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW

General Comments

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

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

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

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

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

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

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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	T01_20240917	T02_20240917	T03_20240917	----	----
			Sampling date / time	17-Sep-2024 00:00	17-Sep-2024 00:00	18-Sep-2024 00:00	----	----
Compound	CAS Number	LOR	Unit	ES2431034-001	ES2431034-002	ES2431034-003	--------	--------
				Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**2.4**	**11.3**	**21.6**	**----**	**----**
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	**22**	**8**	**80**	**----**	**----**
Cadmium	7440-43-9	1	mg/kg	**5**	<1	**36**	**----**	**----**
Chromium	7440-47-3	2	mg/kg	**27**	**17**	**74**	**----**	**----**
Copper	7440-50-8	5	mg/kg	**247**	**67**	**612**	**----**	**----**
Lead	7439-92-1	5	mg/kg	**835**	**147**	**4490**	**----**	**----**
Nickel	7440-02-0	2	mg/kg	**12**	**6**	**51**	**----**	**----**
Zinc	7440-66-6	5	mg/kg	**1620**	**755**	**13900**	**----**	**----**

QUALITY CONTROL REPORT

Work Order	: **ES2431034**	Page	: 1 of 3
Client	: **RAMBOLL AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR STEPHEN MAXWELL	Contact	: Customer Services ES
Address	: PO BOX 560 NORTH SYDNEY NSW, AUSTRALIA 2060	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61 2 8784 8555
Project	: 318001968	Date Samples Received	: 20-Sep-2024
Order number	: ----	Date Analysis Commenced	: 26-Sep-2024
C-O-C number	: ----	Issue Date	: 27-Sep-2024
Sampler	: Sam Buckley		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 3		
No. of samples analysed	: 3		

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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW

General Comments

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

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

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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC
* = The final LOR has been raised due to dilution or other sample specific cause; adjusted LOR is shown in brackets. The duplicate ranges for Acceptable RPD% are applied to the final LOR where applicable.

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 6080744)									
ES2430886-065	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	3	3	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	9	7	18.6	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	10	10	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	8	9	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	47	38	21.9	No Limit
ES2430959-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	<5	0.0	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 6080747)									
ES2431034-002	T02_20240917	EA055: Moisture Content	----	0.1 (1.0)*	%	11.3	9.6	15.9	0% - 50%

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 6080744)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	121.1 mg/kg	98.5	88.0	113
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	0.74 mg/kg	80.6	70.0	130
EG005T: Chromium	7440-47-3	2	mg/kg	<2	19.6 mg/kg	107	68.0	132
EG005T: Copper	7440-50-8	5	mg/kg	<5	52.9 mg/kg	103	89.0	111
EG005T: Lead	7439-92-1	5	mg/kg	<5	60.8 mg/kg	92.7	82.0	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.3 mg/kg	95.4	80.0	120
EG005T: Zinc	7440-66-6	5	mg/kg	<5	139.3 mg/kg	88.6	66.0	133

Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 6080744)							
ES2430886-065	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	102	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	104	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	105	68.0	132
		EG005T: Copper	7440-50-8	250 mg/kg	102	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	105	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	105	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	105	66.0	133

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2431034**	Page	: 1 of 4
Client	: **RAMBOLL AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR STEPHEN MAXWELL	Telephone	: +61 2 8784 8555
Project	: 318001968	Date Samples Received	: 20-Sep-2024
Site	: ----	Issue Date	: 27-Sep-2024
Sampler	: Sam Buckley	No. of samples received	: 3
Order number	: ----	No. of samples analysed	: 3

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)						
Moisture Content	EA055	1	14	7.14	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055) T01_20240917, T02_20240917	**17-Sep-2024**	**----**	----	----	**26-Sep-2024**	01-Oct-2024	✓
Soil Glass Jar - Unpreserved (EA055) T03_20240917	**18-Sep-2024**	**----**	----	----	**26-Sep-2024**	02-Oct-2024	✓
EG005(ED093)T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) T01_20240917, T02_20240917	**17-Sep-2024**	**26-Sep-2024**	16-Mar-2025	✓	**27-Sep-2024**	16-Mar-2025	✓
Soil Glass Jar - Unpreserved (EG005T) T03_20240917	**18-Sep-2024**	**26-Sep-2024**	17-Mar-2025	✓	**27-Sep-2024**	17-Mar-2025	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	1	14	**7.14**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Total Metals by ICP-AES	EG005T	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Metals by ICP-AES	EG005T	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Total Metals by ICP-AES	EG005T	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)

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

Appendix 6
Borehole Logs

Bore Hole / Test Pit Logging Sheet

Sample ID:	HA1

Project Name:	Captains Flat Detailed Remediation	Ramboll Personnel	Sam Buckley, Brodie Wood
Project No:	318001968		
Date:	17/09/2024		
Start time:	8:30 AM	Subcontractors:	n/a
Finish time:	4:30pm	Location:	Captains Flat, NSW

Drill Method	Depth	PID	Sample	Description	Well
Hand Auger					
	0.0 - 0.1		HA1_0.0	FILL: Gravelly SAND, fine, orange/brown, rootles, dry.	
	0.1 - 0.5		HA1_0.5	FILL: Gravelly CLAY, orange, fine, angular gravel, moist.	
				EOI at 0.5mbgl	

Water	Graphic Log	Equipment Serial No.
Standing Water Level	D = Disturbed	
Seepage	SPT = Split Spoon	
	U = Undisturbed	
	PT = Push Tube	

Bore Hole / Test Pit Logging Sheet

Sample ID:	HA2

Project Name:	Captains Flat Detailed Remediation	Ramboll Personnel	Sam Buckley, Brodie Wood
Project No:	318001968		
Date:	17/09/2024		
Start time:	8:30 AM	Subcontractors:	n/a
Finish time:	4:30pm	Location:	Captains Flat, NSW

Drill	Depth	PID	Sample	Description	Well
Hand Auger					
	0.0 - 0.1		HA2_0.0	FILL: Gravelly SAND, fine, small angular gravels, orange, rootlets, dry.	
	0.1 - 0.3			FILL:SANDY CLAY, soft medium plasticity, orange, moist.	
	0.3 - 0.5		HA2_0.5	NATURAL: CLAY, soft medium plasticity, pale grey, wet.	
				EOI at 0.5mbgl	

Water	Graphic Log	Equipment Serial No.
Standing Water Level	D = Disturbed	
Seepage	SPT = Split Spoon	
	U = Undisturbed	
	PT = Push Tube	

Bore Hole / Test Pit Logging Sheet

Sample ID:	HA3

Project Name:	Captains Flat Detailed Remediation	Ramboll Personnel	Sam Buckley, Brodie Wood
Project No:	318001968		
Date:	17/09/2024		
Start time:	8:30 AM	Subcontractors:	n/a
Finish time:	4:30pm	Location:	Captains Flat, NSW

Drill	Depth	PID	Sample	Description	Well
Hand Auger					
	0.0 - 0.1		HA3_0.0	FILL: Gravelly SAND, fine, orange/brown, rootles, dry.	
	0.1 - 0.5		HA3_0.5	FILL: Gravelly CLAY, orange, fine, angular gravel, moist.	
				EOI at 0.5mbgl	

