Preliminary Site Investigation

Bungendore Station

03 May 2022

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Preliminary Site Investigation

Bungendore Station

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Acronyms and Abbreviations

Name	Description
ACL	Added Contaminant Limit
ALS	Australian Laboratory Sciences
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
CLM	Contaminated Land Management
COC	Chain of Custody
COPC	Contaminant of Potential Concern
CRN	Country Rail Network
CSM	Conceptual Site Model
DQO	Data quality objectives
EIL	Ecological Investigation Levels
EPA	Environment Protection Authority
ERM	Environmental Resources Management Australia Pty Ltd
GDE	Groundwater Dependant Ecosystems
GW	Groundwater
HIL	Health Investigation Levels
IDE	Inflow Dependant Ecosystems
JHR	John Holland Rail
m AHD	meters Australia Height Datum
m BGL	Meters Below Ground Level
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NSW EPA	New South Wales Environmental Protection Authority
PAH	Polycyclic Aromatic Hydrocarbons
POEO	Protection of the Environment Operations Act 1997
PSI	Preliminary Site Investigation
QA/QC	Quality Assurance and Quality Control
QPRC	Queanbeyan Palerang Regional Council
SAP	Sampling Analysis Plan
SOPs	ERM Standard Operating Procedures
SPR	Source-Pathway-Receptor
TAHE	Transport Assets Holding Entity
TfNSW	Transport for New South Wales
TRH	Total Recoverable Hydrocarbons
XRF	X-Ray Fluorescence

EXECUTIVE SUMMARY

Environmental Resources Management Australia Pty Ltd (ERM) was commissioned by Country Regional Network John Holland Rail Pty Ltd (JHR) to undertake a Preliminary Site Investigation (PSI) with supplementary shallow soil assessment at the Bungendore Station, Majara Street, Bungendore NSW (the 'Site').

The Site is owned by Transport for NSW (TfNSW) via the Transport Assets Holding Entity (TAHE) and forms part of the broader Bungendore Rail Precinct. Management of the Site falls under Sydney Trains, however JHR have requested this PSI as part of their overarching management of lead issues at the Bungendore Rail Precinct. The PSI has been completed in parallel to a PSI on the Bungendore Rail Corridor and Sidings, which form part of the Country Rail Network (CRN). The works completed for the broader Bungendore Rail Corridor to date have focused on potential impacts related to the transport of lead ore by the rail line which passes adjacent to the Site.

The objectives of the PSI were to collect Site information that is sufficient to:

- *identify potential sources of contamination and determine potential contaminants of concern;*
- *identify areas of potential contamination;*
- *identify potential human and ecological receptors;*
- *identify potentially affected media; and*
- *assess the nature and extent of identified key contaminants (heavy metals) of potential concern in surface soils.*

Additionally, as required, the preliminary conceptual site model can be used to assess potential implications for notification to the New South Wales Environment Protection Authority (NSW EPA) under Section 60 of the Contaminated Land Management Act 1997 (CLM Act) and to assess and manage potential liabilities in relation to ongoing human health and/or environmental risks. In order to meet the objectives, the scope of work included desktop database searches and reviews and a site inspection which was supplemented with a limited shallow soil investigation.

The Site is zoned as Infrastructure (SP2) has been utilised for rail activities since 1885. Although a number of potentially contaminating activities may have occurred at the Site in association with the long term rail usage, the primary potentially contaminating activities historically undertaken onsite appear to be the transport of lead ore by the adjacent rail. Lead ore was historically transported via Bungendore within uncovered wagons from the Captains Flat Mine, located approximately 35 km to the south. Based on historical photograph review, it appears that rail infrastructure was historically present at the southern portion of the Site, however the purpose of the infrastructure is unconfirmed. A previous investigation undertaken by Rambol (2021) identified lead concentrations in surface soils at the Site which appeared to be related to historical lead ore transport and/or handling. The data collected by Rambol has been considered in the conclusions of this PSI.

The soil sampling completed as part of this preliminary investigation consisted of 15 shallow soil sampling locations applying a systematic sampling pattern and supplemented the historical data set. Results were screened against Tier 1 criteria which were selected based on the identified Site receptors.

Based on the data collected, concentrations of lead in shallow soils (<0.1 m bgl) are present above applicable screening criteria at a number of locations with the most elevated concentrations observed in the southern portion of the Site and in proximity to the rail line. Concentrations observed during this PSI exceeded recreational HILs at depths of 0.05 - 0.1 m bgl, however historical data (Rambol 2021) indicates concentrations in surface soils exceed commercial/industrial criteria. Concentrations immediately to the east of the former Stationmasters residence (in proximity to the rail line) exceed both residential and commercial/industrial criteria. However, concentrations appear to decrease rapidly with distance from the rail line.

Results obtained both as part of this investigation and the Rambol investigation demonstrated that the concentrations in the surface soils (0 - 0.05m bgl) were up to an order of magnitude higher than soils at 0.1m bgl, indicating that concentration may decrease rapidly with depth.

Through the works described herein and the development of a preliminary conceptual site model, ERM has undertaken an assessment of potential:

- *sources of contamination;*
- *potential contaminants of concern; and*
- *potential human and ecological receptors.*

From this assessment, ERM considers that a number of potentially complete Source – Pathway – Receptor (SPR) linkages may exist at the Site, including for onsite commercial/industrial and recreational users of the Site (rail patrons and other members of the public). It is noted that onsite risks could be managed through the implementation of appropriate institutional controls. A potential SPR linkage has been conservatively identified for the former Stationmasters residence based on previously collected data on the eastern boundary. The potential risk to offsite residences has not been confirmed through direct sampling on the property and there is evidence to suggest that concentrations may not extend to the residence. Additional potential SPR linkages may exist for offsite groundwater bore users and offsite ecological receptors, however these issues have not been comprehensively assessed through groundwater and surface water assessment at this time.

Based on the identified lead impact in surface soils at the Site, and the potentially complete SPR Linkages present, a duty to notify the NSW EPA under S.60 of the CLM Act (1997) is considered to have been triggered. As part of the notification process, it is recommended that the NSW EPA should be engaged to discuss whether additional data collection and further assessment of potentially complete SPR Linkages may be beneficial in the NSW EPA's assessment of the Site. This Site should be managed as part of the broader Bungendore Rail Precinct.

1. INTRODUCTION

Environmental Resources Management Australia Pty Ltd (ERM) was commissioned by John Holland Rail Pty Ltd (JHR) to undertake a Preliminary Site Investigation (PSI) with supplementary shallow soil assessment at the Bungendore Station, Majara Street, Bungendore NSW (the 'Site').

