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TARAGO LEAD MANAGEMENT ACTION PLAN

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TARAGO LEAD MANAGEMENT ACTION PLAN

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GLOSSARY

Term	Description
mg/L	milligrams per Litre
ADWG	Australian Drinking Water Guidelines
ANZECC	Australian and New Zealand Environment and Conservation Council
CRN	Country Regional Network
Metals	As: Arsenic, Cd: Cadmium, Cr: Chromium, Cu: Copper, Fe: Iron, Ni: Nickel, Pb: Lead, Zn:Zinc, Hg: Mercury
NATA	National Association of Testing Authorities
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
pH	A measure of acidity, hydrogen ion activity
QA/QC	Quality Assurance/Quality Control
RPD	Relative Percent Difference
SAQP	Sampling Analysis and Quality Plan
TDS	Total Dissolved Solids
VMP	Voluntary Management Proposal / Plan
-	On tables is "not calculated", "no criteria" or "not applicable"

1. INTRODUCTION

1.1 Background

Ramboll Australia Pty Ltd (Ramboll) was commissioned by Transport for NSW (TfNSW) to revise an Action Plan previously prepared under engagement to John Holland Rail Pty Ltd (Ramboll 2020) for the interim management of lead contamination existing within the rail corridor at Tarago and in a soil stockpile[1] adjacent the rail corridor. Lead contaminated ballast within the rail formation and surrounding soils occur within an area of approximately three hectares within the corridor and this area is here-in referred to as "the site" (see **Figure 1**, **Appendix 2**).

1.2 Site Identification

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

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

Table 1-1: Site Identification

Information	Description
Street Address:	Accessed from Stewart Street and Goulburn Street Tarago NSW
Identifier:	Part Lot 22 DP1202608
Site Area:	Approximately 7.5 ha
Local Government:	Goulburn Mulwaree Shire
Owner:	Transport for NSW
Current Site Use:	Forms part of the Goulburn to Bombala rail line and the Country Regional rail Network (CRN)

1.3 Land Use

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

1. Tarago Station (onsite).
2. A residence adjacent (east of) the site and adjacent (north of) Tarago Station. This residence is defined as 106 Goulburn Street Tarago (Lot 1 DP816626 - the Station Masters Cottage) and is known to be impacted by the contamination from the site[2].
3. A residence with a dam that previously received waters from the site (during surface water flow), located adjacent (east of) the northern end of site. During inspection in September 2023 a recently constructed draingage line was observed along the western boundary of the residence that would divert surface water from the site to Braidwood Road
4. Tarago Public School approximately 120 m east of the northern end of site.
5. Residences approximately 70 m west of the south end of site and east of Goulburn Street.
6. Tarago Recreation Area approximately 300 m east of site.

1.4 Site History Related to Contamination

Lead and to a lesser extent zinc and copper have been identified in soils within the Goulburn – Bombala rail corridor at Tarago in the vicinity of the former Woodlawn Mines Ore Concentrate

[1] Stockpile of 750m^3 was generated during construction of the loop line extension and was placed on adjacent (west) of the rail corridor. It is understood this land is owned by Veolia.

[2] Investigations are progressing for the Tarago FSMC and any actions relating to Tarago FSMC will be detailed in a separate Action Plan or IEMP as required.

Loadout Complex (the Loadout Complex). The load out complex was identified as having been historically located within the rail corridor at this location and investigations have identified lead and to a lesser extent zinc and copper in soils within the corridor.

Ramboll has completed a DSI (Ramboll 2020) of the rail corridor to characterise the extent of contamination present. Additional investigation comprising assessment of contamination to surrounding private and public properties has been completed. Information relating to the site and offsite public land has been presented in the DSI. Private property reports have been presented under separate covers.

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

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

TfNSW has since purchased 106 Goulburn Street, Tarago (Lot 1 DP816626) and has been included as part of the remediation works for the site.

A voluntary management proposal (VMP) was prepared to define how the Contaminant and associated risks would be managed and this was approved by the NSW EPA on 28 May 2020. Principal Feature 7 of the VMP relates to interim management and defines requirement to develop an Action Plan to define responses to mitigate risks from the Contaminant originating from the Site to offsite receptors.

This Action Plan has been prepared as an interim management measure to minimise exposure pathways to human health and ecology to contamination at or originating from the site until such time as permanent remediation works are completed.

This Action Plan has been prepared in accordance with the relevant legislation and industry standards, with reference to the *Guideline for the Preparation of Environmental Management Plans* (DIPNR 2004), *Preparing environmental management plans for contaminated land practice note* (NSW EPA 2022) and SafeWork NSW lead guidance.

This Action Plan shall be integrated within UGL management systems as the current manager of the CRN. UGL will be responsible for its implementation.

Development and implementation of this Action Plan is an element of a Voluntary Management Plan agreed to with the NSW EPA and is a legal requirement.

1.5 Topography, Hydrology, Geology and Hydrogeology

The site slopes gently east toward the Mulwaree River consistent with surrounding topography which is characterised by a drainage to the Mulwaree River which flows to the north.

Review of the Australian Geoscience Information Network (AUSGIN) portal (http://portal.geoscience.gov.au/ accessed 8/1/2020) identified regional geology including channel and flood plain alluvium (gravel, sand and clay) locally formed as calcrete overlying quaternary sedimentary rock.

Review of the NSW Department of Planning Industry Environment MinView portal (https://minview.geoscience.nsw.gov.au/) identified 12 wells within a 500 m radius from the site. Review of drilling and construction details for registered wells indicates the shallowest regional aquifer is present in gravel layers from 5.5 – 18.6 mbgl with deeper aquifers present in fractures of underlying shale, siltstone and limestone from 50 – 74 mbgl.

1.6 Operation of the Action Plan

The requirements of this Action Plan apply to lead contamination identified on and from the site and to the maintenance and management of the lead impacted soil stockpile.

This Action Plan will remain in place until a longer-term plan is developed and implemented or until the Site has been remediated and validated.

1.7 Objective

The objective of this Action Plan is to address risks from exposure to lead from the site due to the presence of lead containing ore. Specific actions include:

1. Measures to prevent further offsite migration of contamination via airborne dust or surface water and monitoring to assess the effectiveness of these measures
2. Measures to prevent members of the public accessing the site
3. Controls for rail workers accessing the site

Previous plan objectives included removal of contaminated sediment from affected rainwater tanks and removal of internal dust from affected buildings surrounding the site. These objectives have now been addressed. The plan does not address other lead sources that may be present on site or in the community, such as lead paint.

2. HAZARD IDENTIFICATION

Lead is known to cause health effects in humans, especially children and developing foetuses. SafeWork NSW recognises that females with childbearing capacity is the most sensitive receptor at work sites. Migration of lead into the environment, soils, groundwater and surface water, may cause environmental harm.

Future disturbance of lead impacted materials presents a hazard, which can cause a risk if exposures occur. The main route of human exposure is via inhalation and ingestion of lead dust. Therefore, measures should be aimed at minimising dust generation and exposure at the site. As children and pregnant women are particularly prone to lead related health effects, care should be taken to avoid the spread of lead dust and stop its spread within the surrounding environment.

2.1 Contamination within the Corridor

Ballast within a rail siding, the loop line, mainline and adjacent soils are contaminated with lead and lead impacted spoil was generated during loop extension works. A site-specific risk assessment was completed to consider risks associated with lead exposure to rail workers (Ramboll 2019b). A site-specific criteria (maximum lead concentrations in soil) of 2,200 mg/kg was recommended to guide protection rail workers following loop extension. Areas remaining after construction works within the rail corridor at Tarago with lead concentrations above 2,200 mg/kg are presented on **Figure 2a – 2e**, **Appendix 2**.

Loop extension works included disturbance of contaminated materials at the site. An estimated total of 750 m^3 of fouled ballast and 50 m^3 of contaminated railway sleepers were excavated during construction. Contaminated railway sleepers have been disposed of at an appropriately licensed waste facility. Stockpiled ballast was observed to be covered with geofabric and stabilised sand (approximately 0.1m thick).

2.2 Contamination from the Corridor

Potential for offsite migration of contamination (lead) from the site has been considered through assessment of lands adjacent the site and (where requested) more broadly within the surrounding area. High lead concentrations arising from the site appear limited to adjacent land and have migrated through surface water and airborne dust. Specific impacts were identified in soil, surface water, internal dust and sediment within rainwater tanks. Affected private property owners were notified and rectification works completed.

The main routes of ecological exposure appear to be via dust deposition and overland flow.