Water	Graphic Log	Equipment Serial No.
Standing Water Level	D = Disturbed	
Seepage	SPT = Split Spoon	
	U = Undisturbed	
	PT = Push Tube	

Bore Hole / Test Pit Logging Sheet

Sample ID:	HA4

Project Name:	Captains Flat Detailed Remediation	Ramboll Personnel	Sam Buckley, Brodie Wood
Project No:	318001968		
Date:	17/09/2024		
Start time:	8:30 AM	Subcontractors:	n/a
Finish time:	4:30pm	Location:	Captains Flat, NSW

Drill	Depth	PID	Sample	Description	Well
Hand Auger					
	0.0 - 0.1		HA4_0.0	FILL: Gravelly SAND, fine, orange/brown, rootles, dry.	
	0.1 - 0.5		HA4_0.5	FILL: Gravelly CLAY, orange, fine, angular gravel, moist.	
				EOI at 0.5mbgl	

Water	Graphic Log	Equipment Serial No.
Standing Water Level	D = Disturbed	
Seepage	SPT = Split Spoon	
	U = Undisturbed	
	PT = Push Tube	

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Bore Hole / Test Pit Logging Sheet

Sample ID:	HA5

Project Name:	Captains Flat Detailed Remediation	Ramboll Personnel	Sam Buckley, Brodie Wood
Project No:	318001968		
Date:	17/09/2024		
Start time:	8:30 AM	Subcontractors:	n/a
Finish time:	4:30pm	Location:	Captains Flat, NSW

Drill	Depth	PID	Sample	Description	Well
Hand Auger					
	0.0 - 0.1		HA5_0.0	FILL: Gravelly, SAND, fine, brown, moist.	
	0.1 - 0.5		HA5_0.5	FILL: CLAY, soft medium plasticity, orange/pale grey moist.	
				EOI at 0.5mbgl	

Water	Graphic Log	Equipment Serial No.
Standing Water Level	D = Disturbed	
Seepage	SPT = Split Spoon	
	U = Undisturbed	
	PT = Push Tube	

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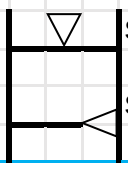
Bore Hole / Test Pit Logging Sheet

Sample ID:	HA6

Project Name:	Captains Flat Detailed Remediation	Ramboll Personnel	Sam Buckley, Brodie Wood
Project No:	318001968		
Date:	17/09/2024		
Start time:	8:30 AM	Subcontractors:	n/a
Finish time:	4:30pm	Location:	Captains Flat, NSW

Drill	Depth	PID	Sample	Description	Well
Hand Auger					
	0.0 - 0.1		HA6_0.0	FILL: Gravelly SAND, fine, small angular gravels, orange/brown, moist.	
	0.1 - 0.5		HA6_0.5	FILL: Gravelly CLAY, orange, fine, angular gravel, moist.	
				EOI at 0.5mbgl	

Water		Graphic Log	Equipment Serial No.
	Standing Water Level	D = Disturbed	
		SPT = Split Spoon	
	Seepage	U = Undisturbed	
		PT = Push Tube	

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Bore Hole / Test Pit Logging Sheet

Sample ID:	HA7

Project Name:	Captains Flat Detailed Remediation	Ramboll Personnel	Sam Buckley, Brodie Wood
Project No:	318001968		
Date:	17/09/2024		
Start time:	8:30 AM	Subcontractors:	n/a
Finish time:	4:30pm	Location:	Captains Flat, NSW

Drill	Depth	PID	Sample	Description	Well
Hand Auger					
	0.0 - 0.1		HA7_0.0	FILL: Gravelly, SAND, fine, brown, moist.	
	0.1 - 0.5		HA7_0.5	FILL: Gravelly CLAY, medium plasticity, light grey, wet.	
				EOI at 0.5mbgl	

Water	Graphic Log	Equipment Serial No.
Standing Water Level	D = Disturbed	
Seepage	SPT = Split Spoon	
	U = Undisturbed	
	PT = Push Tube	

Bore Hole / Test Pit Logging Sheet

Sample ID:	HA8

Project Name:	Captains Flat Detailed Remediation	Ramboll Personnel	Sam Buckley, Brodie Wood
Project No:	318001968		
Date:	17/09/2024		
Start time:	8:30 AM	Subcontractors:	n/a
Finish time:	4:30pm	Location:	Captains Flat, NSW

Drill	Depth	PID	Sample	Description	Well
Hand Auger					
	0.0 - 0.1		HA8_0.0	FILL:Gravelly SAND, fine, orange/brown, rootles, dry.	
	0.1 - 0.5		HA8_0.5	FILL: Gravelly CLAY, medium plasticity, black fine angular gravels, moist.	
				EOI at 0.5mbgl	

Water	Graphic Log	Equipment Serial No.
Standing Water Level	D = Disturbed	
Seepage	SPT = Split Spoon	
	U = Undisturbed	
	PT = Push Tube	

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Bore Hole / Test Pit Logging Sheet

Sample ID:	HA9

Project Name:	Captains Flat Detailed Remediation	Ramboll Personnel	Sam Buckley, Brodie Wood
Project No:	318001968		
Date:	17/09/2024		
Start time:	8:30 AM	Subcontractors:	n/a
Finish time:	4:30pm	Location:	Captains Flat, NSW

Drill	Depth	PID	Sample	Description	Well
Hand Auger					
	0.0 - 0.1		HA9_0.0	FILL:Gravelly SAND, fine, black, dry.	
	0.1 - 0.3			FILL:Sandy Gravel, small angular, black, dry.	
	0.3 - 0.5		HA9_0.5	FILL:CLAY, orange/black, medium plasticity, soft, moist.	
				EOI at 0.5mbgl	

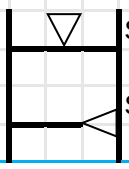
Water	Graphic Log	Equipment Serial No.
Standing Water Level	D = Disturbed	
Seepage	SPT = Split Spoon	
	U = Undisturbed	
	PT = Push Tube	

Bore Hole / Test Pit Logging Sheet

Sample ID:	HA10

Project Name:	Captains Flat Detailed Remediation	Ramboll Personnel	Sam Buckley, Brodie Wood
Project No:	318001968		
Date:	17/09/2024		
Start time:	8:30 AM	Subcontractors:	n/a
Finish time:	4:30pm	Location:	Captains Flat, NSW

Drill	Depth	PID	Sample	Description	Well
Hand Auger					
	0.0 - 0.1		HA10_0.0	FILL:Gravelly SAND, fine, orange/brown, rootles, dry.	
	0.1 - 0.5		HA10_0.5	FILL:Gravelly CLAY, orange, fine, angular gravel, moist. D03 & T03_20240929	
				EOI at 0.5mbgl	

Water		Graphic Log	Equipment Serial No.
	Standing Water Level	D = Disturbed	
	Seepage	SPT = Split Spoon	
		U = Undisturbed	
		PT = Push Tube	

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Bore Hole / Test Pit Logging Sheet

Sample ID:	HA11

Project Name:	Captains Flat Detailed Remediation	Ramboll Personnel	Sam Buckley, Brodie Wood
Project No:	318001968		
Date:	17/09/2024		
Start time:	8:30 AM	Subcontractors:	n/a
Finish time:	4:30pm	Location:	Captains Flat, NSW