The Site is owned by Transport for NSW (TfNSW) via the Transport Assets Holding Entity (TAHE) and forms part of the broader Bungendore Rail Precinct. Management of the Site falls under Sydney Trains, however JHR have requested this PSI as part of their overarching management of lead issues at the Bungendore Rail Precinct.

A Site Location Map is provided as *Figure 1* of *Appendix A*.

1.1 Background

The Bombala Line which passes through the Bungendore Rail Corridor and adjacent to the Site, forms part of the CRN. The Bombala Line was historically linked with the Captains Flat Line to the south of Bungendore, which was used to transport lead ore from the Captains Flat mine, located approximately 35km to the south. The Bombala Line ceased to be used for goods traffic in 1989, however the Bungendore Rail Corridor remains an operational passenger line for Countrylink services between Sydney and Canberra (NSW State Heritage Inventory, 2021).

ERM recently completed a PSI (ERM 2021) for the portions of the Bungendore Rail Precinct included all lands in the Bungendore Rail Precinct that form part of the Country Rail Network (CRN). The PSI included extensive sampling of surface soils along the length of the rail corridor and associated sidings. The sampling identified lead concentrations in excess of landuse criteria and concluded that potentially complete Source Pathway Receptor (SPR) linkages may be present.

The Bungendore Station is adjacent to the areas of the Bungendore Rail Precinct where lead was identified in the PSI. A limited assessment was undertaken by Rambol on behalf of TfNSW in the vicinity of the Bungendore Station, which indicated that lead may be present at the Site.

This PSI is required to assist JHR and the landowner (TfNSW) understand whether the lead contamination extends to the Bungendore Station Site and potential risks to identified receptors, or whether any historical activities may have been undertaken at the Site which may have resulted in additional contamination.

1.2 Objectives

The objective of the PSI was to collect Site information sufficient to:

- assess potential sources of contamination and identify key potential contaminants of concern;
- assess areas of potential contamination;
- identify potential human and ecological receptors; and
- assess the nature and extent of identified key contaminants (heavy metals) of potential concern in surface soils.

This information will be used to develop a preliminary Conceptual Site Model (CSM), which provides a representation of site-related contamination sources, receptors and exposure pathways between these sources and receptors.

Additionally, as required, the preliminary CSM can be used to assess potential implications for notification to the NSW Environment Protection Authority (EPA) under Section 60 of the *Contaminated Land Management Act* (1997) (CLM Act) and to assess and manage potential liabilities in relation to ongoing human health and/or environmental risks.

1.3 Scope of Works

The PSI included a preliminary desktop review to collect basic site information and a site walkover, supplemented by shallow soil sampling. This information was used to develop the conceptual site model. Specific tasks associated with each stage of work are presented in the following subsections.

1.3.1 Desktop Searches and Review

An understanding of the Site and environmental setting is necessary for developing the conceptual site model, to do this the report has taken into consideration the following:

- Site description;
- Site activities (current and historic);
- Site history;
- geology;
- hydrogeology; and
- hydrology.

Review of background information relating to the Site, including:

- Historical land titles;
- Historical aerial photographs;
- Contaminated land register;
- Groundwater bore register;
- Environmental permit/license registers;
- Australian heritage databases; and
- Any historical investigation reports relating to contamination at the Site.

1.3.2 Site Visit Including Shallow Soil Sampling

Site investigation works comprised a detailed site walkover prior to the collection of shallow soil samples. This stage of works included the following tasks:

- health and safety preparation including:
  - review of “Dial Before You Dig”/service plans;
  - development of an overarching Health, Safety and Environment Plan;
  - consideration of a site-specific Sampling Analysis Plan (SAP);
- Site walkover to identify potential areas of environmental concern and to allow for necessary improvements in the investigation design;
- identification of key features, potential contamination sources and any areas where evidence of environmental impact associated with former site uses is present;
- collection of 15 primary shallow soil samples. Samples were collected on a combination of systematic and judgemental sampling design;
- each sample was collected from a depth of approximately 0.05 - 0.1 metres below ground level (m BGL) using hand tools;
- samples were submitted under chain of custody (COC) documentation to a National Association of Testing Authorities (NATA) accredited laboratory; and
- samples were analysed for heavy metals, which are considered the key contaminants of potential concern (COPCs) for the Site.

2. SITE IDENTIFICATION

2.1 Site Identification

The Site identification information is presented within Table 2-1 below:

Table 2-1: Site Identification

Item	Description
Site Owner	Transport for New South Wales
Site Occupier / Usage	Sydney Trains / Railway station
Site Address	Majara St, Bungendore, NSW, 2621
Legal Description	Part Lot 2 DP814518 & public infrastructure lands (railway station).
Current Zoning[1]	Infrastructure (SP2)
Site Perimeter[2]	720 m
Site Area[2]	15,170 m^2
Elevation[1]	700 m AHD
Site Location and Site Layout	Figures 1 - 2 Appendix A

[1] Data sourced from Queanbeyan-Palerang Regional Council (2021)

[2] Data sourced from https://maps.six.nsw.gov.au/

2.2 Site Description and Use

This Site is owned by TfNSW and managed by Sydney Trains as an active railway station. The Bungendore Station building is located on the central eastern boundary of the site which adjoins to the Bungendore Railway Corridor. The Site is relatively flat, covered with grass and contains several mature trees. The Station is accessed via Majara Street by a gravel road which passes through the centre of the Site. A carpark with gravel surface is located to at the southern portion of the Site. At the time of reporting, the southern car park was fenced off and not in use.

The eastern boundary of the Site is fenced to restrict access to the railway corridor, with the exception of the platform area. A heritage site, the former 'Stationmasters Residence' (Lot 1 DP814518), zoned as low density residential is located to the north of the Site, however is not included as part of this investigation.

The Site layout is illustrated in *Figure 2, Appendix A*. Further details regarding site observations made during the Site inspection are presented in *Section 4.*

2.3 Surrounding Land Use

The Site is predominately surrounded by low-density residential zoned and the rail corridor to the east. The key land use surrounding the Site are illustrated on *Figure 1, Appendix A* and are summarised below in Table 2-2:

Table 2-2: Surrounding Land Uses

Direction	Land use
North	Low density residential (R2) property bordering the north of the Site (former Stationmasters Residence), followed by the Queanbeyan Palerang Regional Council Chambers. Turallo Creek is located 320m to the north-east and is situated within a parcel of environmental conservation (E2) zoned land.
East	The Bungendore Rail Corridor zoned as Infrastructure (SP2), followed by Powell Street and low density residential (R2) properties beyond the rail corridor.
South	Kings Highway borders the south of the Site followed by rail infrastructure (SP2) land (Woolshed Siding).
West	Majara Street followed by a mixture of low density residential (R2), general residential (R1), infrastructure (SP2). The low density residential (R2) land across Majara Street from the Site is a public school.