3. LEAD MANAGEMENT STRATEGY

Section 17 of the WHS Act requires risks to health and safety be eliminated so far as is reasonably practicable. The SafeWork NSW code of practice for managing risks of hazardous chemicals in workplace provides a hierarchy of control measures. The hierarchy of controls is a framework integrated widely through health and safety planning and has been applied within this Action Plan to define controls for risks associated with lead within both the corridor and the surrounding area. Whilst management of impacts within the corridor are not governed by SafeWork NSW, the same approach to management is appropriate.

The WHS Regulation require duty holders to work through the hierarchy of control measures when managing certain risks; however, it can be applied to any risk. The hierarchy ranks control measures from the highest level of protection and reliability to the lowest. You must, so far as is reasonably practicable eliminate risks by eliminating hazards; this is the most effective control measure. If this is not reasonably practicable, the risk must be minimised by using one or more of the following approaches:

1. substitute hazards with something safer. Substitution is the replacement of a hazardous chemical with a chemical that is less hazardous and presents lower risks
2. isolate hazards from people. Isolation involves separating people from the chemicals or hazards by distance or barriers to prevent or minimise exposure.
3. use engineering controls to minimise any risks that have not been eliminated. Engineering controls are physical in nature, including mechanical devices or processes that eliminate or minimise the generation of chemicals, suppress or contain chemicals, or limit the area of contamination in the event of spills and leaks

If a risk then remains, it must be minimised by implementing administrative controls, so far as is reasonably practicable. Any remaining risk must be minimised with suitable personal protective equipment (PPE)

4. LEAD MANAGEMENT STRUCTURE

4.1 Roles and Responsibilities

TfNSW (and its contractors) have a responsibility for protecting human health and the environment. The key roles and responsibilities for this Action Plan are presented in **Table 4-1**. UGL RL is ultimately responsible for developing a process to ensure this Action Plan is identified and implemented for management of retained contamination within the site.

Table 4-1: Roles and Responsibilities

Role	Responsibility
TfNSW	• To maintain ultimate responsibility for the Action Plan and enable UGL RL to implement it • Undertake all stakeholder management including public display of this Action Plan in accordance with the VMP Principal Feature 7, liaison with regulatory bodies and follow-up of all external complaints • Provision of a copy of this Action Plan to any future purchasers or occupiers of the site and attach a copy of the document to the contract of sale / lease

UGL Regional Linx (UGL RL) (Country Regional Network Contract Holder) Environment Manager –	• To implement this Action Plan including engagement of sub-contractors and consultants as required. This includes responsibility for:
	  ○ Implementation of measures to prevent further offsite migration of contamination via airborne dust or surface water and monitoring to assess the effectiveness of these measures. These measures are defined further under **Sections 5.1**, **5.2 and 5.3**
	  ○ Measures to prevent members of the public accessing the site
	  ○ Controls for rail workers accessing the site
	• To ensure that all employees, contractors and consultants that commission or carry out work on the site are aware of the contents of this Action Plan
	• To ensure compliance to the requirements of this Action Plan through surveillance and monitoring of consultants and contractors
	• Review effectiveness of this Action Plan following any incident or any other event that suggests this Action Plan is ineffective
	• Responsible for coordinating revisions and amendments to this Action Plan if site conditions change. Track all management of the revisions and amendments, and ensure amendments are communicated to all stakeholders
	• Ensure any site workers and contractors engaged at the Site are inducted on the requirements of this Action Plan

All site personnel	• To take reasonable care for their own health and safety and for the health and safety of their co-workers. With specific regard for this Action Plan all workers have a responsibility to implement controls as relevant to their site duties and to report any non-conformances with this plan to the UGL RL Environment Manager.
Relevant stakeholder health and safety representative	• Monitor and report (where relevant) on environmental and safety hazards, impacts or improvements to work activities. • Immediate reporting of all non-conformances or complaints or concerns to TfNSW regarding the implementation of this Action Plan • Undertake corrective actions to rectify non-conformances or complaints
Relevant stakeholder environmental representative	• Provide advice on environmental issues and incidents as necessary • Undertake monitoring and reporting requirements outlined in this Action Plan[1]

Role	Responsibility
	• Update this Action Plan as necessary

[1]Action Plan inspections must be completed by a UGL Representative suitably trained and experienced in application and management of erosion and sediment controls including stockpile management.

4.2 Legislative and Regulatory Framework

This Action Plan has been prepared to address the requirements of relevant legislation and codes. The key pieces of legislation applicable to this Action Plan are:

1. NSW Work Health and Safety Act 2011
2. NSW Work Health and Safety Regulation 2017
3. Protection of the Environment Operations Act 1997
4. Protection of the Environment Operations (Waste) Regulation 2014
5. Contaminated Land Management Act 1997

The key codes of practice are:

1. SafeWork NSW Lead Guidance
2. SafeWork NSW 2022 Code of Practice Managing risks of hazardous chemicals in the workplace
3. NSW EPA LeadSmart – Work Smart: Tradespeople and Mining Industry Workers
4. NHMRC Managing Individual Exposure to Lead in Australia – A Guide for Health Practitioners 2016
5. Workplace Exposure Standards for Airborne Contaminants (SafeWork NSW 2018)

4.3 Periodic Review

This Action Plan must be reviewed routinely from date of issue or when:

1. Requested by a health and safety representative from the relevant stakeholders
2. Lead containing material is removed, disturbed, sealed or enclosed
3. If monitoring described in **Section 5.2** indicates offsite migration of contaminants is continuing to occur
4. Changes to land use occur
5. When a longer-term lead management plan is in place
6. Where a monitoring detects an exceedance of an exposure scenario
7. At least annually by the UGL RL Environment Manager or health and safety representative

4.4 Corrective Actions

Where corrective actions are identified as required to be undertaken by any onsite personnel, these must be communicated to UGL RL. Corrective actions should be administered by the UGL RL Environment Manager. Where the actions relate to breaches in environmental controls, use of PPE and WHS requirements, corrective action must be implemented immediately.

4.5 Record Keeping

UGL RL (or appropriate contractor representative) shall keep records of the inductions, inspections, corrective actions and reports prepared for the Site. These records should be evaluated and used for completing the review of this Action Plan. Records shall be kept for a minimum of 30 years.

5. INTERIM MANAGEMENT MEASURES AND VERIFICATION MONITORING

5.1 Mitigation of offsite contaminant migration

The following interim management measures have been defined to prevent offsite contaminant migration via air borne dust or surface water. These measures shall be implemented until a long term remedial strategy is implemented and validated to have effectively mitigated risks associated with site contamination:

- Areas of contamination identified onsite (as described on the **Figure 2a** – **2e**, **Appendix 2** including the area of indicative contamination and the footprint of the former loadout complex buildings). Specific measures to implement the exclusion zone will include durable signage (similar in construction to public street signage) on 100 lineal meter increments adjacent both sides of the rail formation and on similar spacing to demarcate contamination in adjacent soils. Signage will include:

  Works within the exclusion zone will largely be limited to temporary stabling of trains on the Loop Line. Train operators must be provided with the Action Plan and advised that if exiting is required within the exclusion zone, controls described in **Section 6.1** must be implemented.

  Works will also include routine inspection of controls described within the Action Plan and could foreseeably include maintenance, emergency or construction works. Such works are centrally controlled though a work scheduling system and induction to the Action Plan has been added as a hold-point for works at Tarago.

  Exclusion zone controls shall be inspected monthly and repaired as required.
- A polymer sealant shall be applied to the surface of the lead impacted area as described on the **Figure 2a** – **2e**, **Appendix 2**. The polymer sealant shall be selected and applied by UGL. The polymer sealant shall be inspected and maintained by UGL in accordance with product specifications. The Tarago Yard Dust Suppression Works Report (UGL 2023) describes that Dustless™ and DirtGlue Regular™ have been applied to collectively cover the lead impacted area and that:
  - The supplier of the Dustless polymer product recommends the reapplication every 10-12 months.
  - The supplier of the DirtGlue Regular product recommends the reapplication every 18 months to 2 years
- Sediment controls will be installed and maintained in/or adjacent to each rail formation culvert where sediment entrainment is visible, derived from the drainage path, surrounding land and rail formation batters. Sediment controls shall be inspected monthly and after rainfall events (>10mm) in a 24 hour period. A telemetry enabled rain gauge is to be maintained at the site by UGL RL and rainfall data reviewed to identify triggers for inspections.