Drill	Depth	PID	Sample	Description	Well
Hand Auger	0.0 - 0.1		HA11_0.0	FILL:Gravelly SAND, fine, brown/orange, small angular gravels, rootlets, dry.	
				EOI at 0.1mbgl - Refusal (target depth 0.5 mbgl)	

Water	Graphic Log	Equipment Serial No.
Standing Water Level	D = Disturbed	
Seepage	SPT = Split Spoon	
	U = Undisturbed	
	PT = Push Tube	

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Bore Hole / Test Pit Logging Sheet

Sample ID:	HA12

Project Name:	Captains Flat Detailed Remediation	Ramboll Personnel	Sam Buckley, Brodie Wood
Project No:	318001968		
Date:	17/09/2024		
Start time:	8:30 AM	Subcontractors:	n/a
Finish time:	4:30pm	Location:	Captains Flat, NSW

Drill	Depth	PID	Sample	Description	Well
Hand Auger					
	0.0 - 0.1		HA12_0.0	FILL:Sand, fine, orange dry.	
	0.1 - 0.5		HA12_0.5	FILL:Gravelly clay, orange/brown, moist.	
				EOI at 0.5mbgl	

Water	Graphic Log	Equipment Serial No.
Standing Water Level	D = Disturbed	
Seepage	SPT = Split Spoon	
	U = Undisturbed	
	PT = Push Tube	

Bore Hole / Test Pit Logging Sheet

Sample ID:	HA13

Project Name:	Captains Flat Detailed Remediation	Ramboll Personnel	Sam Buckley, Brodie Wood
Project No:	318001968		
Date:	17/09/2024		
Start time:	8:30 AM	Subcontractors:	n/a
Finish time:	4:30pm	Location:	Captains Flat, NSW

Drill	Depth	PID	Sample	Description	Well
Hand Auger					
	0.0 - 0.1		HA13_0.0	FILL:Gravelly SAND, fine, grey, dry.	
				EOI at 0.1mbgl - Refusal (target depth 0.5 mbgl)	

Water	Graphic Log	Equipment Serial No.
▽ Standing Water Level	D = Disturbed	
Seepage	SPT = Split Spoon	
	U = Undisturbed	
	PT = Push Tube	

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Bore Hole / Test Pit Logging Sheet

Sample ID:	HA14

Project Name:	Captains Flat Detailed Remediation	Ramboll Personnel	Sam Buckley, Brodie Wood
Project No:	318001968		
Date:	17/09/2024		
Start time:	8:30 AM	Subcontractors:	n/a
Finish time:	4:30pm	Location:	Captains Flat, NSW

Drill	Depth	PID	Sample	Description	Well
Hand Auger					
	0.0 - 0.1		HA14_0.0	FILL:Gravelly SAND, fine, orange/brown, dry.	
				EOI at 0.1mbgl - Refusal (target depth 0.5 mbgl)	

Water	Graphic Log	Equipment Serial No.
Standing Water Level	D = Disturbed	
	SPT = Split Spoon	
Seepage	U = Undisturbed	
	PT = Push Tube	

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Bore Hole / Test Pit Logging Sheet

Sample ID:	TP1

Project Name:	Captains Flat Detailed Remediation Design		
Project No:	318001968		
Date:	17/09/2024		
Start time:	8:00 AM	Subcontractors:	RCA Australia
Finish time:	4:30 PM	Location:	Captains Flat, NSW

Drill Method	Depth	PID	Sample	Description	Well
Excavator	0.0		TP1_0.0	FILL; Generally comprising lead ore/GRAVEL, SAND and SILT, dark grey and dark brown-grey, medium to coarse angular gravel, fine to coarse grained sand, with some rubbish (ie. Steel rods, steel wire, terracotta, plastic) throughout. Inclding ballast	
			TP1_0.5		
			TP1_1.0		
			TP1_1.5		
	2.2		TP1_2.0	Silty sandy CLAY, medium plasticity, orange and pale grey mottling, fine to coarse grained sand with fine to coarse sub-angular gravels throughout	
			TP1_2.5		
			TP1_3.0		
	3.5			SILTSTONE/SANDSTONE, very fine grained, grey to brown with iron oxide staining	
	3.7			EOI @ 3.7mbgl	

Water	Graphic Log	Equipment Serial No.
Standing Water Level	D = Disturbed	
Seepage	SPT = Split Spoon	
	U = Undisturbed	
	PT = Push Tube	

Bore Hole / Test Pit Logging Sheet

Sample ID:	TP2

Project Name:	Captains Flat Detailed Remediation Design		
Project No:	318001968		
Date:	17/09/2024		
Start time:	8:00 AM	Subcontractors:	RCA Australia
Finish time:	4:30 PM	Location:	Captains Flat, NSW

Drill	Depth	PID	Sample	Description	Well
Excavator	0.0		TP2_0.0	FILL: Generally comprising silty sandy GRAVEL, fine to coarse angular lead ore gravel, dark grey, fine to coarse sand, with ballast (up to 100nn size)	
	0.4		TP2_0.5	Silty sandy CLAY, low plasticity, orange brown fine to coarse grained sand with fine to coarse angular gravels (ballast), abundant with siltstone/	
			TP2_1.0	shale cobles and boulders up to approx. 300mm in size	
	1.1			Silty sandy CLAY, low to med plasticity, pale grey mottled orange, fine to medium sand with fine to coar	
			TP2_1.5		
	2.0		TP2_2.0	SILTSTONE/SANDSTONE, very fine grained, off white and orange	
				EOI @ 2 m bgl	

Water	Graphic Log	Equipment Serial No.
Standing Water Level	D = Disturbed	
Seepage	SPT = Split Spoon	
	U = Undisturbed	
	PT = Push Tube	

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Bore Hole / Test Pit Logging Sheet

Sample ID:	TP3

Project Name:	Captains Flat Detailed Remediation Design		
Project No:	318001968		
Date:	17/09/2024		
Start time:	8:00 AM	Subcontractors:	RCA Australia
Finish time:	4:30 PM	Location:	Captains Flat, NSW

Drill	Depth	PID	Sample	Description	Well
Excavator	0.0		TP3_0.0	FILL: siltstone COBBLES/Boulders, pale grey-brown with fine to coarse angular gravels and fine to coarse grained sand with silt	
			TP3_0.5		
	1.2		TP3_1.0	FILL: comprising siltstone COBBLES/BOULDERS within gravelly silty CLAY, low to med plasticity, orange brown, med to coarse angular gravel with fine to coarse grained sand	
			TP3_1.5		
			TP3_2.0		
			TP3_2.5		
				EOI @ 2.5 mbgl	

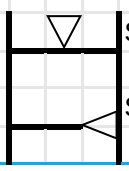
Water	Graphic Log	Equipment Serial No.
Standing Water Level	D = Disturbed	
Seepage	SPT = Split Spoon	
	U = Undisturbed	
	PT = Push Tube	