Source: Quenbeyan-Palerang Regional Council (2021)

2.4 Desktop Regulatory Records Search

For the purpose of the desktop review of publically available regulatory information, Lotsearch was subcontracted to complete the searches. The information provided by Lotsearch was reviewed and assessed in the context of this PSI. A summary of the relevant background information is presented in the following subsections and is presented in full in *Appendix C*

2.4.1 Hazardous Chemicals Information

No bulk hazardous chemicals are currently stored at any Area of the Site. During the Site inspection (refer to *Section 4*) no indications of historical above or below ground fuel storage were observed. A search of the Dangerous Goods Register was not undertaken as part of this PSI due to the focus being primarily on heavy metals. The potential for use or storage of hazardous chemicals at the Site was also assessed through the review of available data retrieved from Geoscience Australia regarding liquid fuel storage and by aerial photograph analysis (See *Appendix C* and *Section 2.5.2*). The National Liquid Fuel Facilities databases did not indicate any instances of chemical storage onsite, although there are three bulk fuel storage facilities located in Bungendore (all petrol stations).

Based on review of historical aerial photographs, it is unlikely that the historical storage of bulk above ground hazardous chemicals occurred on the Site. Historical aerial photographs indicate that a structure in the Sites south-eastern extent was removed sometime between 1968 and 1976. It is unknown what this structure was used for, or what may have been stored there historically.

2.4.2 Regulatory Agency Search

Key findings from searches of NSW Environment Protection Authority (EPA) databases of Contaminated Sites, and of the National Waste Management Site database are presented below:

- The NSW EPA Contaminated Land List is a database of sites that have been notified to the NSW EPA under Section 60 of the CLM Act (1997) and are either under assessment or have been confirmed to present an immediate or long-term risk of harm to human health and/or the environment under the CLM Act and are currently under NSW EPA regulation. The register shows all current and former sites on the list in NSW. As presented in *Appendix C*, there is no portion of the Site identified on the register. A former timber treatment plant (located on the corner of King and Bulmaroo Streets) been classified as ‘contamination formerly regulated under the CLM Act’ exists approximately 550m south-east of the site;
- The National Waste Management Site database lists the locations of Australia’s known landfills, waste transfer stations and a large number of waste reprocessing facilities. As presented in *Appendix C*, the Site does not appear in this databased and there are no identified waste management site within a 1,000 m distance of the Site; and

- The NSW Protection of the Environment Operations (POEO) Act 1997 establishes a licensing and monitoring requirement for certain activities where there is a potential risk to the environmental if not managed appropriately. The Site is adjacent to a railway corridor listed on the POEO register under EPL 13421, which regulates the entire CRN for the operation of railway systems and activities. There are no other licensed activities under the POEO Act (1997) occurring within 1,000m of the Site.

2.4.3 Ecological Constraints

A search for Groundwater Dependant Ecosystems (GDEs) and Inflow Dependant Ecosystems (IDEs) identified Turallo Creek 277m north of the site as a 'high potential GDE' & 'high potential IDE'.

A search for Endangered and Vulnerable Species identified on the NSW BioNet Atlas database as potentially occurring within 10km of the site identified 35 species of flora or fauna that are either endangered or vulnerable, refer to *Appendix C* for a list of species. Considering the nature of the species listed, it is considered unlikely that the Site would form significant habitat for these species given the limited vegetation across the site and the location of the Site within the Bungendore Township.

2.4.4 Site History

A summary of the site history as interpreted from available background sources is presented in the following subsections.

2.4.5 Historical Potentially Contaminating Activities

Information obtained from JHR during the completion of the PSI confirmed that the Bombala Line adjacent to the Site was used to transport lead ore from the Captains Flat mine with likely uncovered wagons of unknown integrity.

2.4.6 Historical Aerial Photographs

Historical aerial photographs indicate that the site has been somewhat remodelled over time. A summary of observations made for each photograph is presented in *Table 2-3* below.

Table 2-3: Historical Aerial Photograph Summaries

Year	Description
1944	In 1944, the Site existed in a similar layout compared to 2021. The station buildings and station-masters' residence are present, along with the open drainage channel bordering the western extent of the site. An unknown structure exists in the south western corner of the Site. The road running through the Site is also present, entering in the northwest at Majara St and exiting at the south onto what is now the Kings Highway. The area immediately surrounding the Site is sparsely populated.
1959	The 1959 aerial photograph is very low resolution, however it appears as though there were minimal changes since 1944 with the exception of the construction of a few properties to the southeast of the Site.
1961	In 1961, further developments to the sites surrounds are observable, however it appears minimal changes have occurred on the Site itself.
1968	The 1968 aerial photograph displays further developments to the sites surrounds, however it appears minimal changes have occurred on the Site itself, with the exception of the land within the fenced area in the southeast of the Site appearing to be cleared.
1976	The 1976 photograph displays continued residential developments surrounding the Site. Onsite, the building and associated structures in the Sites south eastern extent have been removed completely.
1985	Residential developments around the Site have increased markedly, whilst the primary school is now evident west of Site. Roads surrounding the Site now also appear to be asphalted. Onsite, grass appears to have been cleared through the central north-western extent.

Year	Description
1992	Residential development has again continued in the Sites surrounds. Onsite, a walking track running the southern and western extents is now evident, along with two small bare patches just south of the station buildings.
1997	Residential developments again continue, and the school has expanded. Onsite, some vegetation is present, along with a walking track running through the centre of the Site. The station roof also appears to have been remodelled and replaced.
2002	Offsite, residential developments continue. Onsite, the dirt road running through the centre of site has been redirected to exit westward onto Majara St at the southern extent, rather than southwards onto the Kings Highway. Vegetation has also increased markedly.
2009	By 2009 the QPRC chambers are evident to the sites' north. Residential developments along with an expansion of the primary school have also occurred. Onsite, vegetation has increased further.
2015	Offsite, developments to the school and residences have continued. Onsite, vegetation has increased, and a new dirt walking track is evident in the Sites' south portion.
2021	Minimal changes occurred between 2015 and 2021 both on and offsite. It appears as though vegetation has increased marginally.

2.4.7 Heritage

Local and State Heritage

A review of the search results relating to state and local heritage items (*Appendix C*) found that the Site appears on the State Heritage Register, and is defined as part of the 'Bungendore Railway Station & Yard Group'. The 'Bungendore Railway and Yard Group' is also considered an item of local heritage.

