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CAPTAINS FLAT LEAD ABATEMENT PLAN – CROWN ROAD RESERVE ADJACENT THE FORMER CAPTAINS FLAT PRESCHOOL

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ABBREVIATIONS

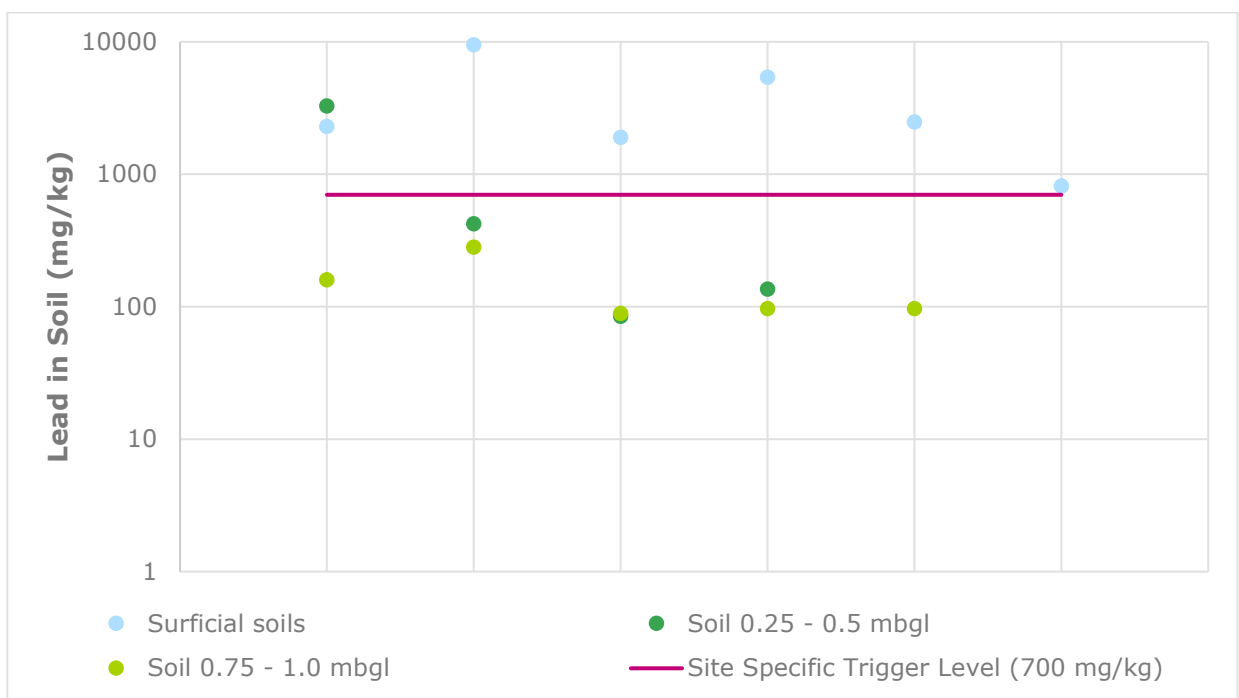
Measures	Description
%	per cent
km	Kilometres
m	Metre
mAHD	Metres Australian Height Datum
mbgl	Metres below ground level
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Litre
ppm	Parts Per Million
AHD	Australian Height Datum
BoQ	Bill of Quantities
CEMP	Construction Environmental Management Plan
CLM Act	NSW Contaminated Land Management Act 1997
COC	Chain of Custody
CSM	Conceptual Site Model
DP	Deposited Plan
DQI	Data Quality Indicator
DQO	Data Quality Objective
EIL	Ecological Investigation Level
EMP	Environmental Management Plan
ENM	Excavated Natural Material
Envirolab	Envirolab Services Pty Ltd
EPA	Environment Protection Authority (NSW)
ESL	Ecological Screening Level
HIL	Health Investigation Level
LAP	Lead Abatement Plan
LEP	Local Environment Plan
LMP	Lead Management Plan
LOR	Limit of Reporting
LTEMP	Long Term Environmental Management Plan
Mercury	Inorganic mercury unless noted otherwise
Metals	As: Arsenic, Cd: Cadmium, Cr: Chromium, Cu: Copper, Ni: Nickel, Pb: Lead, Zn: Zinc, Hg: Mercury
NATA	National Association of Testing Authorities
ND	Not Detected
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
NL	Non-Limiting
n	Number of Samples
pH	A measure of acidity, hydrogen ion activity
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
REF	Review of Environmental Factors
RPD	Relative Percent Difference
RRO/RRE	Resource Recovery Order/Exemption
SAQP	Sampling Analysis and Quality Plan
SEPP (Resilience and Hazards) 2021	Former State Environmental Planning Policy 55 – Remediation of Land, Now Chapter 4 Remediation of Land in State Environmental Planning Policy (Resilience and Hazards) 2021

Measures	Description
SSTL	Site Specific Trigger Level
SWL	Standing Water Level
TCLP	Toxicity Characteristic Leaching Procedure
UCL	Upper Confidence Limit
USEPA	United States Environmental Protection Agency
VENM	virgin excavated natural material
-	On tables is "not calculated", "no criteria" or "not applicable"

EXECUTIVE SUMMARY

Ramboll Australia Pty Ltd (Ramboll) was retained by the Department of Regional NSW (Regional NSW) to prepare the Lead Abatement Plan to address exposure risks from lead within the Crown Road Reserve adjacent the former Captains Flat Preschool located at 27 Foxlow Street, Captains Flat, New South Wales (NSW) (the site). This Lead Abatement Plan forms part of the Captains Flat Lead Management Plan (LMP).

Potential for human health risks from exposure to lead in soil was identified as moderate or high in seven areas of Captains Flat. Risks were generally limited to the southern part of Captains Flat and public land near the northern bank of the Molonglo River though also included Foxlow Parklet. Assessment of lead concentrations at the Crown Road Reserve adjacent the former preschool against a site-specific trigger level (SSTL) protective of human health is summarised in **Graph 1**.



Graph 1: Lead in soil at the Crown Road Reserve adjacent the former preschool

Concentrations of lead in soil ranged between 85 to 9,500 mg/kg with an average concentration of 1,929 mg/kg. Lead concentrations above the adopted SSTL were limited to the upper 0.5 m however elevated concentrations were not delineated on the western portion of the site and were observed to extend to greater depth on adjacent land.

The objectives of this abatement plan are:

- To define an abatement strategy to reduce community exposure risks
- To provide a detailed design including a separable bill of quantities and relevant drawings to allow abatement to be approved and implemented
- To provide an abatement works plans to guide execution of the nominated strategy

The proposed abatement includes placement of geofabric marker and clean capping layers with a total minimum of 0.3 m thickness over the extent of the site. Remnant contamination will require management under a long term environmental management plan (LTEMP).

The effectiveness of remediation at mitigating exposure risks associated with site contamination in the receiving environment will be assessed through validation of the cap construction.