Bore Hole / Test Pit Logging Sheet

Sample ID:	TP4

Project Name:	Captains Flat Detailed Remediation Design		
Project No:	318001968		
Date:	17/09/2024		
Start time:	8:00 AM	Subcontractors:	RCA Australia
Finish time:	4:30 PM	Location:	Captains Flat, NSW

Drill	Depth	PID	Sample	Description	Well
Excavator	0.0		TP4_0.0	FILL: Silty gravelly SAND, fine to coarse grained, dark grey/brown, fine to coarse angular gravels with angular cobbles/lead ore fragments	
	0.4		TP4_0.5	FILL: siltstone cobbles/boulders within gravelly silty CLAY, low to medium plasticity clay, pale brown and pale orange, medium to coarse angular gravels with fine to coarse grained sand	
			TP4_1.0		
			TP4_1.5		
	2.0		TP4_2.0	EOI @ 2 mbgl	

Water		Graphic Log	Equipment Serial No.
	Standing Water Level	D = Disturbed	
	Seepage	SPT = Split Spoon	
		U = Undisturbed	
		PT = Push Tube	

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Bore Hole / Test Pit Logging Sheet

Sample ID:	TP5

Project Name:	Captains Flat Detailed Remediation Design		
Project No:	318001968		
Date:	17/09/2024		
Start time:	8:00 AM	Subcontractors:	RCA Australia
Finish time:	4:30 PM	Location:	Captains Flat, NSW

Drill	Depth	PID	Sample	Description	Well
Excavator	0.0		TP5_0.0	FILL: silty gravelly SAND, fine to coarse grained, dark greu and brown, fine to coarse angular gravels, with some lead ore gravel	
			TP5_0.5		
	1.0		TP5_1.0	FILL: silty sandy GRAVEL, fine to coarse agular gravel, dark grey/black, fine to coarse grained sand with angular cobbles. Ballast and lead ore sand throughout	
			TP5_1.5		
	1.8			FILL: silty gravelly CLAY, low plasicity, orange, fine to coarse angular gravels with siltstone/sandstone cobbles with some lead ore throughout	
			TP5_2.0		
			TP5_2.5		
	2.8				
				EOI @ 2.8 mbgl	

Water	Graphic Log	Equipment Serial No.
Standing Water Level	D = Disturbed	
Seepage	SPT = Split Spoon	
	U = Undisturbed	
	PT = Push Tube	

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Bore Hole / Test Pit Logging Sheet

Sample ID:	TP6

Project Name:	Captains Flat Detailed Remediation Design		
Project No:	318001968		
Date:	17/09/2024		
Start time:	8:00 AM	Subcontractors:	RCA Australia
Finish time:	4:30 PM	Location:	Captains Flat, NSW

Drill	Depth	PID	Sample	Description	Well
Excavator	0.0		TP6_0.0	FILL: silty gravelly SAND, fine tocoarse grained, dark grey/brown, fine to coarse angular gravels with some cobbles/boulders including ballast	
			TP6_0.5		
	0.6			FILL: silty gravelly CLAY, low to med plasticity, dark orange, fine to coarse angular gravels with	
			TP6_1.0	lead ore snad and ballast	
			TP6_1.5		
			TP6_2.0		
			TP6_2.5		
	2.6			Silty CLAY, low to medium plasticity, pale grey mottled orange with some fine to coarse angular	
	3.0		TP6_3.0	siltstone gravels	
				EOI @ 3 mbgl	

Water	Graphic Log	Equipment Serial No.
▽ Standing Water Level	D = Disturbed	
Seepage	SPT = Split Spoon	
	U = Undisturbed	
	PT = Push Tube	

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GEOTECHNICAL BOREHOLE LOG

BH1

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16510
CLIENT: Ramboll Australia Pty Ltd
PROJECT: Geotechnical Investigation
LOCATION: Captains Flat Rail Corridor, Copper Creek

DATE COMMENCED: 10/10/2024
DATE COMPLETED: 10/10/2024
SURFACE RL: 868.91 m AHD
COORDS: 720876.53 m E 6058770.97 m N MGA94 56
DRILL MODEL: Hanjin 8D, Track Mounted Drill Rig

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	Not Encountered	0.50m PP150 - 400kPa SPT 4, 4, 7 N=11 0.95m	0.50m D 0.95m	868.5 868.0	0.5 1.0		GM	FILL; Generally comprising a mixture of GRAVEL, SAND and SILT, dark grey-black, fine to coarse angular gravels (lead ore?), medium to coarse grained sand	M		EMBANKMENT FILL
								From approximately 0.75 to 0.95m; layer of Silty Gravelly CLAY, low to medium plasticity, orange-brown and orange, fine to coarse angular gravels	w~PL M		
		1.50m SPT 4, 5, 6 N=11 1.95m	1.50m D 1.95m	867.5 867.0	1.5 2.0			From approximately 1.2m; becoming with some cobbles, angular, grey and pale grey, including siltstone and lead ore fragments			
				866.5	2.50		CL-CI	FILL; Silty CLAY, low to medium plasticity, orange and dark orange-brown, mottled pale brown with some black speckles at intermittent intervals, with fine to coarse grained sand and fine to coarse sub-angular to angular gravels throughout	w~PL		
		3.00m PP90 - 160kPa SPT 2, 2, 3 N=5 3.45m	3.00m D 3.45m	866.0 865.5	3.0 3.5						
				865.0							

LOGGED: CD | CHECKED: MA | DATE: 22/10/2024

GEOTECHNICAL BOREHOLE LOG
BH1

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16510
CLIENT: Ramboll Australia Pty Ltd
PROJECT: Geotechnical Investigation
LOCATION: Captains Flat Rail Corridor, Copper Creek

DATE COMMENCED: 10/10/2024
DATE COMPLETED: 10/10/2024
SURFACE RL: 868.91 m AHD
COORDS: 720876.53 m E 6058770.97 m N MGA94 56
DRILL MODEL: Hanjin 8D, Track Mounted Drill Rig

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	Not Encountered	4.50m PP90kPa SPT 2, 2, 3 N=5 4.95m	4.50m D 4.95m	864.5 864.0	4.5 5.00		CL-CI	FILL; Silty CLAY, low to medium plasticity, orange and dark orange-brown, mottled pale brown with some black speckles at intermittent intervals, with fine to coarse grained sand and fine to coarse sub-angular to angular gravels throughout	w~PL		EMBANKMENT FILL
				863.5	5.50		CL-CI	FILL; Silty CLAY, low to medium plasticity, orange and dark orange-brown, mottled pale brown with some black speckles at intermittent intervals, with fine to coarse grained sand and fine to coarse sub-angular to angular gravels throughout	w~PL		Drillers noted increased drilling resistance from 5.5m
		6.00m SPT 8, 8, 13 N=21 6.45m	6.00m D 6.45m	863.0 862.5	6.0 6.5			FILL: Generally comprising siltstone rock fragments, considered representative of COBBLE, angular, pale grey and grey-brown From approximately 6.25-6.35m; band of Silty Sandy GRAVEL, fine to medium angular gravel, dark brown, medium to coarse grained sand From approximately 6.35m; crushed crystalline (quartz slag?) material encountered	M M-W M		
					6.60			SILTSTONE/SHALE, orange-brown and green-brown	MW	M - H	BEDROCK Vey hard grinding drilling from 6.6m
				862.0 861.5 861.0	6.80 7.0 7.5			BOREHOLE BH1 TERMINATED AT 6.80 m TC Bit refusal on rock			