A total of 67 further sites of local heritage exist within the 1000m buffer zone of the site (*Appendix C*). The heritage search also identified major additions and changes to the Bungendore rail precinct prior to the aerial photograph record. These included the installation of a 12-ton cart weighbridge (1891, removed at an unknown date), carriage shelter shed/engine shed (1902, relocated to Coffs Harbour in 1918), and loading bank (1909). The exact location of these features is unknown is has not been confirmed whether they were located at the Site or within the Bungendore Railway Precinct.

National and Commonwealth Heritage

Review of National and Commonwealth Heritage database listings (*Appendix C*) has not identified the Site as an item of natural, historic, or indigenous place of National or Commonwealth significance.

2.4.8 Title Deed Information

A review of heritage information (*Appendix C*) identified that the Site has been operated as a railway line since the railway station was opened in 1885. No historical title search was completed as part of this investigation as the heritage information is considered sufficient to determine that the Site history has not altered from rail use.

2.5 Summary of Previous Investigations

A limited assessment was undertaken by Rambol on behalf of TfNSW in the vicinity of the Bungendore Station and Queanbeyan Regional Council Chambers, which indicated that lead may be present in surface soils at the Site. Given the relevance of the Rambol investigation to the PSI, the text, tables and figures of the Rambol report have been included in *Appendix H*. The investigation included survey with X-Ray Fluorescence (XRF) which semi-quantitatively identified lead concentrations in shallow soils.

The Rambol Investigation focussed on superficial and shallow soils within the Bungendore Railway Station yard and rail corridor. Field measurements taken from surface soils at the Bungendore Station area also indicated that lead was present above land use criteria (commercial/industrial and recreational open space), in particular at the southern portion of the Station area, nearest to the Wool Shed (up to 10,770 mg/kg). Ramboll noted that concentrations appeared to decrease significantly at 0.1 m bgl when compared to those taken at surface, indicating that the primary lead impact may be present in surface soils.

3. ENVIRONMENTAL SETTING

The following description of the site's environmental setting is based on a site visit undertaken on 7 October 2021 and information provided in *Appendix C*, which was obtained from publically available databases and reference sources.

3.1 Local Topography and Hydrology

According to topographical information obtained from the Department of Finance, Services, and Innovation, presented in *Appendix C*, the Site is located at an elevation of approximately 700m AHD. The Site area is generally flat with the broader area surrounding the Site generally sloping gently from the south-east towards the north-west.

Stormwater and associated runoff is directed offsite through open drainage channels along the western site boundary towards Turallo Creek, to the north surface water is generally expected to either infiltrate directly through the soil profile or in sheet flow in a north-westerly direction.

3.2 Geology and Soils

According to the mapping units provided by the NSW Department of Industry, Resources and Energy and presented in *Appendix C,* the Site is underlain by a turbiditic sequence of sandstone, mudstone, shale, quartzite, quartz phillite, phyllite, and slate.

Soils observed on the Site were variable, with varying degrees of fill noticed throughout. Soils mostly consisted of silt and sand mixtures with varying degrees of gravels. Ballast-like gravels and sandy fill was noticed in the sites southern extent, whilst blueish grey fill was noticed in the sites most northern portion.

The Atlas of Australian Acid Sulfate Soils maps, as presented in *Appendix C*, shows that the site contains of sodosol soils, with a 'Low (6% - 70%)' probability of occurrence of acid sulfate soils.

3.3 Hydrogeology

A review of the groundwater bore information presented in *Appendix C* identified 68 boreholes within a 1,000 m radius of the Site. The seven bores located within 500m are shown in *Appendix C*. These bores are GW403783 (124m east), GW402023 (159m east), GW404621 (326m east), GW416600 (337 north-east), GW404164 (444m north-east), GW025806 (482m east), and GW403817 (498m north west. Six of the seven nearest bores located within 500m of the site are registered for domestic use. The other is monitoring bore 416600, which was installed in 2015 and is located 337m to the north east of Site. It was installed to 5.1 m bgl, and has a recorded standing water level of 4.35 m bgl.

The water supply for the township of Bungendore is via municipal extraction bores and therefore it is assumed that the bores within close proximity to the Site may be potable and are potentially used for drinking purposes. Depth to groundwater and groundwater flow direction at the Site has not been confirmed through the installation of groundwater monitoring wells. However, based on the location of Turallo Creek, and the local topography, it is anticipated that groundwater would generally flow in a north to north-west direction, towards the creek. It is important to note that groundwater flow direction can be influenced locally and regionally by not only surface topography, but recharge and discharge areas, horizontal and vertical inconsistencies in the types, location and orientation of subsurface soils, fill or bedrock and proximity to groundwater extraction wells.

4. SITE INSPECTION

4.1 General

A Site inspection was conducted by ERM on 7 October 2021. The overall purpose of the site inspection was to gather information and consolidate the findings of the desktop review through physical inspection of contaminant sources, pathways and receptors as an assessment of surface (and potential subsurface) Site conditions. Observations made during the Site Inspection were used for the description of the current Site layout and usage is presented in *Section 2.2*. The following section details information gathered at the time of the Site visit. A photographic log is provided in *Appendix F*.

4.2 Site Observations

Key observations noted during the site inspection and soil sampling included:

- The Bungendore railway station is located at the central eastern portion of the Site and consists of four separate buildings. The buildings paintwork appears to be well maintained. Renovations were underway on the toilet block, to the south of the platform. There was no evidence of the removed structures noted in the Sites' southeast during the aerial photograph review;
- The former 'Stationmasters Residence' borders the Site to the north, with the rail corridor forming the eastern boundary. The residences' southern fence was covered with flaking paint;
- A compacted dirt driveway enters from Majara street and arcs from the northwest of the site across to the station and around to the southwest where it re-joins Majara street;
- The carpark at the southern portion of the Site was inaccessible to the public, secured by temporary fencing;
- The Site was generally well vegetated with grasses, large gum trees, and smaller shrubs in raised beds;
- Bare patches were noted amongst grassed areas across the site, particularly towards the car parking area, and towards the northeast of the site. Grass was also longer, although patchy towards the southern extent of the site;
- A vegetated open storm-water channel runs south to north along the western boundary of the site;
- Pooling water was intermittently present to the immediate east of the storm-water channel; and

Soils on the Site were somewhat consistent, with varying degrees of fill noticed throughout. Ballast-like gravels and sandy fill was noticed in the sites southern extent whilst blueish grey fill was noted in the north.