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

1. INTRODUCTION

Ramboll Australia Pty Ltd (Ramboll) was retained by the Department of Regional NSW (Regional NSW) to prepare the Lead Abatement Plan to address exposure risks from lead within the Crown Road Reserve adjacent the former Captains Flat Preschool located at 27 Foxlow Street, Captains Flat, New South Wales (NSW) (the site).

1.1 Background

This Lead Abatement Plan forms part of the Captains Flat Lead Management Plan (LMP) and the site is located within the Captains Flat Lead Management Precinct (the Precinct). The Precinct was defined in the Conceptual Site Model (Ramboll 2021a) and encompasses built areas of the Captains Flat community, the legacy Lake George Mine site and the Molonglo River from upstream of the water supply dam to a waterhole approximately 1.5 km downstream of the mine. The Precinct includes roads accessing Captains Flat (to a distance of at least 400 m), the rail corridor (to a distance of 1 km) and bushland areas at the perimeters of the community.

The Precinct boundary and site locality are presented on **Figure 1, Appendix 1**. A site features plan is presented as **Figure 2, Appendix 1**.

1.2 Conceptual Site Model Summary

Potential human health risks for lead in soil are considered to be **high** in the following areas:

- The Old Mine Site and rail corridor
- Public spaces south of the Molonglo River including the former preschool, Foxlow Street and the eastern embankment of the Old Mine Site
- Areas where fill appears to have been applied north of the Molonglo River including flood berms adjacent the River and embankments beneath the tennis courts as well as Foxlow Parklet

Potential human health risks for lead in soil are considered to be **moderate** in the following areas:

- The Southern Smelter Area and Keatings Collapse
- Beneath the southern playing field off Foxlow Street
- The southern end of the school playing fields including the new preschool

Potential human health risks for lead in soil are considered to be **low** in the following areas:

- In natural soil to depths of greater than five metres beneath the northern end of Foxlow Street
- In shallow soils in bushland hillside east of the Molonglo River near the southern end of town
- At several other locations in surface soils north of the Molonglo River at concentrations which marginally exceed the health investigation levels

Interim water use guidelines have been developed and define measures to mitigate risks from public water related to exposure to contaminants from historical mining at Captains Flat. The interim guidelines integrate information on current usage based on a survey completed by Regional NSW and it is anticipated they will be reviewed after mine site rehabilitation and abatement measures proposed for public lands within Captains Flat. The potential risk to human health due to environmental impacts in groundwater is relatively low based on the water use survey where no groundwater users were identified.

1.3 Objectives

This abatement plan has been prepared specifically for the Crown Road Reserve adjacent the former preschool on Foxlow Street. The objectives are:

- To define an abatement strategy to reduce community exposure risks
- To provide a detailed design including a separable bill of quantities and relevant drawings to allow abatement to be approved and implemented
- To provide an abatement works plans to guide execution of the nominated strategy

Public Space abatement plans target remediation of lead in soil in areas where potential risks to human health are considered to be moderate or high however it is noted that elevated concentrations of other metals are co-located with lead and present potential risks particularly to ecology. Implementation of the abatement plan could be expected to mitigate risks from other metals and the scope of long-term monitoring in receiving environments is intended to inform evaluation of management outcomes related to ecological risk.

2. SITE DESCRIPTION

2.1 Site Identification

A site locality plan and a site features plan are presented as **Figure 1** and **Figure 2, Appendix 1**. The site details are presented in **Table 2-1**.

Table 2-1: Site Identification

Information	Description
Street Address:	Crown Road Reserve adjacent to 27 Foxlow Street, Captains Flat, NSW
Identifier:	Crown Road Reserve
Site Area:	Approximately 1,500 m ²
Local Government:	Queanbeyan-Palerang Regional Council (QPRC)
County and Parish:	County of Murray, Parish of Ballallaba
Owner:	Crown Land
Leased by:	-
Site boundaries:	The site is bounded by Foxlow Street and the former preschool to the east, the eastern embankment to the west and north and vacant land to the south.
Current Site Use:	Public open space and recreational use.

2.2 Site Details

The site comprises vacant cleared land adjacent to the former preschool and eastern embankment. The site elevation is approximately 850 m above Australian Height Datum (m AHD) and the site is bounded by a moderately steep embankment to the east which sits at approximately 860 m AHD.

2.3 Land Use

The site is currently vacant and the likely used as an informal access behind the preschool.

2.4 Site Condition and Surrounding Environment

Site details observed during the site inspection during June 2021 are outlined in **Table 2-2**.

Table 2-2: Site Condition and Surrounding Environment

Site	Description
Topography	The site comprises relatively flat vacant land adjacent a moderately steep embankment to the west.
Conditions at Site Boundary	The site is bounded by the former preschool to the east, vacant land to the south and the eastern embankment to the west and north. None of the site boundaries are currently fenced.
Visible Signs of Contamination	The site appears to be filled slightly above the road level. Bare soil patches were observed and indicative of surficial contamination. Informal tracks were also observed and likely from pedestrian use. A concrete footing was noted in the eastern portion and its origin is unknown.
Visible Signs of Plant Stress	During the site inspection, the site was observed to be covered in sparse vegetation including native grasses and shrubs. Vegetation was not present in localised bare areas and was considered indicative of surficial contamination.
Presence of Drums, Wastes and Fill Material	Topography indicates the site has been filled slightly above the main road level. Bore logs noted fill comprising clay, sand and gravel present to a depth of 0.4 m in the area. No presence of other anthropogenic waste material was observed at the site.
Odours	No odours were noted onsite during the inspection

3. ABATEMENT CRITERIA

Site specific trigger levels (SSTLs) protective of human health were developed for lead in soil. The bio-accessibility of lead assumed in Health Investigation Levels (HIL) generically applicable in Australia was replaced with site specific bio-accessibility determined through representative sampling and analyses of Captains Flat soils. All other parameters used in the HIL models were retained. The resulting lead in soil concentrations were adopted as SSTLs for human health risk assessment across the land use scenarios that occur in public spaces of Captains Flat. A technical note describing the development of these SSTLs is presented in the CSM report (Ramboll, 2021a). The SSTL technical note was reviewed and approved by the Captains Flat LMP Taskforce integrating the NSW EPA and NSW Department of Planning, Industry and Environment (DPIE) Contaminants and Risks Team.

The adopted abatement criteria for the site are presented in **Table 3-1**.