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GEOTECHNICAL BOREHOLE LOG
BH2

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16510
CLIENT: Ramboll Australia Pty Ltd
PROJECT: Geotechnical Investigation
LOCATION: Captains Flat Rail Corridor, Copper Creek

DATE COMMENCED: 10/10/2024
DATE COMPLETED: 10/10/2024
SURFACE RL: 868.77 m AHD
COORDS: 720858.20 m E 6058793.52 m N MGA94 56
DRILL MODEL: Hanjin 8D, Track Mounted Drill Rig

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	Not Encountered			868.5	0		GM	FILL; Generally comprising a mixture of GRAVEL, SAND and SILT, dark grey-black, fine to coarse angular gravels (lead ore?), medium to coarse grained sand	M		EMBANKMENT FILL
		0.50m PP250 - 450kPa	0.50m		0.5						
		SPT 3, 4, 10 N=14	D	868.0				From approximately 0.65m to 0.85m; layer of Silty Gravelly CLAY, low to medium plasticity, orange-brown and orange, fine to coarse angular gravels	w~PL		
		0.95m	0.95m		1.0			From approximately 0.85m; becoming with some cobbles, angular, grey and pale grey, including siltstone and lead ore fragments	M		
				867.5							
		1.50m	1.50m		1.5						
		SPT 3, 4, 5 N=9	D	867.0							
		1.95m	1.95m		2.0						
				866.5							
					2.5						
				866.0							
		3.00m	3.00m		3.0			At approximately 2.8m; becoming brown and pale orange-brown			
		SPT 8, 7, 6 N=13	D								
				865.5	3.25		CL-CI	FILL; Silty Gravelly CLAY, low to medium plasticity. orange-brown and dark orange, fine to coarse angular gravels, with some to a trace of fine grained sand, with some siltstone cobbles throughout	w~PL		
		3.45m	3.45m		3.5						
				865.0							

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GEOTECHNICAL BOREHOLE LOG
BH2

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16510
CLIENT: Ramboll Australia Pty Ltd
PROJECT: Geotechnical Investigation
LOCATION: Captains Flat Rail Corridor, Copper Creek

DATE COMMENCED: 10/10/2024
DATE COMPLETED: 10/10/2024
SURFACE RL: 868.77 m AHD
COORDS: 720858.20 m E 6058793.52 m N MGA94 56
DRILL MODEL: Hanjin 8D, Track Mounted Drill Rig

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	Not Encountered	4.50m	4.50m	864.5	4.5		CL-CI	FILL; Silty Gravelly CLAY, low to medium plasticity. orange-brown and dark orange, fine to coarse angular gravels, with some to a trace of fine grained sand, with some siltstone cobbles throughout	w~PL		EMBANKMENT FILL
		SPT 8, 5, 10 N=15	D	864.0				From approximately 4.7m to 4.8m; band of crushed rock recovered in SPT tube	D		
		4.95m	4.95m					From approximately 4.9m to 4.95m; band of crushed rock recovered in SPT tube	w>PL		
					5.00				D MW		
				863.5				SILTSTONE/SHALE, pale orange-brown		M - H	BEDROCK Very hard and grinding drilling from 5.0m
					5.40						
					5.5			BOREHOLE BH2 TERMINATED AT 5.40 m TC Bit refusal on rock			
				863.0							
					6.0						
				862.5							
					6.5						
				862.0							
					7.0						
				861.5							
					7.5						
				861.0							

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GEOTECHNICAL BOREHOLE LOG
BH3

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16510
CLIENT: Ramboll Australia Pty Ltd
PROJECT: Geotechnical Investigation
LOCATION: Captains Flat Rail Corridor, Copper Creek

DATE COMMENCED: 10/10/2024
DATE COMPLETED: 10/10/2024
SURFACE RL: 868.70 m AHD
COORDS: 720855.63 m E 6058795.83 m N MGA94 56
DRILL MODEL: Hanjin 8D, Track Mounted Drill Rig

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	Not Encountered			868.5	0.5		GM	FILL; Generally comprising a mixture of GRAVEL, SAND and SILT, dark grey-black, fine to coarse angular gravels (lead ore?), medium to coarse grained sand	M		EMBANKMENT FILL Note: BH3 not logged to 5.3m depth, considered similar profile to adjacent BH2
				868.0				From approximately 0.65m to 0.85m; layer of Silty Gravelly CLAY, low to medium plasticity, orange-brown and orange, fine to coarse angular gravels	w~PL		
					1.0			From approximately 0.85m; becoming with some cobbles, angular, grey and pale grey, including siltstone and lead ore fragments	M		
				867.5	1.5						
				867.0	2.0						
				866.5	2.5						
				866.0	3.0			At approximately 2.8m; becoming brown and pale orange-brown			
				865.5	3.25		CL-CI	FILL; Silty Gravelly CLAY, low to medium plasticity. orange-brown and dark orange, fine to coarse angular gravels, with some to a trace of fine grained sand, with some siltstone cobbles throughout	w~PL		
				865.0	3.5						

LOGGED: CD | CHECKED: MA | DATE: 22/10/2024

GEOTECHNICAL BOREHOLE LOG
BH3

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16510
CLIENT: Ramboll Australia Pty Ltd
PROJECT: Geotechnical Investigation
LOCATION: Captains Flat Rail Corridor, Copper Creek

DATE COMMENCED: 10/10/2024
DATE COMPLETED: 10/10/2024
SURFACE RL: 868.70 m AHD
COORDS: 720855.63 m E 6058795.83 m N MGA94 56
DRILL MODEL: Hanjin 8D, Track Mounted Drill Rig

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	Not Encountered	6.05m 6.11m SPT 15/60mm N=R		864.5 864.0 863.5 863.0 862.5 862.0 861.5 861.0	4.5 5.0 5.30 5.5 6.0 6.5 6.55 7.0 7.5		CL-CI	FILL; Silty Gravelly CLAY, low to medium plasticity. orange-brown and dark orange, fine to coarse angular gravels, with some to a trace of fine grained sand, with some siltstone cobbles throughout	w~PL		EMBANKMENT FILL
								SILTSTONE/SHALE, orange-brown and green-brown	XW - HW	VL - L	BEDROCK Drillers noted slightly increased drilling resisteance from 5.3m
								At approximately 6.1m; becoming moderately weathered and medium to high strength	MW	M - H	
								BOREHOLE BH3 TERMINATED AT 6.55 m TC Bit refusal on rock			

LOGGED: CD | CHECKED: MA | DATE: 22/10/2024

GEOTECHNICAL TEST PIT LOG
TP1

SHEET 1 OF 1

PROJECT No: 16510
CLIENT: Ramboll Australia Pty Ltd
PROJECT: Geotechnical Investigation
LOCATION: Captains Flat Rail Corridor, Copper Creek

DATE: 17/10/2024
SURFACE RL: 867.34 m AHD
COORDS: 720880.90 m E 6058781.95 m N MGA94 56
EXCAVATION METHOD: 14t excavator, 600mm bucket