5. PRELIMINARY SHALLOW SOIL SAMPLING

5.1 General

Following the Site inspection, a limited shallow soil sampling investigation was undertaken on 7-8 October 2021. All works were conducted in general accordance with ERM Proposal (P0612302) and ERM Standard Operating Procedures (SOPs).

5.2 Data Quality Objectives

Data quality objectives (DQOs) were developed to define the type and quality of data required to achieve the project objectives outlined in Section 1.2.

The DQOs have been prepared in line with the seven-step approach outlined in *National Environment Protection (Assessment of Site Contamination) Measure (the ASC NEPM)* (NEPC, 1999) (as amended 2013), and with reference to the NSW EPA (1997) *Contaminated Land Management* Act (CLM Act).

The seven steps of the DQO process, and how they were applied to this Preliminary Shallow Soil Sampling, are presented in the *Appendix D*. The DQO process is validated, in part, by the quality assurance and quality control (QA/QC) procedures and assessment presented in *Appendix E* of this report.

5.3 Contaminants of Concern

Based on the initial desktop review and observations made during the Site Inspection the key contaminants of concern for the Site are heavy metals (in particular lead), due to the historical transport of lead ore along the Rail Line by uncovered wagons of unknown integrity.

Additionally, based on the extensive historical use of the Site as a railway precinct and the limited understanding of the historical practices undertaken, a broad suite of COPCs may also considered relevant, including;

- Total Recoverable Hydrocarbons (TRH);
- Benzene, Toluene, Ethylbenzene and Xylenes (BTEX);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Phenols;
- Organochlorine and Organophosphate (OC/OP) pesticides; and
- Asbestos.

Although a wide range of COPCs have been identified, heavy metals were focused on for the shallow sampling. Additional COPCs should be considered for subsequent scopes of work.

5.4 Rationale for Sampling Design

The primary potentially contaminating activity historically undertaken associated with the investigation area was the transport of lead ore by rail. It is possible that dust from wagons and potential spills along the adjacent rail line have resulted in the presence of heavy metals such as lead.

Given the preliminary nature of the investigation, soil sampling design and spread were focused upon gaining a comprehensive and representative understanding of the condition of surface soils. Surface soil samples at the Site were sampled on a ~25m herringbone grid pattern. Sampling locations are illustrated in *Figure 1, Appendix A*.

The sampling was designed to provide an initial assessment of potential soil contamination issues to the extent practicable and is considered appropriate for the purposes of this report. Assessment of soils deeper than 0.1m bgl and groundwater was not included within the sampling design.

The analytical suite for soil samples focused on only the key COPCs, including 15 heavy metals (arsenic, boron, barium, beryllium, cadmium, chromium, cobalt, copper, manganese, nickel, lead, selenium, vanadium, zinc and mercury).

5.5 Soil Sampling Method

A total of 15 surface soil samples were collected. The following methodology was adopted as part of the soil sampling activities:

- investigation locations were sampled using a trowel or collected directly by hand to a depth of 0.1m bgl;
- soils at each location were logged by an experienced environmental scientist with any evidence of potential contamination noted if observed;
- a single soil sample was collected from each location into laboratory supplied jars which were sealed, appropriately labelled, and place in a cooler on ice for transport to the laboratory; and
- to reduce the potential for cross contamination between sampling locations, nitrile gloves were changed between the collection of each sample and non-disposable investigation equipment was decontaminated prior to the commencement of each location.

5.6 Soil Observations

During the fieldwork sampling program, the following observations were made during soil sampling:

- Soils were somewhat consistent across the majority of the Site, mostly consisting of silt and sand mixtures with varying degrees of gravels;
- Natural and fill soils were approximately equally distributed across site;
- A superficial blue/grey fill layer to 0.05m bgl was observed at the northernmost sampling point;
- Fill layers were generally more compact and contained greater proportions of gravels and sands when compared to the natural siltier soils; and
- No noticeable staining or odours were noted in materials were observed across the Site.

Field descriptions of each of the samples collected are provided in *Table 3, Appendix B.*

5.7 Laboratory Analysis

The laboratory used for the investigation was accredited by the National Association of Testing Authorities (NATA), Australia. The primary laboratory used for soil analysis, including intra-laboratory duplicate samples, was Australian Laboratory Services (ALS). The secondary laboratory used for the analysis of inter-laboratory duplicate samples was NATA accredited Eurofins. The analytical methods used by each laboratory are provided in the laboratory certificates provided as *Appendix G*.

All samples were analysed for the suite of heavy metals listed in Section 5.4.

5.8 Waste

No soil waste was generated as a result of soil sampling activities, and each investigation location was backfilled using the soil cuttings removed and surrounding surface materials. General waste associated with disposable sampling equipment (e.g. gloves and glass sample jars) was removed from the Site and disposed off-site appropriately as general waste.

5.9 Soil Screening Criteria

The Tier 1 screening criteria for soil data has been selected based on a review of the ASC NEPM (2013 update): Schedule B1: Guideline on the Investigation Levels for Soil and Groundwater. Health Investigation Levels (HILs) for human health – direct contact and Ecological Investigation Levels (EIL's) were applied. Given the broad area of investigation, criteria for various land uses were applied based on the identified Site receptors as described in *Section 6.5*. The Screening Criteria were applied as follows:

- Commercial/Industrial (HIL D and EIL) - all samples were screened against commercial/industrial criteria, due to the Sites' proximity to the rail corridor and the ongoing restoration works being undertaken on Site;
- Open Space/ Recreation (HIL-C) – all samples were screened against HIL C criteria due to the degree of community access to the site; and
- Residential (HIL A) and EIL (Urban Residential & Open Space) – selected samples that were located on the Sites boundaries were additionally screened against residential criteria as an indication of whether any offsite risks may be plausible.

In order to nominate an appropriate EIL for certain analytes, Site specific data for certain parameters is necessary. The specific data is not available, and therefore conservative assumptions have been made based on Site observations. A low clay content of 1% was used based on the silty gravelly soil observed onsite. Conservative values of 5 pH and 10 cmol/kg Cation Exchange Capacity (CEC) were adopted. The EILs also make an allowance for a background level of a certain contaminant to be present and the background concentration is added to the screening level. Concentrations observed at un-impacted areas of the Bungendore Rail Precinct (Trucking Yard) (ERM, 2021) were used to represent background conditions. An average of these samples was calculated and added to the Added Contaminant Limit (ACL) as specified in NEPM (2013).

The screening criteria are summarised in the header portion of the analytical results *Table 4, Appendix B*.