Table 3-1: Soil Assessment Criteria (mg/kg)

Contaminant	Human Health SSTL (C)
Lead	700

The 95% upper confidence limit of the arithmetic mean lead reading (as measured by fpXRF in the field) will be assessed against the criteria nominated in **Table 3-1** where the following conditions are met:

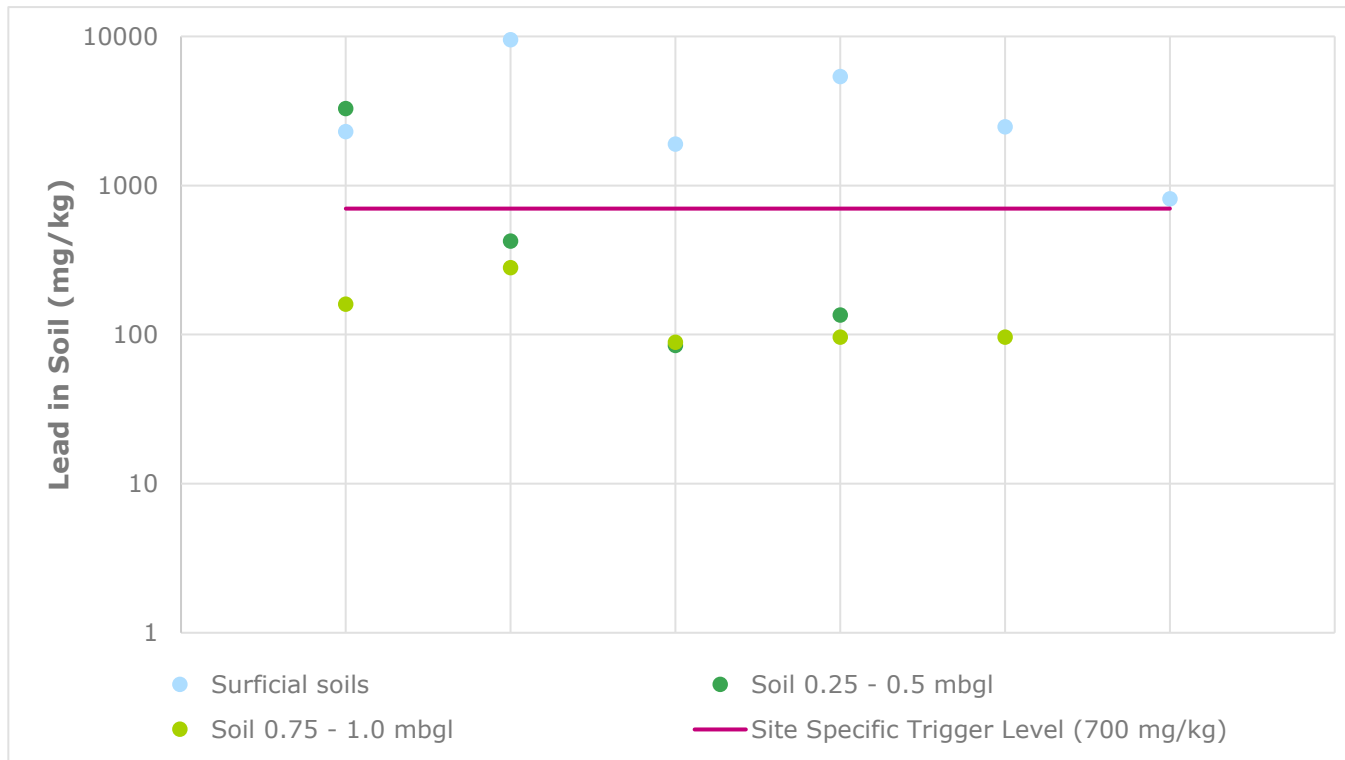
- the standard deviation of the results is less than 50% of the criteria, and
- no single value should exceed 250% of the criteria

Where these conditions are not met absolute lead readings will be adopted.

4. SITE CHARACTERISATION

Soil descriptions from the recent investigations (Ramboll, 2021a) indicate the site is underlain by fill comprising sand, clay and gravel overlying natural clay.

Assessment of lead concentrations at the Crown Road Reserve adjacent the former preschool against a SSTL protective of human health is summarised in **Graph 2**.



Graph 2: Lead in soil at the Crown Road Reserve adjacent the former preschool

Concentrations of lead in soil ranged between 85 to 9,500 mg/kg with an average concentration of 1,929 mg/kg. Lead concentrations above the adopted SSTL were limited to the upper 0.5 m however elevated concentrations were not delineated on the western portion of the site and were observed to extend to greater depth on adjacent land.

The extent of lead concentrations exceeding the adopted assessment criteria and requiring remediation is presented on **Figure 2, Appendix 1**.

5. ABATEMENT OPTIONS ASSESSMENT AND ABATEMENT STRATEGY

An abatement options assessment was prepared in consultation with the Captains Flat LMP Taskforce to identify preferred strategies for public spaces identified as having moderate or high potential human health exposure risks from lead in soil (Ramboll 2022).

The preferred abatement strategy for the site is to apply clean marker and capping layers to achieve a total minimum thickness of 0.3m over the existing site surface. The core elements of this strategy are:

- Survey the of the site prior to capping to obtain the base level for the capping layer
- Placement of a geofabric marker layer on the top of the contaminated soil surface to act as a visual and physical barrier
- Placement of a clean capping layer with a minimum of 0.3 m thickness over the extent of the site
- The capping layer should comprise a VENM/ENM clay material with low permeability
- Survey of the final surface (X, Y, Z co-ordinates) of the capping layer to ensure that the required thickness has been achieved
- Revegetation of the final capped surface to minimise soil erosion and damage to the capping layer
- Management of remnant contamination under an LTEMP

5.1 Bill of Quantities for Preferred Abatement Option

A bill of quantities (BoQ) for the preferred abatement option for the site was prepared and summarised in **Table 5-1**.

Table 5-1: Bill of Quantities for Preferred Abatement Option

Description	Unit	Estimated Qty
Preliminaries and Management Plans	Item	1
Mobilisation and site establishment	Item	1
Design	Item	1
Supply and placement of geofabric	m ²	1500
Supply and place 0.2m sub-soil layer	m ³	300
Supply and place 0.1m topsoil layer	m ³	150
Landscaping and equipment reinstatement	Item	1
Project Management	Week	2
Validation	Item	1
Financial Assurance	Item	1

The BoQ specifications exclude details associated with revegetation such as species selection and placement. The Principal should provide clarification of preferred species and final vegetation design to inform Contractor planning.

6. ABATEMENT WORKS PLAN

6.1 Key Personnel

All site personnel have the responsibility of protecting human health and the environment. Key personnel and their roles and responsibilities are outlined in **Table 6-1**.

Table 6-1: Key Personnel roles and Responsibilities

Personnel	Name and Contact Details	Role / Responsibility
Principal	Crown Land	Responsible for implementing the lead abatement plan (LAP).
Principals Environmental Representative	TBC	Personnel employed by Crown Lands or sub-contracted to Crown Lands to oversee / provide technical advice on remediation works and ensure works are completed in accordance with relevant guidelines.
Contractor	TBA	Company contracted to undertake remediation works. Responsible for supplying all plant and personnel to conduct the works as outlined in this LAP and as required under local, state and federal legislation.
Contractor’s Supervisor or Project Manager	TBA	Responsible person appointed by contractor to supervise / coordinate all aspects of remedial works on behalf of the contractor. The primary point of contact for the project.

6.2 Licenses and Approvals

As a precursor to licensing and approvals specific to remediation, Land Owner Consent (LOC) will be required as will an assessment of Native Title.