Test Pit Information						Field Material Information					
WATER	DYNAMIC PENETROMETER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
Not Encountered				867.0	0.0		GM	FILL; Generally comprising Lead Ore/GRAVEL, SAND and SILT, dark grey and dark brown-grey, medium to coarse angular gravel, fine to coarse grained sand, with some rubbish (ie. steel rods, steel wire, terracotta pieces, plastic, etc.) throughout	D M		EMBANKMENT FILL
				866.5	0.5						
				866.0	1.0						
				865.5	1.5						
			2.20m		2.0						
			U50		2.20		CI	Silty Sandy CLAY, medium plasticity, orange and pale grey mottled red-orange, fine to coarse grained sand, with fine to coarse sub-angular to sub-rounded gravels throughout	w>PL		EMBANKMENT FILL/RESIDUAL?
		PP80 - 100kPa	2.40m (D 2.4-2.5m) 2xB	865.0							
			2.60m		2.5						
			2.70m								
			D 2.80m								
				864.5							
		PP90 - 120kPa			3.0						
				864.0							
					3.50			SILTSTONE/SANDSTONE, very fine grained, grey-brown with iron oxide staining	MW	M - H	BEDROCK
				863.5				TEST PIT TP1 TERMINATED AT 3.70 m Limit of investigation			

LOGGED: CD | CHECKED: MA | DATE: 22/10/2024

GEOTECHNICAL TEST PIT LOG
TP2

SHEET 1 OF 1

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16510
CLIENT: Ramboll Australia Pty Ltd
PROJECT: Geotechnical Investigation
LOCATION: Captains Flat Rail Corridor, Copper Creek

DATE: 17/10/2024
SURFACE RL: 866.24 m AHD
COORDS: 720871.88 m E 6058748.53 m N MGA94 56
EXCAVATION METHOD: 14t excavator, 600mm bucket

Test Pit Information						Field Material Information					
WATER	DYNAMIC PENETROMETER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
Not Encountered				866.0	0.40		GM	FILL; Generally comprising Silty Sandy GRAVEL, fine to coarse angular lead ore gravel, dark grey, fine to coarse sand, with cobbles (up to 100mm size)	M		FILL Trace of rubbish (ie. steel, etc.)
				865.5	0.5 1.0		CL	Silty Sandy CLAY, low plasticity, orange-brown, fine to coarse grained sand, with fine to coarse angular gravels (siltstone rock fragments), abundant with siltstone/shale cobbles and boulders (up to approximately 300mm size)	w>PL		COLLUVIUM / FILL?
		PP80kPa PP>600kPa	1.30m (D 1.3-1.4m (U50 1.3-1.5m (2xB 1.4-1.6m) 1.60m	865.0	1.10		CL-CI	Silty Sandy CLAY, low to medium plasticity, pale grey mottled orange, fine to medium sand, with fine to coarse sub-angular to angular siltstone rock fragments and siltstone/sandstone cobbles (up to approximately 150mm size)		F St	RESIDUAL
				864.5	1.5 1.90			SILTSTONE/SANDSTONE, very fine grained, off white and orange-brown, recovered as COBBLE, up to approximately 200mm size	MW	M - H	BEDROCK
				864.0	2.00 2.5			TEST PIT TP2 TERMINATED AT 2.00 m Practical excavator refusal on rock			
				863.5	3.0						
				863.0	3.5						
				862.5							

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GEOTECHNICAL TEST PIT LOG
TP3

SHEET 1 OF 1

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16510
CLIENT: Ramboll Australia Pty Ltd
PROJECT: Geotechnical Investigation
LOCATION: Captains Flat Rail Corridor, Copper Creek

DATE: 17/10/2024
SURFACE RL: 868.45 m AHD
COORDS: 720854.85 m E 6058804.27 m N MGA94 56
EXCAVATION METHOD: 14t excavator, 600mm bucket

Test Pit Information						Field Material Information					
WATER	DYNAMIC PENETROMETER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
Not Encountered		PP70 - 100kPa	1.40m D 1.50m 2xB 1.70m	868.0 867.5 867.0 866.5 866.0 865.5 865.0 864.5	0.5 1.0 1.20 1.5 2.0 2.40 2.5 3.0 3.5		CL-CI	FILL; comprising Siltstone COBBLES/BOULDERS, up to approximatley 600mm size, pale grey-brown, with fine to coarse angular gravels and fine to coarse grained sand, with silt, trace of clay in upper 0.2m	D - M		EMBANKMENT FILL With rubbish (ie. steel, plastic, etc.) to approximately 0.2m
								FILL; comprising Siltstone COBBLES/BOULDERS situated within a Gravelly Silty CLAY matrix, cobbles/boulders up to approximatley 600mm size, low to medium plasticity clay, orange-brown, medium to coarse angular gravel, with fine to coarse grained sand Large boulder present at 2.3m	w>PL		
								TEST PIT TP3 TERMINATED AT 2.40 m Due to presence of large boudler			

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GEOTECHNICAL TEST PIT LOG
TP4

SHEET 1 OF 1

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16510
CLIENT: Ramboll Australia Pty Ltd
PROJECT: Geotechnical Investigation
LOCATION: Captains Flat Rail Corridor, Copper Creek

DATE: 17/10/2024
SURFACE RL: 868.38 m AHD
COORDS: 720858.46 m E 6058799.74 m N MGA94 56
EXCAVATION METHOD: 14t excavator, 600mm bucket

Test Pit Information						Field Material Information					
WATER	DYNAMIC PENETROMETER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
Not Encountered		PP70kPa	0.70m 2xB 0.90m D 1.00m 1.60m D 1.70m	868.0 867.5 867.0 866.5	0.40 0.5 1.0 1.5 2.00		SM	FILL; Silty Gravelly SAND, fine to coarse grained, dark grey-brown, fine to coarse angular gravels, with angular cobbles/lead ore fragments (up to approximately 80mm size)	D-M		FILL Root mattress to approximately 0.15m
							CL-CI	FILL; comprising Siltstone COBBLES/BOULDERS situated within a Gravelly Silty CLAY matrix, cobbles/boulders up to approximatley 900mm size, low to medium plasticity clay, pale brown and pale orange-brown, medium to coarse angular gravels, with fine to coarse grained sand	w>PL		EMBANKMENT FILL From approximately 1.5m; Large boulders present in main excavation face, causing instability for excavator during excavation
				866.0 865.5 865.0 864.5	2.5 3.0 3.5			TEST PIT TP4 TERMINATED AT 2.00 m Due to excavation instability			

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GEOTECHNICAL TEST PIT LOG
TP5

SHEET 1 OF 1

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16510
CLIENT: Ramboll Australia Pty Ltd
PROJECT: Geotechnical Investigation
LOCATION: Captains Flat Rail Corridor, Copper Creek

DATE: 17/10/2024
SURFACE RL: 868.52 m AHD
COORDS: 720869.16 m E 6058788.24 m N MGA94 56
EXCAVATION METHOD: 14t excavator, 600mm bucket