- Excavation within contaminated areas of the site shall only occur if completed in accordance with provisions defined in **Section 6**.
- Controls for the existing stockpile shall be implemented in accordance with **Section 6.3**.

5.2 Health Monitoring

Health monitoring is not considered necessary unless works include soil disturbance. Where works include soil disturbance a Certified Occupational Hygienist should be engaged to determine health monitoring specific to the scope or the work should be managed as Lead Risk Work as described under **Appendix 1**.

5.3 Environmental Monitoring

The effectiveness of this Action Plan in preventing further offsite contaminant migration has been verified through routine monitoring of surface water (August 2019 – March 2024) and airborne dust (September 2022 – June 2024). This monitoring supports the following conclusions:

- Risks to human health related to lead in airborne dust at and from the site have remained low and acceptable throughout the monitoring period
- Risks to human health and ecology related to metals in surface water at and from the site have remained low and acceptable throughout the monitoring period

Due to the low risk of contamination migrating offsite, an activity-based model is proposed whereby disturbance of ground surfaces, such as remediation, would trigger a monitoring event. A monitoring event will also be triggered where visible evidence of offsite dust or sediment migration is observed by TfNSW or UGL.

A plan for monitoring of surface water and air quality shall be developed to specifically assess potential impacts of any future excavation in the lead exceedance area (as identified on **Figure 2a – 2e**, **Appendix 2**).

Monitoring is to be completed by contaminated land management and air quality specialists suitably qualified and experienced to complete the prescribed monitoring program. Monitoring reports are to be authored reviewed or approved by a site contamination specialist certified as an environmental practitioner under the Environment Institute of Australia and New Zealand CEnvP Scheme. Where verification monitoring indicates offsite contaminant migration continues, corrective actions shall be implemented by UGL RL.

5.3.1 Surface Water Monitoring

Historic surface water monitoring locations are presented on **Figure 3**, **Appendix 2**. These locations should be considered in future monitoring to support comparison with existing data. Future monitoring should include the field parameters and analyses are described in **Table 5-1**.

Table 5-1: Surface Water Analytes

Field Parameters	Metals (filtered and total)
Electrical Conductivity	Aluminium
pH	Arsenic
Total Dissolved Solids	Cadmium
	Chromium
	Cobalt
	Copper
	Iron
	Lead
	Nickel
	Zinc
	$CaC0_3$

5.3.2 Air Monitoring

An onsite air quality monitoring program will be developed specific to any proposed scope of excavation in the lead impacted areas (defined on **Figures 2a –e**, **Appendix 2**) and will include daily monitoring using appropriate instruments. A summary of the monitoring system to be implemented as part of the excavation works is detailed below, however, a Dust Management Plan for the excavation/remediation works should include onsite air quality monitoring specific to the Remediation Contractor's methodology.

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

A three-level air quality alert system is proposed. The trigger levels should be based on real-time monitoring from the Precinct collected prior to remediation. The alert values should be based on the 98%, 99.9% and 100% percentile of the 15-minute averages of measurements over a minimum 12-month period. These values are considered appropriate when considering what is acceptable in the community, the low airborne lead measured in absence of remediation and when considered against the air quality criteria at longer averaging periods. Trigger values should be reviewed following the first month of data and potentially revised with consideration of the air quality criteria, monitoring technique and positioning of monitors.

1. Alert Level
    a. Elevated levels of dust measured for one 15-minute averaging period.
    b. Initial trigger values set at 98 percentile 15-minute average

   c. Observe the operation to identify dust generating activities. Consider further action to minimise dust generation or continue to observe closely.
2. Action Level 1
   a. Elevated levels of dust measured for two consecutive 15-minute averaging periods.
   b. Initial trigger values set at 99.9 percentile 15-minute average
   c. Immediately action additional dust mitigation measures and communicate requirement to reduce dust levels to all operational staff.
3. Action Level 2
   a. Elevated levels of dust measured for three consecutive 15-minute averaging periods.
   b. Initial trigger values set at 100 percentile 15-minute average
   c. Cease operation and prioritise dust mitigation measures. Operation can recommence once subsequent alert levels are at Action Level 1 or below.

6. SITE LEAD MANAGEMENT

6.1 Mitigating Onsite Risks

Remediation was recommended to remove lead impacted soils from the Woodlawn Siding and adjacent soils to temporary stockpile as an interim measure before remediation. The loop extension is now complete including all associated requirements for excavation of lead impacted materials.

Future disturbance of soils within lead exceedance areas (if/when required) presents a hazard, which can cause a risk if exposures occur. The main route of human exposure is via inhalation and ingestion of lead dust. Therefore, measures should be aimed at minimising dust generation and exposure at the site. As children and pregnant women are particularly prone to lead related health effects, care should be taken to avoid the spread of lead dust and stop its spread to workers homes and premises. SafeWork NSW definitions of lead risk work and associated notification requirements are provided in **Appendix 1**.

Specific work methods are to be developed for any excavation works undertaken within the lead exceedance areas identified onsite (as described on the **Figure 2a – 2e, Appendix 2**). These works should include application of controls prescribed for lead risk work unless a Certified Occupational Hygienist is engaged to assess the specific scope of works to be completed and advises otherwise. Additional hazard mitigation measures are provided in **Table 6-1.**

Table 6-1: General Hazard Mitigation Measures

Category		General Requirements
Exposure abatement	Exclusion zones	Areas of contamination identified onsite (as described on the **Figure 2a – 2e**, **Appendix 2)** will be demarcated as exclusion zones. These areas shall not be utilised as thoroughfares and shall only be accessed by persons inducted to this Action Plan.
	Personal protective equipment (PPE)	Standard rail corridor PPE – full length clothing (sleeves and trousers / overalls), orange high visibility upper clothing or vest, safety (steel capped) boots, protective eyewear, hard hat or hat and gloves at all times. At a minimum, a P2 dust mask must be worn whenever entering lead impacted areas.
	Onsite practices	Use the required PPE whenever inside lead impact areas, prevent vehicular access over contaminated soils (unless a specific work method statement is developed), decontaminate after leaving lead impact areas by removing/washing/cleaning dusty work clothes, boots, shoes, tools, phones, hands/face/any other exposed body area, always wash hands before eating or drinking, eating or drinking to be conducted in a clean dust free location, any dust cleaning to be performed with damp cloth/mop. Shall not drink, eat, smoke or chew gum in the lead impacted area. Keep finger nails short.
	Offsite practices	Leave shoes, work clothes, work boots outside unless free of site-related dust, if possible shower prior to coming home, keep work gear separate from other clothing and wash separately. Keep baby equipment like child car seats etc. out of work vehicle. Discourage family visits to the workplace during hazard elimination.

Category		General Requirements
Hazard elimination activity	Excavation (if required) – lead risk activity	Excavation within lead exceedance areas shall be completed so that visible airborne dust is not generated. Control measures will include: • Avoidance of dust generating activities during adverse weather conditions (e.g. stop work or modify activities during winds above 30km/hr). A log of wind speeds at the site should be maintained during excavation works. • Application of water on disturbed surfaces and materials such as vehicle routes, stockpiles and excavation areas if dust is visible e.g. through use of a water cart. • Minimise travel speed and distance in the excavation area (e.g. limit light vehicles to 30 km/h and heavy machinery to 8 km/h). • Minimise drop height of material to reduce emissions from loading and unloading activities (e.g. limit drop height to less than 1.5m). • Avoid disturbance of areas stabilised with dust suppressant. • Air monitoring described in **Section 5.3.2** will be undertaken during all excavation of soils in lead exceedance areas as described on the **Figure 2a** – **2e**, **Appendix 2**. The details of this Action Plan shall be communicated to all onsite workers including external contractors, any workers involved shall adhere to requirements set out below.
	Stockpiling	Refer to stockpiling requirements set out in **Section 6.3**
	Facilities	The following facilities are to be provided during lead risk works: • Clean and dust free workers area for eating and drinking • Toilet facilities and wash up areas for decontamination • Disposal of any work-related contaminated material such as dust masks, disposable gloves and tyvek suits, etc.
Workers undertaking excavation within lead impacted areas	Machinery Operators	Whilst inside the cabin of the excavator, a dust musk is not required if: • Cabin is air conditioned, and all windows are up and • Cabin air circulation system (air conditioning) is equipped with high efficiency filter and • Has good seals to eliminate cabin dust intrusion • Personal air quality monitoring results indicate no lead dust inside the cabin. If the monitoring identifies lead dust inside the cabin a P2 mask must be worn.
	Workers outside – assisting excavation	Workers outside the excavator shall be used minimally and on as need basis. These workers shall remain outside a 20m exclusion zone from the excavator, ideally upwind. As a minimum a P2 mask will be worn at all times. If there is a need to be closer to the excavator (i.e. within 20m exclusion zone), workers shall also wear a Type 5 single use disposable Tyvek suit and can wear a higher level of respiratory protection (P3). Unless a Certified Occupational Hygienist advises otherwise all workers that are part of excavation works are to be monitored for