SEPP (Resilience and Hazards) 2021 defines a framework for management of contamination in NSW. It defines requirements for engagement with consent authorities and local councils according to whether remediation is considered Category 1 (requiring development consent) or Category 2 (requiring notification 30 days before remediation). Ramboll consider the preferred abatement strategy to be Category 2 remediation. Category 2 remediation work is deemed remediation work that is not Category 1 remediation as described in Clause 9 of Resilience and Hazards) 2021.

The proposed remediation works do not trigger the criteria in clause 4.8 (a) – (f) and the proposed remediation works are not ancillary to any other current development requiring Development Consent. Based upon the above information and criteria the remediation works are deemed to be Category 2 works under SEPP (Resilience and Hazards) 2021. The Notification Letter included in **Appendix 2** must be provided to QPRC a minimum of 30 days before commencement of remediation.

6.3 Community Relations

Crown Lands will manage community relations through abatement at the Crown Road Reserve adjacent the former preschool according to a formalised community relations plan.

6.4 Protection of Infrastructure, Heritage and Vegetation

The Contractor’s methodology will include measures to ensure the protection of surrounding infrastructure, heritage and vegetation immediately surrounding the site.

The Contractor will make provision for onsite location of services and measures to ensure services are not disturbed. Notification should be given to any service providers to ensure the capping does not disturb service assets.

6.5 Site Establishment

The Contractor will be responsible for site establishment including:

- notification to WorkSafe NSW of lead risk work before mobilisation to site
- communication of the requirements of the LAP to all workers. This requirement must be embedded in commercial agreements with the Contractor and in Contractor management plans
- establishment of site access restrictions and ancillary provisions for site access such as traffic control
- mobilisation and management of all Contractor personnel and plant that are required

Site boundaries are presented on **Figure 2, Appendix 1**.

6.6 Management Plans

Prior to commencing works at the site management plans are required to be developed and approved by the Principal. A Construction Environment Management Plan (CEMP) has been prepared that describes minimum requirements for management of environmental impacts expected during abatement. The CEMP shall be supplemented by the contractor with sub-plans specific to the construction schedule and methodology. As a minimum sub-plans shall include those outlined in **Section 6.7 to 6.11**.

A worker health and safety plan specific to the construction methodology must also be prepared by the contractor.

Plans are to be reviewed and approved by the Principal prior to the commencement of abatement works.

6.7 Earthworks Management Plan

The contractor will prepare an earthworks management plan to describe the systems, equipment and methodologies that will be utilised to implement the abatement plan. At a minimum the earthworks management plan will satisfy the following requirements:

- all earthworks shall be completed in accordance with AS3798-2007
- manufacturer's certification of marker layer will be provided to the Principal and must be approved before these materials are delivered to site
- the lower 0.2 m fill layer shall be constructed with specific regard for provisions described within AS3798-2007 Section 6.2 including compaction of fill as a systematic construction operation using plant that is specifically assigned to the compaction task and which tracks progressively across the surface of the fill. All other provisions for construction of fill described within AS3798-2007 must also be followed
- fill material shall not contain:
 - contaminated material harmful to the receiving environment
 - silts or materials that adversely affect capacity to achieve compliance with AS3798-2007
 - deleterious material that limits geotechnical or aesthetic suitability, or that is not compliance with assessment criteria for imported material described elsewhere in this abatement plan
 - actual or potential acid sulphate soils
- topsoil shall be spread evenly in one lift and compacted lightly so that the finished surface is smooth and free of lumpy material such as stones, wood or other vegetative matter

- placement and establishment of vegetation in accordance with Principal specifications

6.8 Soil and Water Management Plan

The Contractor will prepare a Soil and Water Management Plan to manage soil and water during the works. The Contractor must define and implement controls to prevent offsite contaminant migration above criteria protective of the receiving environment.

6.9 Noise Management Plan

The Contractor will prepare a noise management plan to manage noise during the works. The following noise control measures should be considered:

- construction vehicles and machinery would be selected with consideration of noise emissions. Equipment should be fitted with appropriate silencers (where applicable) and be maintained in accordance with manufacturer's requirements. Machines found to produce excessive noise compared to typical noise levels should be removed and replaced or repaired or modified prior to recommencing works
- where possible construction vehicles and machinery would be turned off or throttled down when not in use
- all site personnel would be informed of their obligations to minimise potential noise impacts on residents during the site induction and need to take reasonable and practical measures to minimise noise
- hours of operation described in **Section 6.14** must be observed.

6.10 Dust Management Plan

The Contractor will prepare a dust management plan to manage dust during the works. The Contractor must define and implement dust controls to prevent offsite contaminant migration above criteria protective of the receiving environment. Controls will prevent offsite migration of dust. The following dust control measures should be considered:

- regularly water vehicle routes and work areas with a watercart
- maintain and sweep roads where deposited dust or spillage is visible
- avoid unnecessary use of and access to unsealed surfaces
- limit vehicle and mobile plant speeds within the work area e.g. 10 km/h
- modify or cease operations during adverse meteorological or dust generating conditions
- consider use of wind breaks or shielding around material and/or stockpiles
- maintain stockpiles at defined height, where the lowest practicable height is preferable
- avoid double-handling of material and optimise transfers to limit time stockpiled or handled
- visually observe dust levels to adapt operations
- cover all loads when transporting material
- identify and allocate sufficient resources to manage dust risks
- facilitate training and tool-box-talks addressing air quality management objectives, hazards, risks, controls, behaviours and consequences for inappropriate behaviour

The Dust Management Plan should include onsite air quality monitoring specific to the Contractor's methodology. There is no available method to 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, PM₁₀ 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 abatement. 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 abatement 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:

- Alert Level:
 - Elevated levels of dust measured for one 15-minute averaging period
 - Initial trigger values set at 98 percentile 15-minute average
 - Observe the operation to identify dust generating activities. Consider further action to minimise dust generation or continue to observe closely
- Action Level 1:
 - Elevated levels of dust measured for two consecutive 15-minute averaging periods.
 - Initial trigger values set at 99.9 percentile 15-minute average
 - Immediately action additional dust mitigation measures and communicate requirement to reduce dust levels to all operational staff
- Action Level 2:
 - Elevated levels of dust measured for three consecutive 15-minute averaging periods
 - Initial trigger values set at 100 percentile 15-minute average
 - Cease operation and prioritise dust mitigation measures. Operation can recommence once subsequent alert levels are at Action Level 1 or below

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

6.11 Material Tracking

All material handled earthworks 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 during abatement. Records will be maintained by Contractor site personnel defining chainage of origin, material types loaded, and material fate (temporary stockpile ID).

Material will be disposed of offsite to the Mine containment cell. Any additional soil that exceeds the cell design will be disposed offsite to a licensed waste facility.

6.12 Survey

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

This survey forms part of the validation requirements described in **Table 7-2**.

6.13 Abatement Schedule

The final remediation schedule will be discussed with the Contractor. A proposed indicative schedule up to the completion of a draft validation report is outlined in **Table 6-2**.