5.10 Soil Analytical Results

A total of 15 primary soil samples were analysed for heavy metals. A summary of analytical data that has applied the relevant screening criteria is presented in *Table 4, Appendix B*. Laboratory certificates of analysis are provided in *Appendix H*. Exceedances of screening criteria are illustrated in *Figure 3, Appendix A* and are summarised in Table 5-1 below.

Table 5-1: Soil Exceedances

Analyte	Applicable Primary Samples	Concentration (mg/kg)	Criteria Exceeded
Lead	SS-STN-01	978	■ NEPM 2013 Table 1A(1) HILs Res A Soil ■ NEPM 2013 Table 1A(1) HILs Rec C Soil
	SS-STN-02	680	■ NEPM 2013 Table 1A(1) HILs Res A Soil ■ NEPM 2013 Table 1A(1) HILs Rec C Soil
	SS-STN-13	515	■ NEPM 2013 Table 1A(1) HILs Rec C Soil

Given that lead is the primary COPC for the Site on the basis of the primary contaminating activities involving movements of lead ore, a concentration map which uses the observed concentrations of lead to estimate potential concentrations across the Site has been included as *Figure 4, Appendix A.*

5.11 Quality Assurance / Quality Control Evaluation

A detailed QA/QC report including field procedures, laboratory methods and an analysis of QA/QC results from the investigation is provided in *Appendix E*.

In summary, field and laboratory QA/QC data were reported generally free of systematic and method biases and were assessed to be of sufficient quality for the purposes of this investigation. Any outliers are discussed in *Appendix E.*

6. PRELIMINARY CONCEPTUAL SITE MODEL

An understanding of potential exposure scenarios is necessary to evaluate the suitability of a site for a particular land use, being the current approved or potential future land use. Potential exposure pathways are evaluated for completeness based on the existence of:

- a source of contamination/impact;
- a mechanism for release of contaminants from identified sources;
- a contaminant retention or transport medium (e.g. soil, air, groundwater, etc.);
- potential receptors of contamination; and
- a mechanism for chemical intake by the receptors at the point of exposure.

Whenever one or more of the above elements is missing, the source/pathway/receptor linkage is incomplete and there is therefore there can be no risk to the identified receptor.

6.1 Potential Sources of Contamination

The current and historic potential sources of on and off-site soil contamination identified through this PSI which are considered to represent a potential environmental liability include the following:

- **Historical handling of lead ore:** the operation of the rail infrastructure immediately adjacent to the Site represents a potential contamination source with respect to potential lead ore spillage and dust from cargoes and their deposition throughout the corridor.
- **Stockpiling of potential contaminated soils:** neighbouring rail sidings including the Woolshed 100m south of site have historically been used for stockpiling potentially contaminating materials. There is a possibility that similar stockpiling occurred historically on Site.
- **Use of lead based paint on structures:** heritage structures are known to have commonly been painted with lead based paints, which can enter soils within the dilapidation footprint.
- **Historical operation of railway lands (various):** the Bungendore Rail Precincts long term use as rail yards may have resulted in a number of additional contaminating activities which were not readily observable during the Site Inspections including (but not limited to) pesticide use, hydrocarbon spills, potential historical hydrocarbon storage, use of contaminated building materials (asbestos), use of PCB oils and potential historical onsite fires.

6.2 Nature and Extent of Impact

The primary COPC for the Site is lead, based on the historical movements of lead ore through the rail corridor adjacent to the Site. Investigations within the rail corridor (ERM 2021a) have indicated that higher lead concentrations are present within rail ballast and areas where lead ore was handled, however decreases significantly with distance from the rail lines.

Previous investigations (Rambol, 2021) at the Site have assessed shallow soils, although have focussed only upon concentrations at the ground surface and upper 0.1m of the soil profile. Results obtained by Rambol have indicated lead concentrations of up to 10,770 mg/kg in the surface soils on Site. Concentrations are appearing to be most elevated at the southern portion of the Site, where until recently a public car parking area was located (now restricted access). It is noted that this is the general area where unknown historical structures were located, however the purpose of the structures has not been confirmed.

Lead concentrations in surface soil proximity to the former stationmasters' residence (currently the nearest residential receptor to the Site), indicated that concentrations immediately to the east of the residence (within the rail corridor) are in excess of both residential and commercial/industrial criteria.

However, concentrations appear to decrease rapidly with distance from the rail corridor and concentrations observed to the south and west of the residence were below residential criteria. Lead concentrations along the western Site boundary were also below all screening criteria, indicating that the lead concentrations in surface soils observed onsite may not extend offsite to the west.

Results obtained both as part of this investigation and the Rambol investigation demonstrated that the concentrations in the surface soils (0-0.05m bgl) were up to an order of magnitude higher than soils at 0.1m bgl. Samples collected during this investigation were collected from 0.05-0.1m bgl and were therefore lower than the concentrations observed by Rambol.

The observed distribution of the lead concentrations observed has been mapped in *Figure 4, Appendix A*.

6.3 Potential Pathways

The primary potential exposure pathways of concern at the site are:

- Dermal contact and / or incidental ingestion with impacted soils / sediments, surface water);
- Home grown produce (residential only);
- Inhalation of dust (from impacted soils);
- Contact with groundwater via abstraction bores; and
- Inhalation of vapours (volatile constituents only).

6.4 Potential Receptors

The following potential receptors have been identified relevant to the site:

Human Receptors:

- On/off-site commercial/industrial workers;
- Rail Patrons/Users of the Bungendore Station (recreational setting);
- Off-site residents;
- Users of Bungendore Public School; and
- Potential users of groundwater.

Ecological Receptors:

- On and off-site terrestrial receptors.

6.5 Qualitative Evaluation of Environmental Risk

6.5.1 Onsite Human Health

The primary Site receptors are considered to be on-site commercial/industrial rail workers and members of the public who use the Railway Station for rail transport purposes. Members of the public are also considered relevant receptors who use the carpark on Site for alternative purposes such as for pick-up/drop off of students for Bungendore Public School. The path for both commercial / industrial and rail patrons/members of the public using the Bungendore Station (recreational setting) is by direct contact with impacted soils. This SPR linkage is considered to be potentially complete.

Dust inhalation is considered to be a potential SPR linkage for both commercial / industrial and rail patrons/members of the public using the Bungendore Station, particularly given that lead is present in surface soils. Any dust generation would be highly incidental given grass coverage is present across the most of the Site, however physical disturbance through vehicle access to impacted areas and climactic conditions would influence levels of dust generation at the Site.

The potential for contamination to have migrated to onsite groundwater has not been assessed, however given the depth of groundwater (likely approximately 7m), it is unlikely that onsite receptors would contact groundwater. No significant sources of volatile contaminants has been identified and therefore vapours inhalation is unlikely to represent a likely exposure pathway.