Category		General Requirements
		blood lead levels before, one month after a worker starts the remediation work and one month after completion of the remediation work as required by SafeWork NSW Lead Guidance for Lead Risk Work.
Others	Onsite workers / contractors / train drivers	Any onsite workers shall remain outside lead impacted areas and preferably upwind.
	Public	It is likely that public may be present at certain times at the Tarago train station during further excavation, though noting public time at the station is likely to be less than 30 minutes. During excavation of contaminated materials within 50m of Tarago Station UGL RL shall assure no dust is generated and: • Prevent access to the station platform until 10 mins prior to arrival/departure of any passenger trains • Stop excavation works 10 mins prior to arrival/departure of any passenger trains The air quality monitoring program specific to any proposed excavation work required under **Section 5.3.2** shall include consideration of potential exposure of members of the public using Tarago train station to lead dust, wind speed and direction and potential requirements to clean the station after excavation and before reopening to the public.

6.2 Material Tracking

All material handled during excavation of lead impacted materials is to be tracked to verify appropriate movement and handling. The system will track materials from cradle-to-grave, and will provide detailed information on the origin, quantity and fate of all materials excavated during remediation. Records will be maintained by construction contractor site personnel defining chainage of origin, material types loaded, and material fate (temporary stockpile ID). These records shall be consolidated digitally according to the tracking spreadsheet attached as **Appendix 3**.

6.3 Stockpile Management

Lead contaminated material excavated during the extension works has been consolidated in a stockpile near the rail alignment on Veolia land and in a manner to minimise human and environmental exposure. The stockpile comprises approximately 750 m^3 of fouled ballast.

All workers undertaking future stockpiling or remedial activities outside of the excavator are to adhere to specific requirements set out in **Table 6-1**. The following stockpiling requirements are nominated to manage any human exposure or environmental migration of lead contaminated material that is excavated to stockpile:

- All stockpiles of lead contaminated materials are to be placed away from drainage lines, gutters or storm water pits or inlets to prevent sediments from leaving the site.
- All stockpiles of lead contaminated materials are to be covered securely ensuring that surface water infiltration cannot occur and that the cover is not disturbed or blown away under windy conditions
- All stockpiles of lead contaminated materials are to be stored in secure areas and sign posted to ensure the stockpile is not inadvertently moved or uncovered, e.g., 'Contaminated Stockpile – DO NOT MOVE OR UNCOVER. Contact [name and phone number of contact].' The objective of this is to ensure tracking of contaminated material is maintained and to prevent increased exposure risks from stockpiled contaminants
- Stockpiles are to be positioned on level surfaces to the extent practicable. If stockpiles cannot be positioned on level surfaces construction of bunds to control ingress/egress of surface water at the base of stockpiles shall occur
- Stockpiles are to be sprayed with dust suppressant to limit airborne dust.
- Stockpiles are to be constructed in low elongated mounds to the extent practicable; and
- Stockpile management is to continue as described above until a long-term management plan is put in place.

Once stockpiles are complete, inspection of the stockpile is to be undertaken to ensure the above controls remain in place. Monitoring of stockpile management measures shall occur monthly and after rainfall events (>10mm in 24 hour period) and shall include inspection of the integrity of stockpile cover.

If inspections identify rectification works are required to reinstate stockpile controls these rectification works are to be undertaken in a timely manner to avoid risk to the community or the environment occurring.

6.4 Summary of Interim Monitoring and Verification Requirements

As outlined in this plan, monitoring is required until a permanent remediation solution is identified. A summary of the monitoring requirements is outlined in **Table 6-2.**

Table 6-2: Summary of interim monitoring requirements

Element	Frequency	Reference
Dust suppression	Monthly and after >10 mm of rainfall in a 24-hour period	Section 5.1
Surface water	Frequency determined during planning for excavation of soils in lead exceedance areas.	Section 5.3.1
Air Quality	Frequency determined during planning for excavation of soils in lead exceedance areas.	Section 5.3.2
Stockpile	Monthly and after >10 mm of rainfall in a 24-hour period	Section 6.3

Monitoring to ensure that the controls described within this plan are maintained will occur monthly or after >10mm rainfall in a 24-hour period and will include completion of the checklist presented as **Appendix 4**.

7. LIMITATIONS

This document is issued in confidence to Transport for New South Wales for the purposes of informing management of risks associated with identified lead contamination on or originating from the rail corridor at Tarago NSW. It is understood that Transport for New South Wales will use this document to communicate with UGL RL controls for management of contamination at the Tarago Rail Yard. Ramboll extends reliance to the NSW EPA and UGL RL for these purposes. It should not be used for any other purpose.

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

8. REFERENCES

Australian Geoscience Information Network (AUSGIN) portal (http://portal.geoscience.gov.au/ accessed 8/1/2020)

Department of Infrastructure, Planning and Natural Resources (2004) *Guideline for the Preparation of Environmental Management Plans*

NHMRC *Managing Individual Exposure to Lead in Australia – A Guide for Health Practitioners 2016*

NSW Department of Planning Industry Environment MinView portal (https://minview.geoscience.nsw.gov.au/)

NSW EPA *LeadSmart – Work Smart: Tradespeople and Mining Industry Workers* *http://leadsmart.nsw.gov.au/wp-content/uploads/2016/09/LeadSmart-Brochure-Working.pdf*

NSW EPA (2022) Preparing environmental management plans for contaminated land practice note *www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/contaminated-land/22p3473-emps-for-contaminated-land-practice-note.pdf?la=en&hash=CBC7F6F0E1997C8B5229A83A2407AEC7F7E5E31B* accessed 11/04/2022.

Ramboll (2019b) *Tarago Loop Extension Preliminary HHRA Rev 1 17/10/2019*

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

SafeWork NSW *https://www.safework.nsw.gov.au/notify-safework/lead-notifications*

SafeWork NSW (2022*) NSW Code of Practice Managing Risks of Hazardous Chemicals in the Workplace*

SafeWork Australia (2018) *Workplace Exposure Standards for Airborne Contaminants*

UGL Regional Linx (2023) *Tarago Yard Dust Suppression Works Report*

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

US EPA (2021) Protect Your Family from Lead in Your Home

APPENDIX 1
SAFEWORK NSW LEAD NOTIFICATION REQUIREMENTS

Where works include soil disturbance a Certified Occupational Hygienist should be engaged to determine health monitoring specific to the scope or the work should be managed as Lead Risk Work.

SafeWork NSW Lead Risk Definition
Lead Risk Work involves work that may cause lead levels in a worker's blood to exceed health limits.
'Lead risk work' means:

- 5 µg/dL (0.24 µmol/L) for a female of reproductive capacity
- 20 µg/dL (0.97 µmol/L) in other cases.

Duty to provide information
Information must be given about the Lead Risk Work to—
(a) a person who is likely to be engaged to carry out the lead process—before the person is engaged, and
(b) a worker for the business or undertaking—before the worker commences the lead process.

SafeWork NSW Notifications
Notification must be provided if the work is likely to cause lead levels in a worker's blood to exceed healthy levels. Notification is also needed if a worker needs to be removed from working with lead.