Table 6-2: Abatement Schedule

Task	Estimated Duration
Planning, engagement of Contractor and receiving facility	12 – 24 weeks
Establishment of Site	1 week
Capping of the site	2 – 3 weeks
Total Duration	15 – 28 weeks

6.14 Hours of Operation

The Contractor shall only undertake works that may generate an audible noise at the closest residential receptors (35 and 18-26 Foxlow Street) during the following hours, unless under direction from relevant authority for safety reasons or in the event of an emergency:

- 7:00 am to 6:00 pm Monday to Friday
- 8:00 am to 6:00 pm Saturdays
- At no time on Sundays or public holidays

6.15 Contingency Plan

The contingencies presented in **Table 6-3** are to be implemented where unexpected site conditions or circumstances occur.

Table 6-3: Contingency Plan

Contingency Event	Contingency Action	Personnel Responsible
Receival of a dust complaint	<p>Stop Work</p> <p>Identify dust source and review control measures.</p> <p>Assess requirements for additional monitoring or investigation of impact.</p> <p>Review trigger alert system to determine if unacceptable impact measured at site boundary.</p> <p>Undertake dust control mitigation measures such as routine water cart spray.</p>	<p>Contractor responsible for receiving complaint and informing Principal and Principal’s Environmental Representative. Contractor responsible for stop work and review working environment.</p> <p>Principal and Principal’s Environmental Representative responsible for responding to complaint.</p> <p>This will be completed in accordance with the Community Relations Plan</p>
Exceedance of dust trigger levels (defined in Section 6.10)	<p>Alert level trigger received – observe the operation to identify dust generating activities. Consider further action to minimise dust generation or continue to observe closely.</p> <p>Action Level 1 – Immediately action additional dust mitigation measures and communicate requirement to reduce dust levels to all operational staff.</p> <p>Action Level 2 - Cease operation and prioritise dust mitigation measures.</p>	<p>Contractor responsible for receiving complaint and informing Principal and Principal’s Environmental Representative. Contractor responsible for stop work and review working environment.</p> <p>Principal and Principal’s Environmental Representative responsible for responding to complaint.</p> <p>This will be completed in accordance with the Community Relations Plan</p>

Contingency Event	Contingency Action	Personnel Responsible
	Operation can recommence once subsequent alert levels are at Action Level 1 or below.	
Discovery of unexpected materials	Contact the Principal’s representative, sort materials into a segregated stockpile and discuss possible disposal options with the Principal or the Principal’s Representative including offsite disposal to the Mine Site Cell.	Principal, following notification from the Contractor.
Receival of a noise complaint	Identify noise source and implement noise control measures	<p>Contractor responsible for receiving complaint and informing Principal and Principal’s Environmental Representative. Contractor responsible for stop work and review working environment.</p> <p>Principal and Principal’s Environmental Representative responsible for responding to complaint.</p> <p>This will be completed in accordance with the Community Relations Plan</p>

6.16 Long Term Environmental Management Plan

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

The report should include the following headings as a minimum:

- Title
- Purpose
- Background
- Description of existing/residual contamination
- Management activities
- Inspection, maintenance, environmental sampling, analysis and reporting
- Monitor and review of environmental management plan
- Communications and notifications

7. VALIDATION PLAN

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

7.1 Validation Data Quality Objectives

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

7.1.1 Step 1: State the Problem

Lead impacted soil exists at the site. Remediation is required to mitigate potential exposure risks into the future and validation is required to demonstrate that abatement works have been successfully completed.

7.1.2 Step 2: Identify the Decisions

The validation SAQP is to ensure that abatement of the site occurs such that remnant lead concentrations are isolated from the potential future receptors. The decisions that are required to address the problem include:

- Has the contamination been isolated such that it doesn't present an exposure risk to current and future occupants of the site?

7.1.3 Step 3: Identify Inputs to the Decision

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

- Validation of imported capping material.
- Survey of initial and final landform to define contaminated soils remaining onsite and to validate capping thickness
- Contractor records demonstrating compliance with earthworks specifications.

7.1.4 Step 4: Define the Study Boundary

The study boundary includes the Crown Road Reserve adjacent to the former Captains Flat Preschool at 27 Foxlow Street, Captains Flat, NSW as defined in **Figure 1**.

7.1.5 Step 5: Development of Decision Rules

Data will be considered reliable if it satisfies the limits of decision error defined in **Section 7.1.6**.

Soil will be considered suitable as backfill material if it meets the definition of VENM or ENM or otherwise meets the requirements of another Resource Recovery Order/Exemption (RRO/RRE) as defined in the POEO Act and also meets the relevant human health and ecological criteria for the proposed land use (e.g. HIL C).

Potential for offsite contaminant migration after remediation will be considered to be satisfactorily low if contaminants are isolated below a suitable capping material at a minimum thickness of 0.3 m.

7.1.6 Step 6: Specify Performance Criteria

Validation performance criteria are defined to assess potential for a false positive or false negative in validation data. Performance criteria are presented in **Table 7-1** below.

Table 7-1: Performance Criteria for Validation Sampling

Category	Performance Criteria	
	Soil XRF Sampling	Sampling of Capping Material
<p>Accuracy: Accuracy in the collection of field data will be controlled by:</p>	<p>Appropriate sampling methodologies will be utilised and complied with. Works to be completed in accordance with US EPA 2007, <i>Method 6200, Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment</i>. These will include:</p> <ul style="list-style-type: none"> • Daily system checks and internal calibration as recommended by the instrument manual. • Measurement of blank reference material (silicon dioxide, SiO₂) – this will be done at the start of the day and repeated every 10 samples. This will mitigate potential inaccuracies associated with cross-contamination of samples. The analyser window will also be cleaned regularly to prevent cross-contamination. • Certified reference materials will be measured to check instrument response and calibration. This will be conducted every 20 samples. • Adopting a dwell time appropriate for measurement of CoPC. A dwell of 60 seconds is considered to provide sufficient precision for the sampling program. 	<p>Soil sampling for laboratory analyses will occur in general accordance with <i>AS 4482.1-2005 Guide to the investigation and sampling of sites with potentially contaminated soil - Non-volatile and semi-volatile compounds</i> and <i>AS 1141.3.1 – 2012 Methods for Sampling and Testing Aggregates, Method 3.1: Sampling – Aggregates</i></p>
<p>Precision: The degree to which data generated from replicate or repetitive measurements differ from one another due to random errors. Precision of field data will be maintained by:</p>	<ul style="list-style-type: none"> • XRF readings will be collected by an experienced scientist holding a NSW EPA radiation users license as required for field based XRF testing • XRF readings will be collected from soil in-situ and measurements will be taken by placing the XRF directly on the ground surface. • The soil surface to be measured will be cleared of debris and grass prior to taking the measurement to ensure that there is no obstruction, that the analyser window is protected and that contact with the sample surface is maintained during measurements. 	<p>In the field, precision will be maintained by:</p> <ul style="list-style-type: none"> • Using standard operating procedures for the collection of soil samples. • Collection of soil samples by suitably experienced environmental scientists. • Use of disposable nitrile rubber gloves between sampling locations. • Placement of samples directly into designated single use sampling containers.