Test Pit Information						Field Material Information					
WATER	DYNAMIC PENETROMETER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
Not Encountered		PP80 - 90kPa	1.80m 2xB 2.00m D 2.20m 2.60m D 2.80m	868.5 868.0 867.5 867.0 866.5 866.0 865.5 865.0	0.5 1.00 1.5 1.80 2.0 2.5 2.80 3.0 3.5		SM	FILL; Generally comprising Silty Gravelly SAND, fine to coarse grained, dark grey and grey-brown, fine to coarse angular gravels, with some lead ore gravel, trace of sandstone boulders (up to approximately 500mm size)	D D-M		EMBANKMENT FILL Rubbish present (ie. steel, glass, shards, plastic, asbestos sheeting, etc.) to approximately 1m.
							GM	FILL; Generally comprising Lead Ore Gravel, recovered as Silty Sandy GRAVEL, fine to coarse angular gravel, dark grey-black, fine to coarse grained sand, with angular cobbles (up to approximately 100mm size)	M - W		From approximately 1.3m to 1.6m, large cavity formed within southern excavation face during excavation
							CL	FILL; comprising Silty Gravelly CLAY, low plasticity, orange and dark orange, fine to coarse angular gravels (siltstone rock fragments), with siltstone/sandstone cobbles abundant throughout (up to approximately 150mm size), with some intermittent layers of lead ore	w>PL		
								TEST PIT TP5 TERMINATED AT 2.80 m Due to excavation instability			

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GEOTECHNICAL TEST PIT LOG
TP6

SHEET 1 OF 1

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 16510
CLIENT: Ramboll Australia Pty Ltd
PROJECT: Geotechnical Investigation
LOCATION: Captains Flat Rail Corridor, Copper Creek

DATE: 17/10/2024
SURFACE RL: 868.83 m AHD
COORDS: 720878.50 m E 6058778.05 m N MGA94 56
EXCAVATION METHOD: 14t excavator, 600mm bucket

Test Pit Information						Field Material Information					
WATER	DYNAMIC PENETROMETER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
Not Encountered				868.5	0.5		SM	FILL; Generally comprising Silty Gravelly SAND, fine to coarse grained, dark grey-brown, fine to coarse angular gravels, with some cobbles/boulders (up to approximately 300mm size)	D-M		EMBANKMENT FILL Rubbish (ie. steel, rubber, glass etc.) present to ~0.6m
					0.60		CL-CI	FILL; Generally comprising Silty Gravelly CLAY, low to medium plasticity, dark orange and pale orange-brown mottled red-orange, fine to coarse angular gravels, abundant with angular lead ore cobbles (up to approximately 200mm size, black)	w>PL		
		PP80kPa	1.20m 2xB 1.40m D 1.50m	868.0 867.5	1.0 1.5			From 1.7m to approximately 2.1m; layer of lead ore present in southern excavation face, black			
		PP90 - 110kPa		867.0	2.0						
				866.5	2.5						
		PP180 - 200kPa	2.60m D 2.70m		2.60		CL-CI	Silty CLAY, low to medium plasticity, pale grey mottled orange and dark orange, with some fine to coarse angular siltstone gravels, trace of fine to medium grained sand			
				866.0	3.00			TEST PIT TP6 TERMINATED AT 3.00 m Limit of investigation			
				865.5	3.5						
				865.0							

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Explanatory Notes – Soil Description

In engineering terms, soil includes every type of uncemented or partially cemented material found in the ground. In practice, if the material can be remoulded by hand in its field condition or in water it is described as a soil. The dominant soil constituent is given in capital letters, with secondary textures in lower case. The dominant feature is assessed from *AS 1726:2017 – Geotechnical Site Investigations* and a soil symbol is used to define a soil layer.

METHOD

Method	Description
AD/T	Auger Drilling with tungsten carbide bit
AD/V	Auger Drilling with V Bit
AS	Auger Screwing
AT	Air Track
BH	Backhoe
CT	Cable Tool Rig
DB	Washbore Drag Bit
DT	Diatube
E	Excavator
EH	Excavator with Hammer
HA	Hand Auger
HQ	Diamond Core-63mm diameter
N	Natural Exposure
NMLC	Diamond Core-52mm diameter
NQ	Diamond Core-47mm diameter
Percussion	Percussion Drilling
PT	Push Tube
RR	Rock Roller
V	Vacuum Excavation
WS	Washbore
X	Existing Excavation

WATER

Water level at date shown

Seepage

NOT ENCOUNTERED: The borehole/test pit was dry soon after excavation. Inflow may have been observed had the borehole/test pit been left open for a longer period.

NOT OBSERVED: The observation of groundwater, whether present or not, was not possible due to drilling water, surface seepage or cave in of the borehole/test pit.

SAMPLING

Sample	Description
B	Bulk Disturbed Sample
D	Disturbed Sample
SPT	Standard Penetration Test
U50	Undisturbed Sample - 50mm diameter
U75	Undisturbed Sample - 75mm diameter
ES	Soil Sample, Environmental
EW	Water Sample, Environmental
G	Gas Sample

SOIL CLASSIFICATION

The appropriate symbols are selected based on the result of visual examination, field tests and available laboratory test results, such as particle size analysis, liquid limit and plasticity index.

Group Symbol	Description
GW	Well graded gravel
GP	Poorly graded gravel
GM	Silty gravel
GC	Clayey gravel
SW	Well graded sand
SP	Poorly graded sand
SM	Silty sand
SC	Clayey sand
ML	Silt of low plasticity
CL	Clay of low plasticity
OL	Organic soil of low plasticity
CI	Clay of medium plasticity
MH	Silt of high plasticity
CH	Clay of high plasticity
OH	Organic soil of high plasticity
Pt	Peat, highly organic soil

MOISTURE CONDITION

For coarse grained soils, the following terms are used

Dry - Non-cohesive and free-running

Moist - Soil feels cool, darkened in colour
- Soil tends to stick together

Wet - Soil feels cool, darkened in colour
- Soil tends to stick together, free water forms when handling

For fine grained soils, the following moisture content (w) terms are used:

w < PL - Moist, dry of plastic limit

w ≈ PL - Moist, near plastic limit.

w > PL - Moist, wet of plastic limit.

w ≈ LL - Wet, near liquid limit.

w > LL - Wet, wet of liquid limit

PLASTICITY

Soil plasticity is a measure of the range of water content over which a soil exhibits plastic properties. The classification of the degree of plasticity in terms of the Liquid Limit (LL) is as follows.

Description of Plasticity	Range of Liquid Limit for Silt	Range of Liquid Limit for Clay
Non-plastic	Not applicable	Not applicable
Low plasticity	≤50	≤35
Medium plasticity	Not applicable	>35 and ≤50
High plasticity	>50	>50

COHESIVE SOILS – CONSISTENCY

The consistency of a cohesive soil is defined by descriptive terminology such as very soft, soft, firm, stiff, very stiff and hard. These terms are assessed by the shear strength of the soil as observed visually, by hand penetrometer, dynamic cone penetrometer or vane shear values and by resistance to deformation to hand moulding.