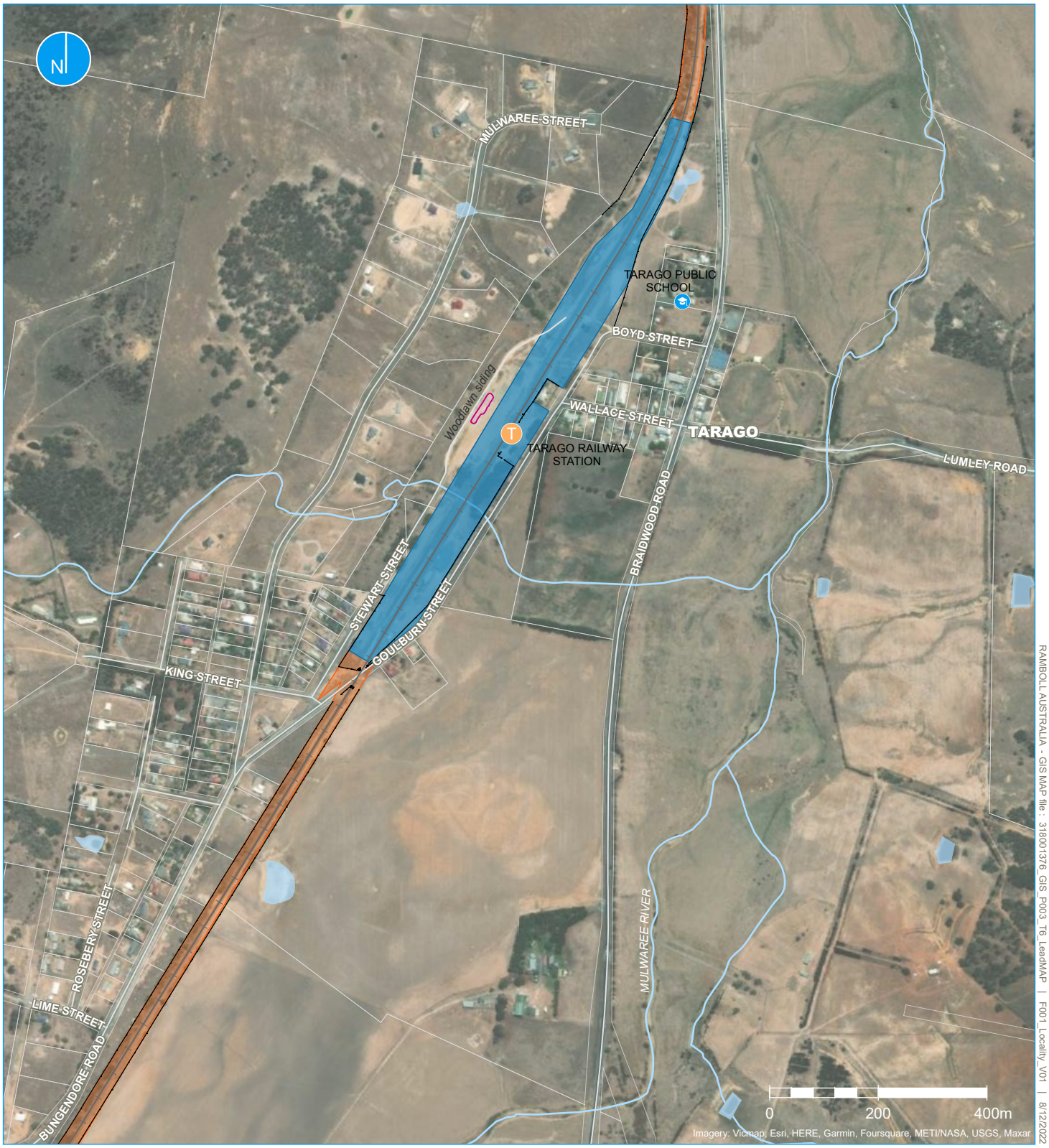
Notification for lead risk work

SafeWork NSW states the following:
You must assess each process that involves lead to determine whether lead risk work is being carried out.
If you cannot determine whether lead risk work is being carried out, then assume it is and notify us.
Submit the Notification of lead risk work form at least seven days before lead work begins. Each form is valid for the duration of the lead risk work.
You need to notify us if a worker needs to be removed from working with lead.
More information on this can be found in the legislation as well as in our Guide on lead notifications. https://www.safework.nsw.gov.au/resource-library/licence-and-registrations/guide-for-applicants-for-lead-notifications
All lead notifications are free.

Health Monitoring

SafeWork NSW states that:
Health monitoring must be provided to workers before lead risk work starts and one month after starting.
For workers who perform ongoing lead work, biological monitoring must be arranged in accordance with the frequencies published in the WHS Regulation.
Additional guidance can be found at https://www.safework.nsw.gov.au/notify-safework/lead-notifications

APPENDIX 2
FIGURES



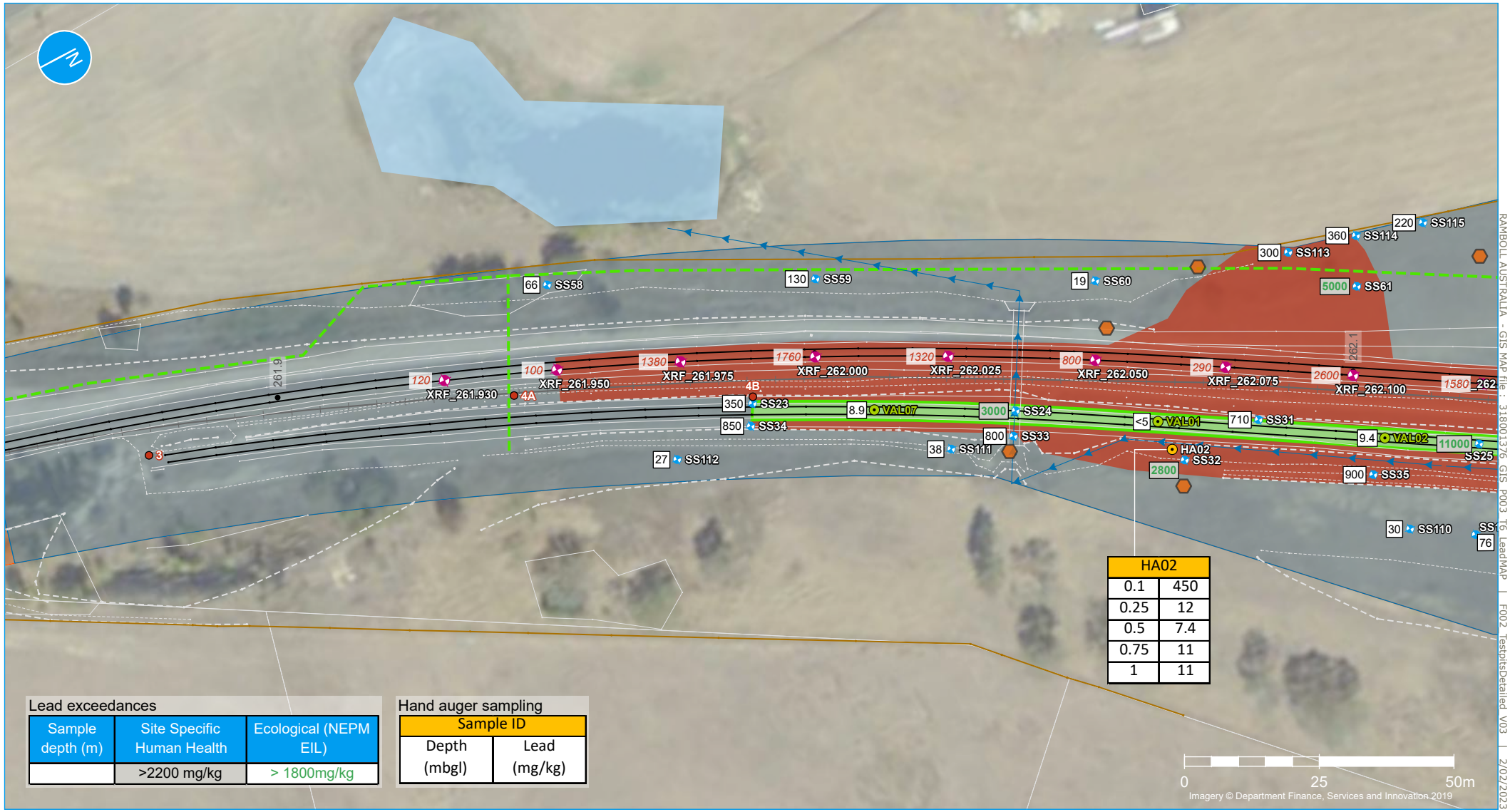
RAMBOLL AUSTRALIA - GIS MAP file : 318001376_GIS_P003_T6_LeadMAP | F001_Locality_V01 | 8/12/2022