Category	Performance Criteria	
	Soil XRF Sampling	Sampling of Capping Material
	<ul style="list-style-type: none"> • As moisture is known to affect measured concentrations, visually dry surfaces will be chosen for measurement. • Soil sampling for confirmatory laboratory analyses will occur at a frequency of 5% covering the observed distribution of concentrations in general accordance with AS 4482.1-2005 Guide to the investigation and sampling of sites with potentially contaminated soil - Non-volatile and semi-volatile compounds. This will include: <ul style="list-style-type: none"> ○ Collection of samples by a suitably experienced environmental scientist ○ Use of disposable nitrile rubber gloves between locations ○ Soil samples will be placed immediately into laboratory supplied and appropriately preserved sampling vessels. • Sample numbers, preservation and analytical requirements are to be recorded on chain of custody documents. 	<ul style="list-style-type: none"> • Collection of intra-laboratory and inter-laboratory duplicate samples at a rate of 1 in 20 primary samples. • Collection of one rinsate sample on reusable sampling equipment at the end of each day. • Recording of sample identification and analytical requirements on chain of custody documents. • Samples transported to the laboratory under chain of custody conditions to a laboratory with NATA accreditation for the analytical methods prescribed. <p>In the laboratory, precision will be assessed using blind duplicate samples and split duplicates.</p>
Completeness: The completeness of the data set shall be judged by:	<ul style="list-style-type: none"> • All locations sampled as outlined in Section 7.1.7. • Sampling completed by experienced personnel • Field documentation completed correctly 	<ul style="list-style-type: none"> • All locations sampled as outlined in Section 7.1.7. • Sampling completed by experienced personnel • Field documentation completed correctly
Representativeness: The representativeness of the field data will be judged by:	<ul style="list-style-type: none"> • Non-disposable sampling equipment, such as the hand auger, will be thoroughly decontaminated between locations using Decon 90 solution and deionised rinsate water. • At each location, a pair of disposable nitrile gloves will be worn while sampling and handling the sample; gloves will be replaced between each successive sample. • Soil analytical samples will be collected directly into the sampling vessels. 	<ul style="list-style-type: none"> • Non-disposable sampling equipment, such as the hand auger, will be thoroughly decontaminated between locations using Decon@90 solution and deionised rinsate water. • At each location, a pair of disposable nitrile gloves will be worn while sampling and handling the sample; gloves will be replaced between each successive sample. • Soil analytical samples will be collected directly into the sampling containers.
Comparability: Comparability to existing field data will be maintained by:	<ul style="list-style-type: none"> • Use of the same appropriate sampling methodologies • Same sampling depths will be used (i.e.: 0-0.05 mbgl) • Analytical samples will be collected for submission to the laboratory to establish a correlation between fpXRF and laboratory results • Photographs will be taken of sampling location conditions at the time of sampling. 	<ul style="list-style-type: none"> • Use of the same appropriate sampling methodologies • Same sampling depths will be used (where practical) • Analytical samples will be collected for submission to the laboratory • Photographs will be taken of sampling location conditions at the time of sampling.

Performance criteria for analyses of soil samples are defined as follows:

- Data will be analysed adopting RPD control limits of +/- 30%. Where concentration levels are less than two times the PQL, the Absolute Difference (AD) shall be calculated. Data will be considered acceptable if the: $AD < 2.5 \text{ times the PQL}$. Any data which does not conform to these acceptance criteria will be examined for determination of suitability.
- Blank samples will be submitted with the analytical samples and analysed for the contaminants of concern: One Field Blank will be collected each day.
- The laboratory will additionally undertake a method blank with each analytical batch of samples. Laboratory method blank analyses are to be below the PQLs. Results shall be examined, and any concentrations in blank samples may not be subtracted from concentrations in primary samples. Positive results may be acceptable if sample analyte concentrations are significantly greater than the amount reported in the blank (ten times for laboratory reagents such as methylene chloride, chloroform, and acetone etc., and five times for all other analytes). Alternatively, the laboratory PQL may be raised to accommodate blank anomalies provided that regulatory guidelines are not compromised by any adjustment made to the PQL.

Decision Error Protocol

If the data received is not in accordance with the defined acceptable limits outlined in Steps 5 and 6, it may be considered to be an estimate or be rejected. Determination of whether this data may be used or if re-sampling is required will be based on the following considerations:

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

Rectifying Non-conformances

If any of the validation procedures or criteria identified are not followed or met, this will constitute a non-conformance. The significance of the non-conformance will determine if rectification is required and should be assessed by the Principal's Environmental Representative.

7.1.7 Step 7: Optimise the Design for Obtaining Data

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

Validation samples, frequency of collection, the analysis required, and justification is presented in **Table 7-2**.

Table 7-2: Validation Plan

Validation Method	Validation Requirements	Measurement / Analyses
<p>Validation of capping/backfill material</p>	<p>Capping/backfill material will be considered suitable if it meets the definition of VENM or ENM or an RRO/RRE.</p> <p>Samples should be tested at a frequency of 1 sample per 25 m³ or in accordance with the relevant RRO.</p>	<p>Certification of the suitability of backfill materials for proposed use (eg: VENM/ENM or similar for topsoil certifying compliance with the NSW EPA Resource Recovery framework described in the POEO (Waste) Regulation).</p> <p>Laboratory analyses of capping/backfill material for COPC including those specified in the ENM Order or other resource recovery order or at a minimum TRH, BTEXN, PAH, OCP, OPP, heavy metals and asbestos as well as any other potential contaminants of concern from the materials origin site.</p>
<p>Validation of cap construction</p>	<p>Cap construction including preparation of remnant soils after excavation will be considered suitable if compliant with all relevant provisions under AS3978-2007</p>	<p>Contractor records demonstrating compliance with earthworks specifications. The Contractor must provide as built drawings demonstrating cap construction in accordance with all specifications defined in this plan.</p>

7.1.7.1 Validation Reporting

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

- Executive summary
- Scope of work
- Site Description
- Summary of site history and previous investigations

- Supporting factual evidence of the abatement work including photographic and field records and materials tracking data
- Validation sampling and analysis results
- Quality assurance/ quality control (QA/QC) protocols for field work and laboratory analysis and
- A statement indicating the adequacy of the abatement completed, degree to which lead impacts have been removed and if / where impacts remain

7.1.7.2 Long Term Environmental Management Plan

A long term EMP will be prepared to define the location of remnant contamination and management measures required to mitigate risks associated with future disturbance of these areas. The Long Term EMP will be prepared in accordance with NSW EPA (2020) *Contaminated Land Guidelines: Consultants Reporting on Contaminated Land* and the NSW EPA (2022) *Practice Note on Preparing Environmental Management Plans for Contaminated Land* and will include:

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

8. CONCLUSIONS

The preferred abatement strategy includes capping the existing landform at the site to minimise exposure to future users of the land.

The contaminated soil will remain at a depth of at least 0.3 m below the final capped surface and remnant contamination will be managed under a LTEMP.

The effectiveness of remediation at mitigating exposure risks associated with site contamination in the receiving environment will be assessed through validation of the cap construction.