A hand penetrometer may be used in the field or the laboratory to provide an approximate assessment of the unconfined compressive strength (UCS) of cohesive soils. Undrained shear strength c_u = 0.5×UCS. Undrained shear strength values are recorded in kPa as follows:

Strength	Symbol	Indicative Undrained Shear Strength, c_u (kPa)
Very Soft	VS	≤12
Soft	S	>12 and ≤25
Firm	F	>25 and ≤50
Stiff	St	>50 and ≤100
Very Stiff	VSt	>100 and ≤200
Hard	H	>200
Friable	Fr	—

COHESIONLESS SOILS – RELATIVE DENSITY

Relative density terms such as very loose, loose, medium dense, dense and very dense are used to describe silty and sandy material, and these are usually based on resistance to drilling penetration, Standard Penetration Test (SPT) N values or Perth Sand Penetrometer resistance.

Term	Symbol	Density Index
Very Loose	VL	0 to 15
Loose	L	15 to 35
Medium Dense	MD	35 to 65
Dense	D	65 to 85
Very Dense	VD	>85

SOIL PARTICLE SIZE DESCRIPTIVE TERMS

Fraction	Name	Subdivision	Size (mm)
Oversize	Boulders		>200
	Cobbles		63 to 200
Coarse grained soil	Gravel	Coarse	19 to 63
		Medium	6.7 to 19
		Fine	2.36 to 6.7
	Sand	Coarse	0.6 to 2.36
		Medium	0.21 to 0.6
		Fine	0.075 to 0.21
Fine grained soil	Silt		0.002 to 0.075
	Clay		<0.002

Explanatory Notes - Rock Description

METHOD

Refer to soil description sheet.

WATER

Refer to soil description sheet.

ROCK QUALITY

The defect spacing is shown where applicable and the Rock Quality Designation (RQD) and Total Core Recovery (TCR) for each core run is given where:

$$TCR = \frac{\text{Length of core recovered}}{\text{Length of core run}} \times 100\%$$

$$RQD = \frac{\text{Sum of axial length of sound core pieces >100mm long}}{\text{Length of core run}} \times 100\%$$

ROCK MATERIAL WEATHERING

Rock material weathering is described using the abbreviations and definitions used in *AS1726:2017– Geotechnical Site Investigations*.

Term		Abbreviation		Definition
Residual Soil		RS		Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely weathered		XW		Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible.
Highly Weathered	Distinctly Weathered	HW	DW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching or may be decreased due to deposition of weathering products in pores.
Moderately Weathered	Distinctly Weathered	MW	DW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.
Slightly Weathered		SW		Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh		FR		Rock shows no sign of decomposition of individual minerals or colour changes.

Where it is not practicable to distinguish between 'Highly Weathered' and 'Moderately Weathered' rock the term 'Distinctly Weathered' may be used. 'Distinctly Weathered' is defined as follows: 'Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in the pores'. There is some change in rock strength.

ROCK MATERIAL STRENGTH

Rock strength is described using *AS1726:2017– Geotechnical Site Investigations* and *ISRM – Commission on Standardisation of Laboratory and Field Tests, 'Suggested method of determining the Uniaxial Compressive Strength of Rock materials and the Point Load Index'* as follows:

Term	Abbreviation	Uniaxial Compressive Strength (MPa)	Point Load Index Is_{50} (MPa)
Very Low	VL	0.6 to 2	0.03 to 0.1
Low	L	2 to 6	0.1 to 0.3
Medium	M	6 to 20	0.3 to 1
High	H	20 to 60	1 to 3
Very High	VH	60 to 200	3 to 10
Extremely High	EH	>200	>10

◀ Diametral Point Load Index test.

▼ Axial Point Load Index test.

DEFECT SPACING/BEDDING THICKNESS

Depending on the project, may be either described as mean perpendicular spacing within a set of defects or bedding, or as the spacing between all defects within the rock mass.

Term	Defect Spacing	Bedding
Extremely closely spaced	<6 mm	Thinly laminated
	6 to 20 mm	Laminated
Very closely spaced	20 to 60 mm	Very thin
Closely spaced	0.06 to 0.2 m	Thin
Moderately widely spaced	0.2 to 0.6 m	Medium
Widely spaced	0.6 to 2.0 m	Thick
Very widely spaced	>2 m	Very thick

DEFECT DESCRIPTION

Type	Definition
JT	Joint
BP	Bedding Parting
CO	Contact
CS	Clay Seam
CZ	Crush Zone
DK	Dyke
DZ	Decomposed Zone
FC	Fracture
FZ	Fracture Zone
FL	Foliation
FLT	Fault
VN	Vein
SM	Seam
IS	Infilled Seam
SZ	Shear Zone

Planarity	Roughness
PR – Planar	VR – Very Rough
CU – Curved	RF – Rough
U – Undulating	S – Smooth
ST – Stepped	POL – Polished
IR – Irregular	SL – Slickensided

Symbol	Coating or Infill
CA	Calcite
Clay	Clay
CN	Clean
Fe	Iron oxide
KT	Chlorite
Qz	Quartz
X	Carbonaceous
SN	Stain
VNR	Veneer

The inclinations of defects are measured from perpendicular to the core axis.

Appendix 7
Surveyed Coordinates

Type	SampleID	X (GDA94 MGA55)	Y (GDA94 MGA55)	X (GDA2020 MGA55)	Y (GDA2020 MGA55)	Note
Borehole	BH1	720875.996	6058769.56	720876.5267	6058770.971	*Derived from survey data*
Borehole	BH2	720857.6648	6058792.108	720858.1955	6058793.519	*Derived from survey data*
Borehole	BH3	720855.0968	6058794.414	720855.6275	6058795.825	*Derived from survey data*
Hand auger	HA1	720977.5202	6058716.333	720978.0508	6058717.744	
Hand auger	HA10	721011.4824	6058665.968	721012.013	6058667.379	
Hand auger	HA11	721005.4762	6058657.458	721006.0068	6058658.869	
Hand auger	HA12	721004.4227	6058648.309	721004.9533	6058649.72	
Hand auger	HA13	720994.5791	6058646.031	720995.1097	6058647.442	
Hand auger	HA14	720995.8218	6058635.465	720996.3524	6058636.876	
Hand auger	HA2	720981.7323	6058727.963	720982.2629	6058729.374	
Hand auger	HA3	720988.5554	6058716.656	720989.086	6058718.067	
Hand auger	HA4	720985.5456	6058708.125	720986.0762	6058709.536	
Hand auger	HA5	720995.6009	6058707.915	720996.1315	6058709.326	
Hand auger	HA6	720997.2386	6058698.548	720997.7692	6058699.959	
Hand auger	HA7	721003.3917	6058695.705	721003.9223	6058697.116	
Hand auger	HA8	721010.6192	6058683.538	721011.1498	6058684.949	
Hand auger	HA9	721010.7696	6058673.869	721011.3002	6058675.28	
Test pit	TP1	720880.3688	6058780.536	720880.8995	6058781.947	*Derived from survey data*
Test pit	TP2	720873.6382	6058756.411	720874.1689	6058757.822	
Test pit	TP3	720854.3182	6058802.856	720854.8489	6058804.267	*Derived from survey data*
Test pit	TP4	720857.9278	6058798.332	720858.4585	6058799.743	*Derived from survey data*
Test pit	TP5	720868.634	6058786.826	720869.1647	6058788.237	*Derived from survey data*
Test pit	TP6	720877.965	6058776.64	720878.4957	6058778.051	*Derived from survey data*