A4
1:10,000

Legend

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

Figure 1 | Locality Plan



HA02	
0.1	450
0.25	12
0.5	7.4
0.75	11
1	11

Lead exceedances

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

Hand auger sampling

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

Legend

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

Survey lines

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

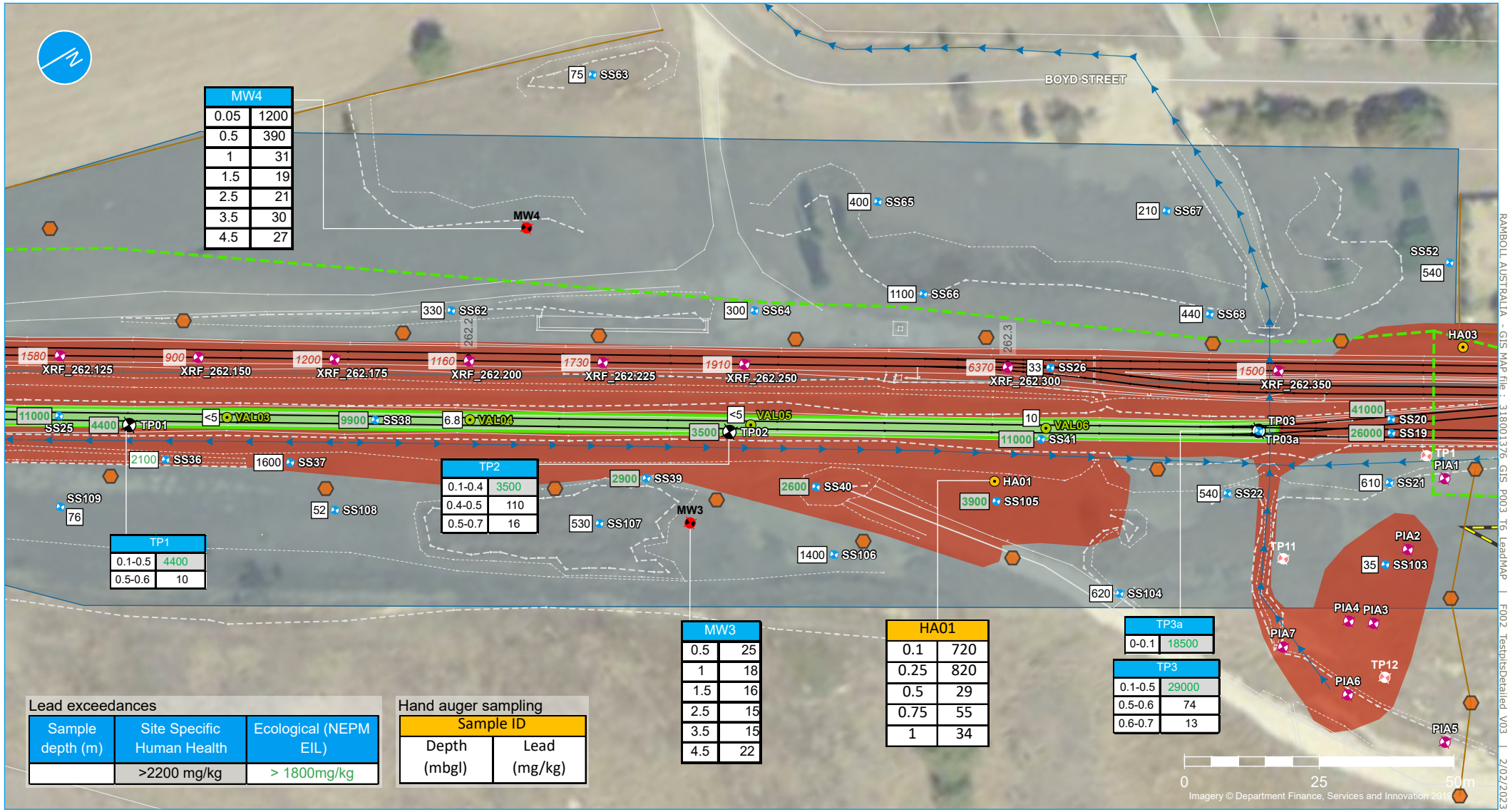
- Previous sampling location (McMahon)
- Shallow soil (Ramboll 2019)
- Hand auger (Ramboll 2019)
- X-Ray fluorescence sampling (Ramboll 2019, 2020)
- 1200 Lead concentration for XRF sample (mg/kg)
- Validation sample (Ramboll 2019)

- Lead exceedance area (requiring application of polymer sealant)
- Area of excavation during loop extension (no further excavation proposed)

A4
1:1,000

Location

Figure 2a | Site Plan



RAMBOLL AUSTRALIA - GIS MAP file : 318001376_GIS_P003_T6_LeadMAP | F002_TestpitsDetailed_V03 | 2/02/2023

Legend

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

Survey lines

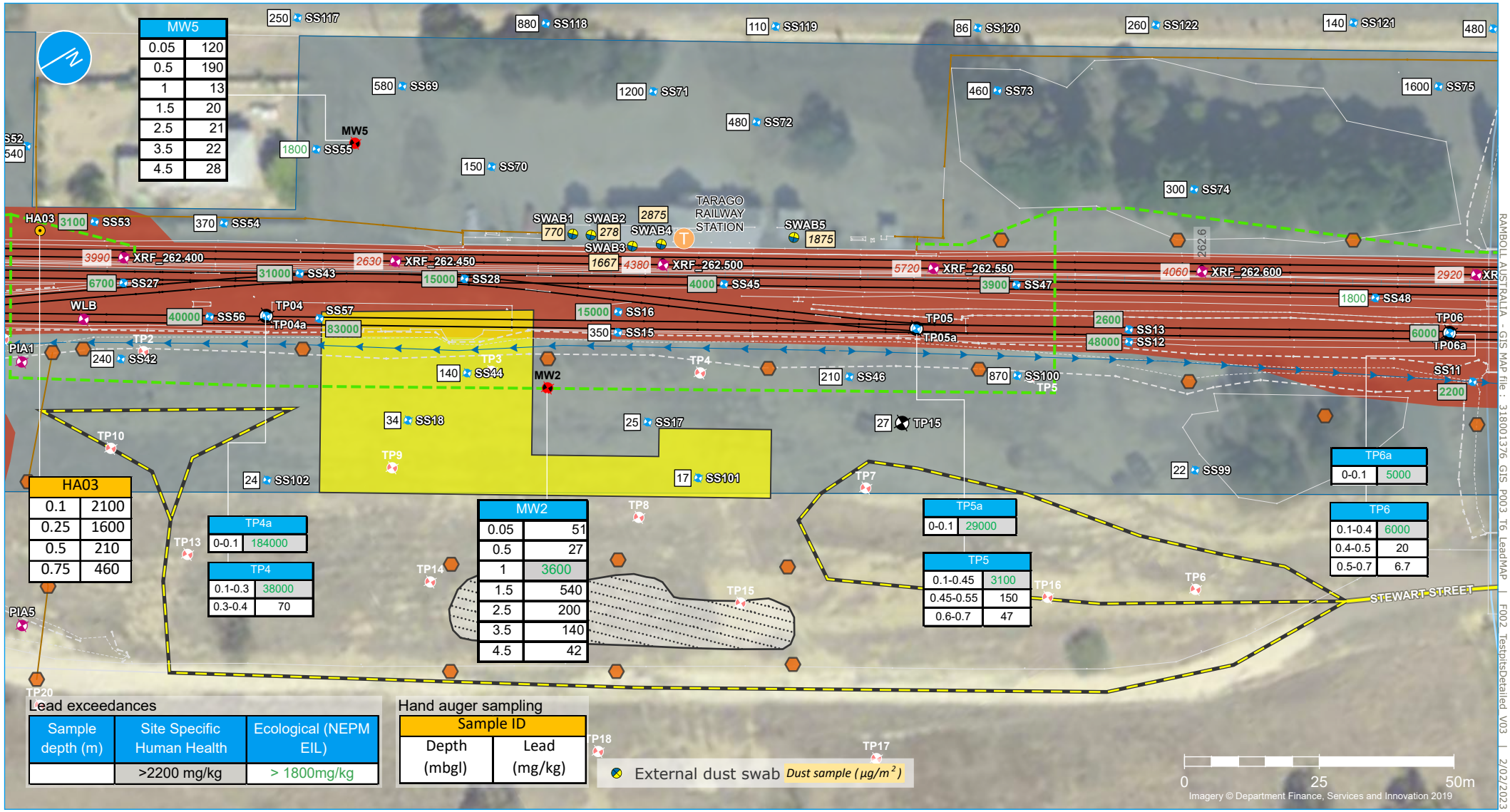
- Rail track
- Top of bank
- Bottom of bank
- Other elements

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

- Lead exceedance area (requiring application of polymer sealant)
- Area of excavation during loop extension (no further excavation proposed)
- Former loadout road (approximate)