6.5.2 Off-site Human Health

A number of registered domestic groundwater bores exist in close proximity to the Site. Groundwater has not been assessed as part of this PSI, and although lead concentrations appear to decrease significantly with depth, the data collected is not sufficient to conclude that vertical delineation has been achieved. Potential exists for lead to have mobilised vertically to groundwater and caused a plume which extends to the offsite bores.

6.5.3 On-site Ecological

Exceedances of ecologically based criteria were noted for a number of heavy metals across the Site (primarily based on Rambol 2021). Whilst is possible that the fauna may access the Site, it is recognised that the Site is not intended to be supportive of ecological communities. Mature trees are present onsite which do not appear stressed. Grass coverage is inconsistent and may be impacted by lead concentrations in surface soils. Based on the concentrations present, the Site may not support shallow rooting or sensitive flora.

6.5.4 Off-site Ecological

It is considered a possibility that identified lead concentrations in shallow soil may mobilise in surface water runoff during rainfall and could migrate offsite into drainage channels which connect to offsite surface water receptors such as Turallo Creek. Offsite surface water has not been assessed as part of this PSI, and as such a potential SPR linkage cannot be excluded from further consideration.

6.6 Potentially Complete Exposure Pathways

A Source-Pathway-Receptor (SPR) linkage is considered to be present when a pathway links a source with a receptor. These linkages explain when there may be risks to the receptor, either now or in future. Based on information reviewed as part of this PSI, the following potentially complete SPR linkages currently exist:

- Onsite commercial / industrial worker through direct contact and/or dust inhalation. This risk may be managed through institutional controls;
- Onsite recreational users (rail patrons/ and/or members of the public using the Bungendore Station) through direct contact and/or dust inhalation. This risk may be managed by further restricting access to impacted areas of the Site;
- Offsite residential through direct contact and/or dust inhalation. Based on the close proximity of the stationmasters' residence to concentrations in excess of screening criteria, lead concentrations may extend to residential receptors;
- Offsite abstraction bore users if lead is present in groundwater and extends to offsite domestic bores;
- Onsite Ecological: Based on the concentrations present, the Site may not support shallow rooting or sensitive flora; and
- Offsite ecological receptors in surface water, noting the surface water has not been assessed as part of this PSI.

It is noted that in some cases the existence of potentially complete SPR linkages is based on incomplete data. The risk to receptors may be further quantified if additional relevant data was obtained.

7. CONCLUSIONS

Based on the results of the investigation works completed for the Site and reported upon within this PSI report, the overall objectives are considered to have been met and a preliminary understanding of potential sources of contamination, receptors and potential exposure pathways has been established.

The Site is zoned as Infrastructure (SP2) has been utilised for rail activities since 1885. The primary potentially contaminating activity identified was the historical use of the adjacent rail corridor/active railway transporting lead ore via uncovered wagons from the Captains Flat Mine. Based on the background information reviewed, a number of additional potentially contaminating historical activities have been identified relating to the long term railway use of the Site.

A previous investigation undertaken by Rambol (2021) identified lead concentrations in surface soils at the Site which appeared to be related to historical lead ore transport and/or handling. The data collected by Rambol has been considered in the conclusions of this PSI.

Soil sampling completed as part of this preliminary investigation focused on heavy metals in shallow soils (<0.1m bgl). The data was used along with the Rambol 2021 data to provide additional on the impact of historical lead ore transport/handling in the adjacent corridor. Based on the data collected, concentrations of lead in shallow soils (<0.1 m bgl) were present above applicable screening criteria at a number of locations. The distribution of lead in shallow soils at the Site can be summarised as follows:

- Lead concentrations in soil appear to be elevated in soils, with most elevated concentrations observed in the southern portion of the Site and in proximity to the rail line;
- Concentrations observed during this PSI exceeded recreational HILs at depths of 0.05-0.1 m bgl, however historical data (Rambol 2021) indicates concentrations in surface soils exceed commercial/industrial criteria and concentrations decrease rapidly with depth;
- Concentrations immediately to the east of the former Stationmasters residence (in proximity to the rail line) exceed both residential and commercial/industrial criteria. However, concentrations appear to decrease rapidly with distance from the rail line; and
- Results obtained both as part of this investigation and the Rambol investigation demonstrated that the concentrations in the surface soils (0-0.05m bgl) were up to an order of magnitude higher than soils at 0.1m bgl, indicating that concentration may decrease rapidly with depth.

Through the development of a preliminary Conceptual Site Model ERM have concluded that that a number of potentially complete SPR linkages at the Site relating specifically to lead. These are considered potential as further assessment is required in order to confirm if a potential risk exists. The identified potential SPR linkages include:

- Onsite commercial / industrial worker through direct contact and/or dust inhalation. This risk may be managed through institutional controls;
- Onsite recreational users (rail patrons/members of the public using the Bungendore Station) through direct contact and/or dust inhalation. This risk may be managed by further restricting access to impacted areas of the Site;
- Offsite residential through direct contact and/or dust inhalation.
  - This is based on the close proximity of the stationmasters' residence to concentrations in excess of screening criteria to the east (towards the rail line), however there is evidence to suggest that concentrations do not extend a significant distance from the rail line in this area and may not extent to the residence;
- Offsite abstraction bore users if lead is present in groundwater and extends to offsite domestic bores;
- Onsite Ecological: Based on the concentrations present, the Site may not support shallow rooting or sensitive flora; and

- Offsite ecological receptors in surface water, noting the surface water has not been assessed as part of this PSI.

Based on the identified lead impact in surface soils at the Site, and the potentially complete SPR Linkages present, a duty to notify the NSW EPA under S.60 of the CLM Act (1997) is considered to have been triggered. As part of the notification process, it is recommended that the NSW EPA should be engaged to discuss whether additional data collection and further assessment of potentially complete SPR Linkages may be beneficial in the NSW EPA's assessment of the Site. This Site should be managed as part of the broader Bungendore Rail Precinct.

8. STATEMENT OF LIMITATIONS

This report was prepared in accordance with the scope of work outlined within this report and subject to the applicable cost, time and other constraints. ERM performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental profession. ERM makes no warranty concerning the suitability of the site for any purpose or the permissibility of any use, development or re-development of the site. Except as otherwise stated, ERM's assessment is limited strictly to identifying specified environmental conditions associated with the subject site and does not evaluate structural conditions of any buildings on the subject site. Lack of identification in the report of any hazardous or toxic materials on the subject site should not be interpreted as a guarantee that such materials do not exist on the site.