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

9. LIMITATIONS

Ramboll Australia Pty Ltd (Ramboll) prepared this report in accordance with the scope of work as outlined in our proposal to Department of Regional NSW and in accordance with our understanding and interpretation of current regulatory standards.

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

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

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

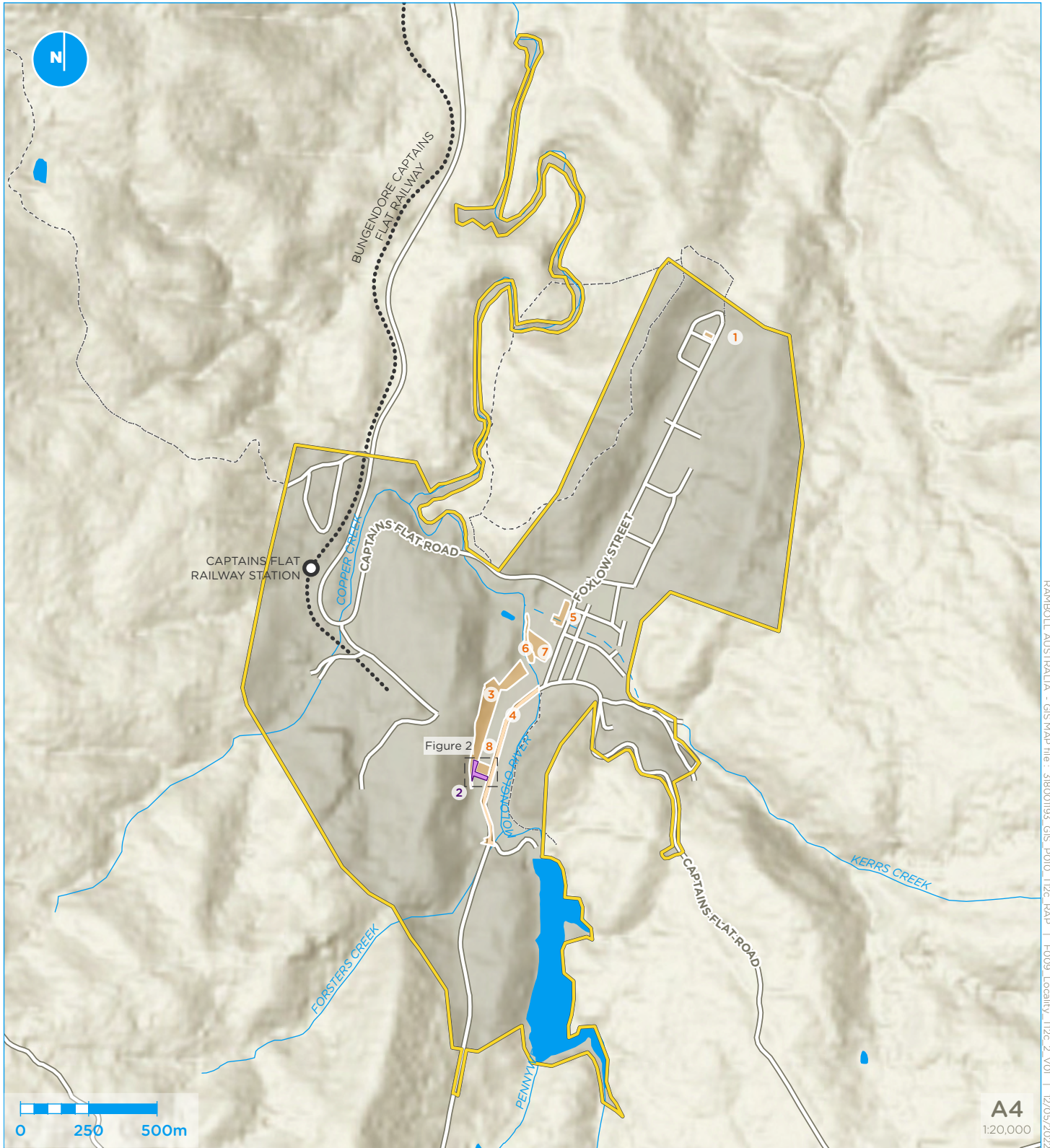
9.1 User Reliance

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

10. REFERENCES

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APPENDIX 1
FIGURES



Esri, Geoscience Australia, NASA, NGA, USGS, Esri, HERE, Garmin, FAO, NOAA, USGS, Esri, USGS

RAMBOLL AUSTRALIA - GIS MAP file : 318001193_GIS_P010_T12c_RAP | F009 Locality_T12c_2_V01 | 12/05/2022