A4
1:1,000

Figure 2b | Site Plan



Legend

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

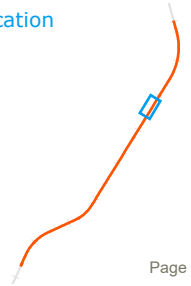
Survey lines

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

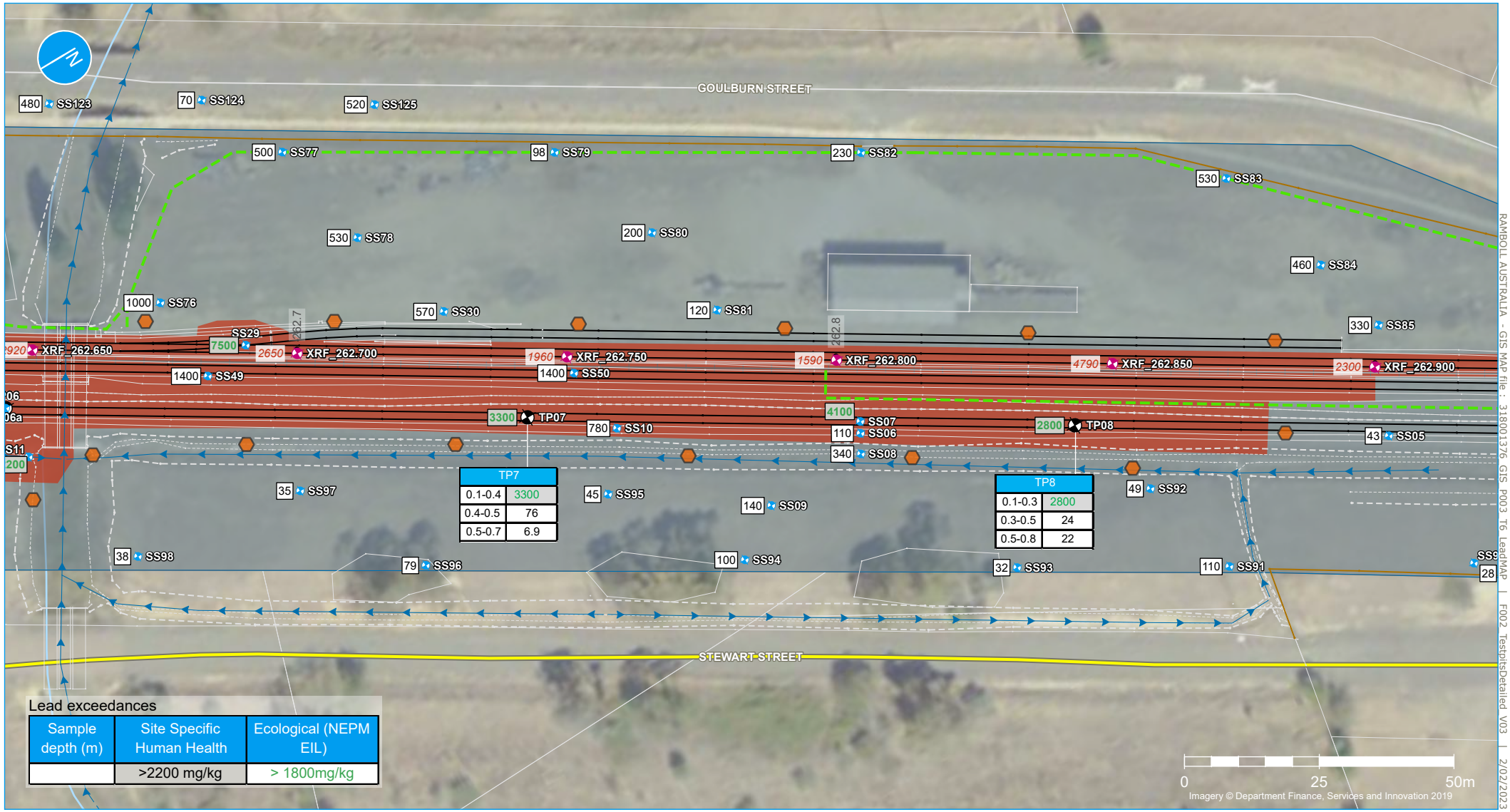
- Shallow soil (Ramboll 2019)
- Test pit (Ramboll 2019)
- Hand auger (Ramboll 2019)
- X-Ray fluorescence sampling (Ramboll 2019, 2020)
- 1200 Lead concentration for XRF sample (mg/kg)
- Groundwater monitoring location
- Test pit (loadout complex)

- Lead exceedance area (requiring application of polymer sealant)
- Former loadout road (approximate)
- Former loadout complex building footprint
- Haul route
- Stockpile (JHR)

A4 Location
1:1,000



RAMBOLL AUSTRALIA - GIS MAP file : 318001376_GIS_P003_T6_LeadMAP | F002_TestpitsDetailed_V03 | 2/02/2023



RAMBOLL AUSTRALIA - GIS MAP file : 318001376_GIS_P003_T6_LeadMAP | F002_TestpitsDetailed_V03 | 2/02/2023

Legend

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

Survey lines

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

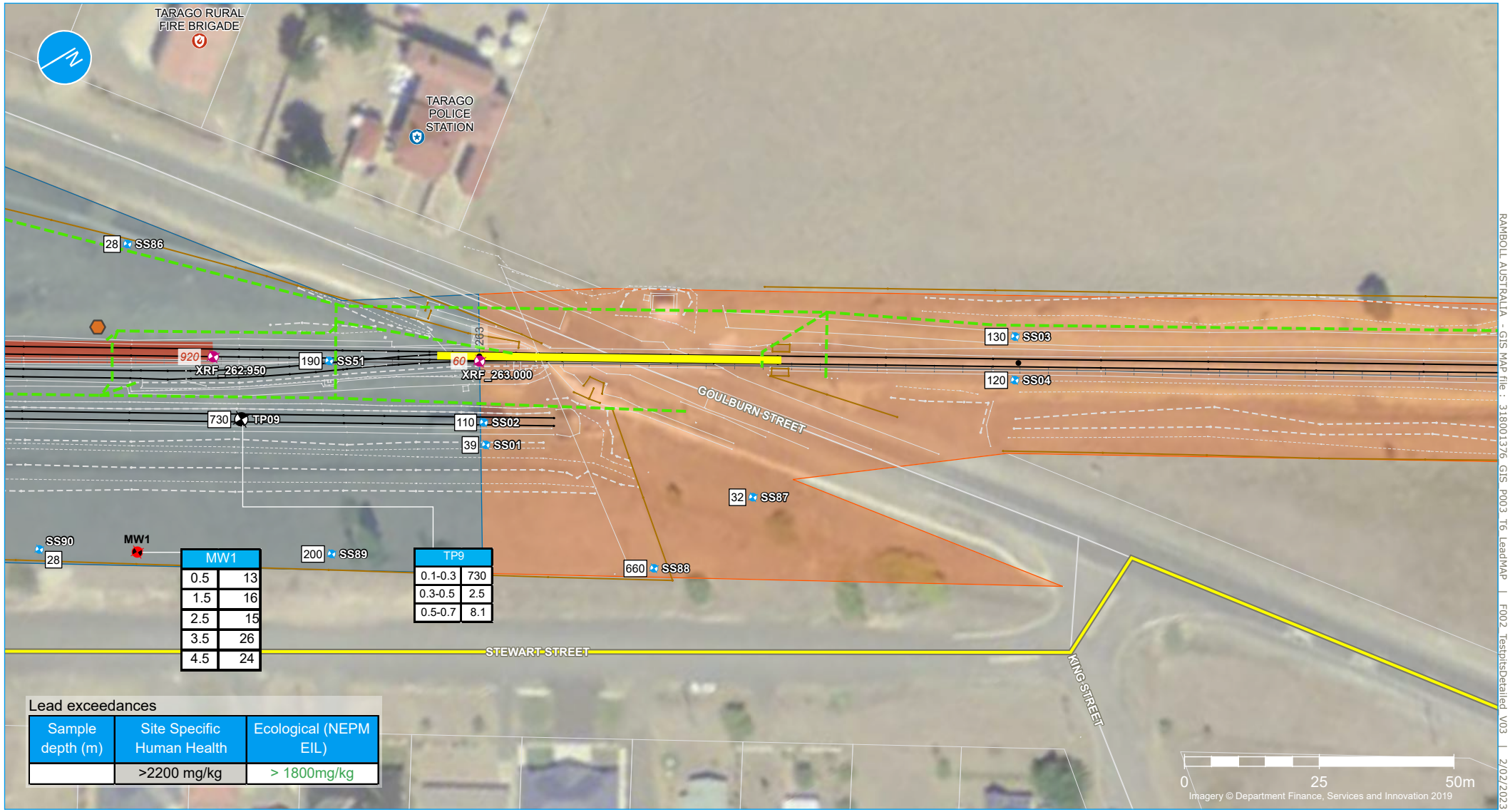
- Shallow soil (Ramboll 2019)
- Test pit (Ramboll 2019)
- X-Ray fluorescence sampling (Ramboll 2019, 2020)
- 1200 Lead concentration for XRF sample (mg/kg)

- Lead exceedance area (requiring application of polymer sealant)
- Haul route

A4
1:1,000

Location

Figure 2d | Site Plan



RAMBOLL AUSTRALIA - GIS MAP file : 318001376 GIS P003 T6 LeadMAP | F002 TestpitsDetailed V03 | 2/02/2023

Legend

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

Survey lines

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

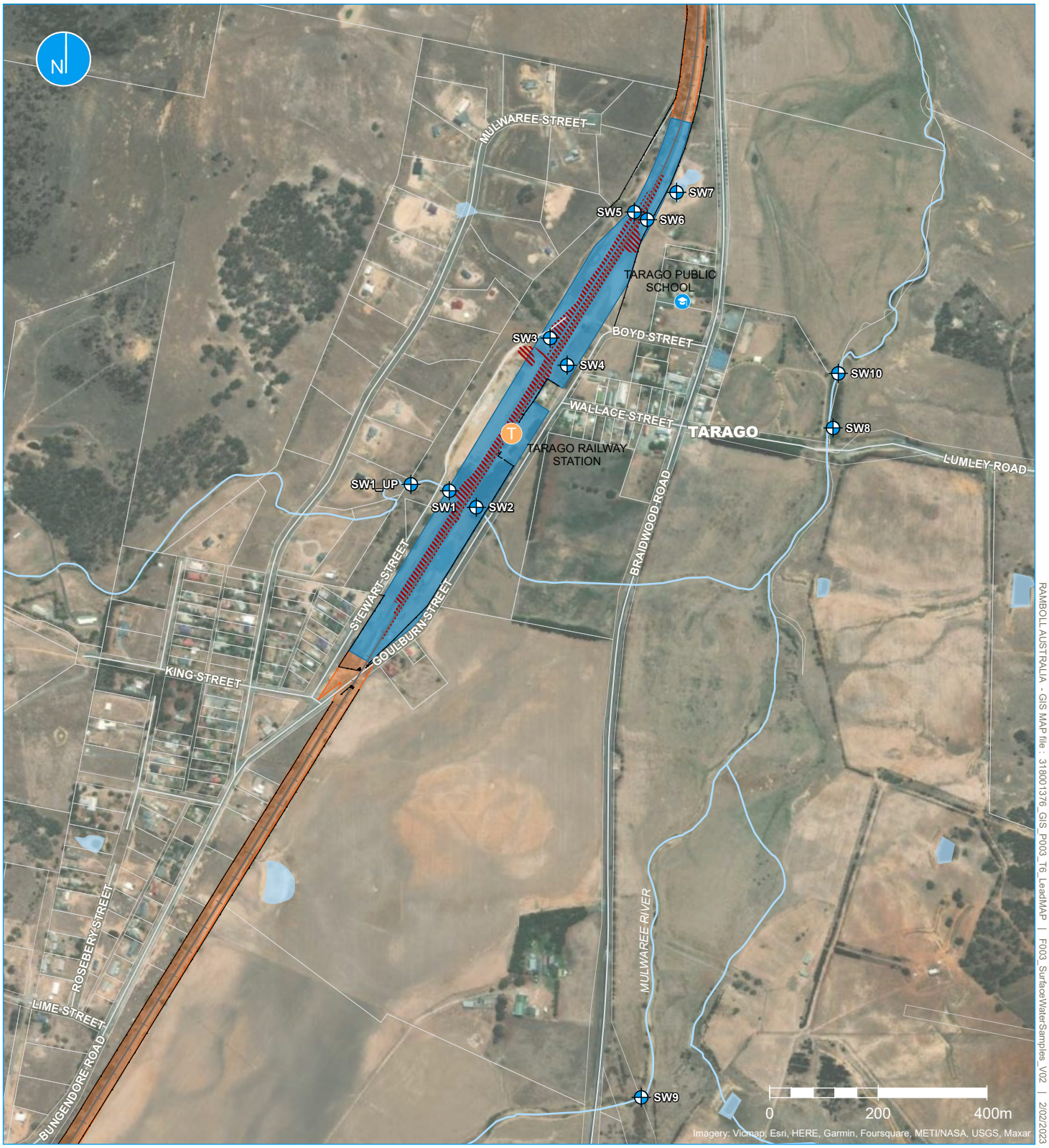
- Shallow soil (Ramboll 2019)
- Test pit (Ramboll 2019)
- X-Ray fluorescence sampling (Ramboll 2019, 2020)
- 1200 Lead concentration for XRF sample (mg/kg)
- Groundwater monitoring location

- Lead exceedance area (requiring application of polymer sealant)
- Haul route
- Rail corridor

A4
1:1,000

Location

Figure 2e | Site Plan



RAMBOLL AUSTRALIA - GIS MAP file - 318001376_GIS_P003_T6_LeadMAP | F003_SurfaceWaterSamples_V02 | 2/02/2023

A4
1:10,000

Legend

- Surface water sampling location
- Site boundary
- Rail corridor
- Rail corridor fence
- Lead impacted area

Figure 3 | Surface water and sediment sampling locations

A4
1:5,000

Legend

- Site boundary
- Rail corridor
- Rail corridor fence

Sampling locations

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

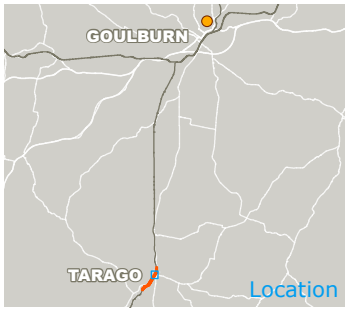


Figure 4 | Air quality monitoring locations

APPENDIX 3
MATERIAL TRACKING SUMMARY TEMPLATE

Client: John Holland Rail

Project Name: Tarago Rail Corridor Lead Management

31-07-20

Material Tracking Summary

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

Notes

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

This material tracking summary will be miantained digitally.

APPENDIX 4
ROUTINE MONITORING CHECKLIST

Tarago Action Plan Routine Inspection Checklist

Date:	UGL RL Environmental Representative completing inspection[1]:
Start time:	
Finish time:	
Weather:	
BoM	
Date and volume of maximum rainfall in a 24hr period since last inspection?	
Date:	
Max volume (mm) in 24hr period:	
General Site Observations	
Is airborne dust from site evident?	
Is sediment run-off evident that is not captured by sediment controls?	
Is surface water discharging from site?	
Is there evidence of excavation or other works non-compliant with the Action Plan?	
Other observations?	

[1]Action Plan inspections must be completed by a UGL Representative suitably trained and experienced in application and management of erosion and sediment controls including stockpile management.

Plan Ref	Control	Inspection		Corrective Action
		Yes	No	
5.1	Is Exclusion Zone signage present as recommended on Figures 2a - 2e Appendix 1 to demarcate contamination in the rail formation and adjacent soils?			
	Is Exclusion Zone signage undamaged?			
	Are sediment controls present in/adjacent each rail culvert?			
	If sediment is present what is the estimated depth of sediment?			
	Are sediment controls still functional?			
	Is the existing stockpile covered securely to prevent surface water infiltration?			
	Are cracks present in the capping of the existing stockpile? If so record the width and length of cracks in written form and through photographs and consolidate with this checklist.			
	Are there signs of erosion or sediment run-off on or relating to the existing stockpile? If so record in written form and through photographs and consolidate with this checklist.			
	Are there signs of vegetation on the existing stockpile? If so record in written form and through photographs and consolidate with this checklist.			
	Is geofabric marker layer visible benath capping of the existing stockpile? If so record in written form and through photographs and consolidate with this checklist. If marker layer is visible rectification work is required.			
7.3	Have any additional stockpiles of contaminated material been created?			
	Are additional stockpiles placed away from drainage lines, gutters, stormwater pits or inlets?			
	Are stockpiles covered securely to prevent surface water infiltration?			
	Are stockpiles positioned on level surfaces with construction of bunds to control water ingress / egress.			

[1]Action Plan inspections must be completed by a UGL Representative suitably trained and experienced in application and management of erosion and sediment controls including stockpile management.