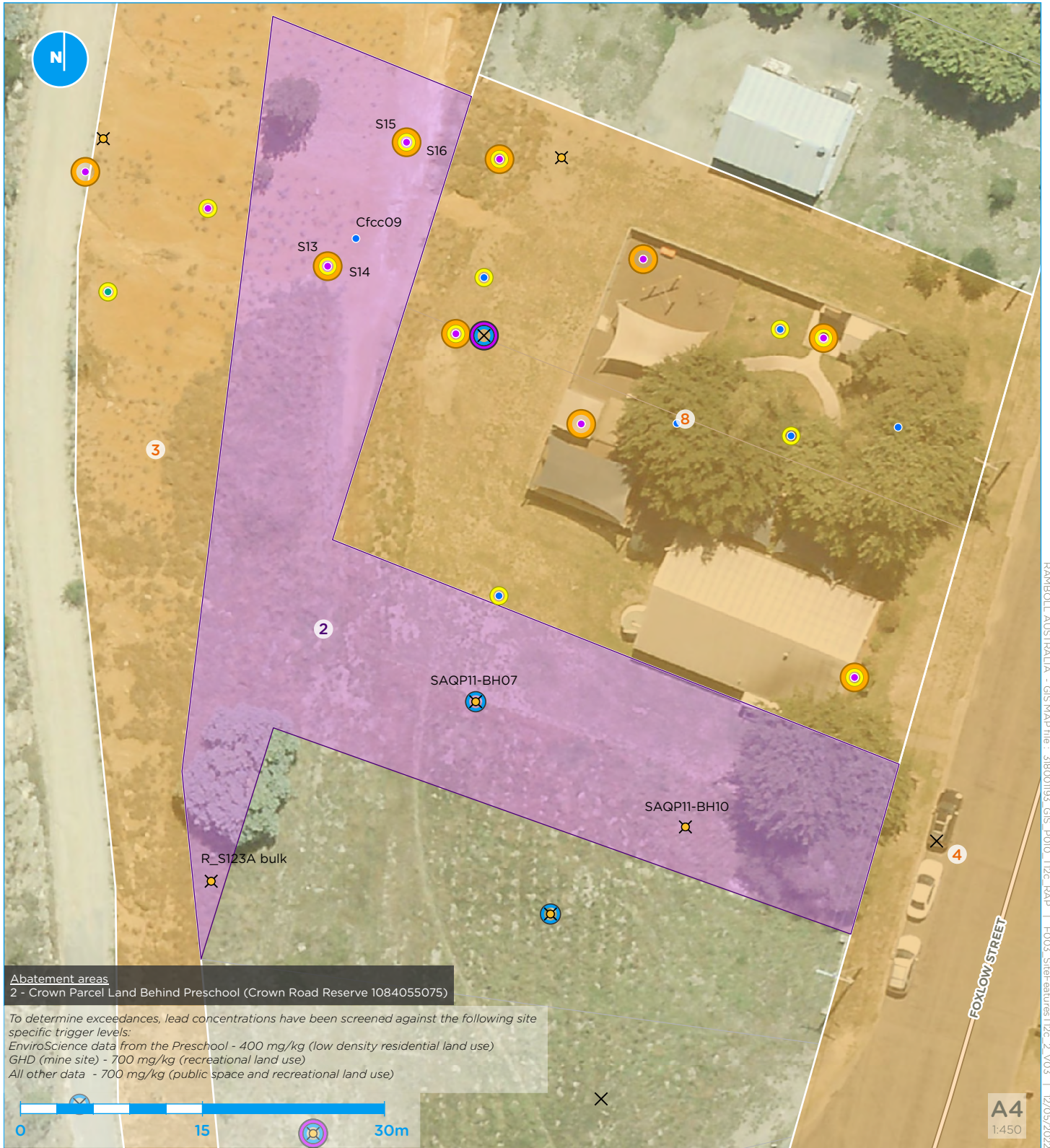
Legend

- Precinct boundary
- Crown Reserve Adjacent Preschool
- Abatement areas



Figure 1 : Site location

Captains Flat Lead Management Plan - Lead Abatement Plan - Crown Reserve Adjacent Preschool



Legend

- | | | |
|----------------------------------|---------------------------------|---------------------------------|
| Crown Reserve Adjacent Preschool | Soil sample | EnviroScience (2021) |
| Abatement areas | Lead exceedance at depth | GHD (2017) |
| | Surface (<0.05 m) | EPA |
| | 0.05 m-0.5 m | Lead exceedance at depth |
| | >0.5 m | Surface |
| | | 0.4-0.5 m |

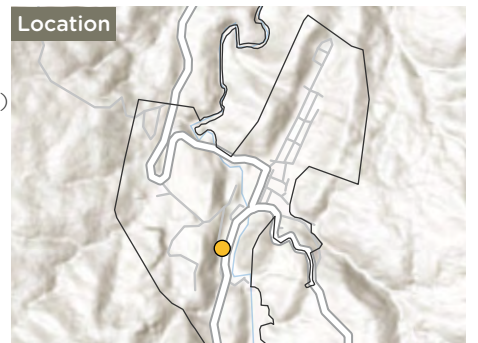


Figure 2 : Site features plan

Captains Flat Lead Management Plan - Lead Abatement Plan - Crown Reserve Adjacent Preschool

**APPENDIX 2
RESILIENCE AND HAZARDS SEPP NOTIFICATION LETTER**

Queanbeyan-Palerang Regional Council
PO Box 90
Queanbeyan NSW 2620
Attention: The General Manager

Date XX/XX/XXXX

CROWN ROAD RESERVE ADJACENT THE FORMER CAPTAINS FLAT PRESCHOOL NOTIFICATION OF CATEGORY 2 REMEDIATION WORKS

INTRODUCTION

Ramboll Australia Pty Ltd (Ramboll) was retained by Department of Regional NSW (DRNSW) on behalf of the landowner to prepare a Lead Abatement Plan (LAP) for contamination identified at a vacant Crown road reserve adjacent the former Captains Flat Preschool. This area is presented on **Figure 1, Appendix 1** and is here-in referred to as the site.

Queanbeyan-Palerang Regional Council (QPRC) respectfully notify QPRC of planned Category 2 remediation works, as defined by *State Environmental Planning Policy (Resilience and Hazards) 2021* that will occur at the site.

REMIEDIATION WORK

The preferred remedial strategy comprises recontouring application of a clean cap across the site to mitigate contaminant exposure risks.

CATEGORY 2 REMEDIATION WORKS

This project is deemed to be Category 2 remediation work in accordance with the Resilience and Hazards SEPP. Category 2 remediation work is deemed remediation work that is not Category 1 remediation as described in Clause 4.8 of the Resilience and Hazards SEPP. The triggers for Category 1 remediation work are evaluated in **Table 1**.

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Ref 318001193

Table 1: Evaluation of Category 1 Triggers

Clause 4.8 Trigger	Evaluation
<p>a) Designated development</p>	<p>The project is not designated development. Schedule 3 Clause 15 of the <i>Environmental Planning and Assessment Regulation 2000</i> describes conditions under which contaminated soil treatment works are deemed designated development. Of specific relevance to this project:</p> <ul style="list-style-type: none"> • The volume of contaminated material falls below 30,000m³ (estimated at < 1000m³) <p>The area of contaminated soil to be disturbed is less than 3 hectares.</p>
<p>b) carried out or to be carried out on land declared to be a critical habitat, or</p>	<p>The project would not be carried out on land declared to be a critical habitat.</p>
<p>c) likely to have a significant effect on a critical habitat or a threatened species, population or ecological community, or</p>	<p>The site is used as flood berms and playing fields and is void of any native vegetation or wildlife. It will not require disturbance of critical habitat or a threatened species, population or ecological community.</p>
<p>d) development for which another State environmental planning policy or a regional environmental plan requires development consent, or</p>	<p>No State Environmental Planning Policy or Regional Environmental Plan identifies the proposed remediation as an activity requiring development consent.</p>
<p>e) carried out or to be carried out in an area or zone to which any classifications to the following effect apply under an environmental planning instrument:</p> <ul style="list-style-type: none"> (i) coastal protection, (ii) conservation or heritage conservation, (iii) habitat area, habitat protection area, habitat or wildlife corridor, (iv) environment protection, (v) escarpment, escarpment protection or escarpment preservation, (vi) floodway, (vii) littoral rainforest, (viii) nature reserve, (ix) scenic area or scenic protection, (x) wetland, or 	<p>The project is located on land zoned RE1 Public Recreation under the <i>Queanbeyan Local Environment Plan 2012</i>. No other environmental planning instrument prescribes the project site as one of the areas listed in point (e).</p>
<p>f) carried out or to be carried out on any land in a manner that does not comply with a policy made under the contaminated land planning guidelines by the council for any local government area in which the land is situated (or if the land is within the unincorporated area, the Western Lands Commissioner).</p>	<p>The <i>Queanbeyan Development Control Plan 2012</i> includes guidance that applies to Contaminated Land. The proposed remediation complies with the guidance.</p>

The proposed remediation works do not trigger the criteria in clause 4.8 (a) – (f) as outlined in **Table 1**, and the proposed remediation works are not ancillary to any other current development requiring Development Consent. Based upon the above information and criteria the remediation works are deemed to be Category 2 works under the Resilience and Hazards SEPP.

It is anticipated that remediation of the activities associated with Lead Abatement at the Crown road reserve adjacent the former Captains flat Preschool would commence in late and be completed

Yours sincerely