This assessment is based on site inspection conducted by ERM personnel, sampling and analyses described in the report, and information provided by John Holland Rail Pty Ltd ('JHR' or 'the client') or other people with knowledge of the site conditions. All conclusions and recommendations made in the report are the professional opinions of the ERM personnel involved with the project and, while normal checking of the accuracy of data has been conducted, ERM assumes no responsibility or liability for errors in data obtained from such sources, regulatory agencies or any other external sources, nor from occurrences outside the scope of this project.

ERM is not engaged in environmental consulting and reporting for the purpose of advertising, sales promoting, or endorsement of any client interests, including raising investment capital, recommending investment decisions, or other publicity or investment purposes.

ERM PREPARED THIS REPORT FOR THE SOLE AND EXCLUSIVE BENEFIT AND USE OF JHR. NOTWITHSTANDING DELIVERY OF THIS REPORT BY ERM OR JHR TO ANY THIRD PARTY, UNLESS OTHERWISE EXPRESSLY AGREED, ANY COPY OF THIS REPORT PROVIDED TO A THIRD PARTY IS PROVIDED FOR INFORMATIONAL PURPOSES ONLY, WITHOUT THE RIGHT TO RELY AND ERM DISCLAIMS ALL LIABILITY TO SUCH THIRD PARTY TO THE EXTENT PERMITTED BY LAW. ANY USE OF THIS REPORT BY A THIRD PARTY IS DEEMED TO CONSTITUTE ACCEPTANCE OF THIS LIMITATION.

9. REFERENCES

Australian Standards (2017), AS 1726:2017 - Geotechnical site investigations

National Environment Protection Council (1999), National Environment Protection (Assessment of Site Contamination) Measure (the ASC NEPM) (as amended 2013)

NSW EPA (2017), Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme (3rd edition)

NSW EPA (1997), NSW Protection of the Environment Operations (POEO) Act, 1997

Heritage NSW (2021), State Heritage Register Heritage Item: Bungendore Railway Station and yard group

NSW EPA (2021), List of NSW contaminated sites notified to the EPA

NSW EPA (2021), Contaminated Lands Records of Notice

Geoscience Australia (2021), National Waste Management Facilities Database

Geoscience Australia (2021), National Liquid Fuel Facilities

NSW EPA (2021), Licensed Activities under the POEO Act 1997

NSW Department of Industry Planning & Environment (DPIE) (2021), Environmental Planning Instrument Land Zoning

CSIRO (2017), Atlas of Australian Acid Sulfate Soils

NSW DPIE (2020) Soil Landscapes of Central and Eastern NSW Groundwater Dependent Ecosystems – BOM

NSW Department of Finance, Services, and Innovation (2019), Topographic Data

NSW DPIE (2014), Geological Units 1:250,000

NSW DPIE (2014), Geological Structures 1:250,000

NSW Government Spatial Services (2021), Tanks (Areas)

NSW DPIE (2021), Environmental Planning Instrument Local

NSW Office of Environment & Heritage (2021), NSW BioNet Species Sightings

Quenbeyan-Pelerang Regional Council (2021). *Planning and Zoning - Online Mapping,* retrieved 7 October 2021 from https://www.qprc.nsw.gov.au/Building-Development/Planning-Zoning/Online-Mapping.

APPENDIX A FIGURES

Site Locality

F1

Drawing No:	0608750s_PSIS_G001_R0.mxd	Preliminary Site Investigation Bungendore Station, Bungendore NSW
Date:	02/12/2021	Drawing Size: A4
Drawn By:	GC	Reviewed By: MC
Coordinate System: GDA 1994 MGA Zone 55		Client: John Holland Rail (JHR)

ERM


GIBRALTAR STREET
GOULBURN BOMBALA RAILWAY
MAJARA STREET
POWELL STREET
MALBON STREET
SS-STN-15
BSX37
BSX13
BSX36
SS-STN-14
BSX14
BSX12
BSX35
BSX11
BSX15
SS-STN-13
BSX34
SS-STN-12
BSX10
BSX33
BSX16
SS-STN-11
BSX09
BSX32
BSX17
BSX08
SS-STN-10
SS-STN-09
BSX31
BSX07
BSX18
BSX30
BSX19
SS-STN-08
SS-STN-07
BSX06
BSX20
BSX21
BSX29
SS-STN-06
BSX05
BSX22
BSX28
BSX04
SS-STN-05
SS-STN-04
BSX23
BSX03
SS-STN-03
BSX27
BSX24
BSX02
BSX25
SS-STN-02
BSX01
BSX26
SS-STN-01
Legend
Site Boundary
Cadastre (Lot)
Railway Line
Watercourses
Shallow Soil
Soil Sample (Ramboll, 2021)
Data Source:
NSW DFSI, DCDB/DTDB 2021
Nearmap Imagery July 2017
Sampling Locations
F2
Drawing No: 0608750s_PSIS_G002_R0.mxd
Date: 02/12/2021
Drawing Size: A3
Drawn By: GC
Reviewed By: MC
Coordinate System: GDA 1994 MGA Zone 55
0 10 20 30m
N
Preliminary Site Investigation
Bungendore Station, Bungendore NSW
Client: John Holland Rail (JHR)
This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.
ERM


GIBRALTAR STREET
GOULBURN BOMBALA RAILWAY
MAJARA STREET
POWELL STREET
MALBON STREET
SS-STN-15
SS-STN-14
SS-STN-13
SS-STN-12
SS-STN-11
SS-STN-10
SS-STN-09
SS-STN-08
SS-STN-07
SS-STN-06
SS-STN-05
SS-STN-04
SS-STN-03
SS-STN-02
SS-STN-01
Legend
Site Boundary
Cadastre (Lot)
Railway Line
Watercourses
Shallow Soil Sample
Lead Results:
Exceeds NEPM 2013 Table 1A(1) HILs Res A Soil
Exceeds NEPM 2013 Table 1A(1) HILs Rec C Soil
< All Screening Criteria
Analytes | Metals
Units | Lead
NEPM 2013 Table 1A(1) HILs Residential A Soil | mg/kg
NEPM 2013 Table 1A(1) HILs Recreational C Soil | 300
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil | 600
1500
Data Source:
NSW DFSI, DCDB/DTDB 2021
Nearmap Imagery July 2017
Soil Exceedances (Lead)
F3
Drawing No: 0608750s_PSIS_G003_R0.mxd
Date: 02/12/2021
Drawing Size: A3
Drawn By: GC
Reviewed By: MC
Coordinate System: GDA 1994 MGA Zone 55
0 10 20 30m
N
Preliminary Site Investigation
Bungendore Station, Bungendore NSW
Client: John Holland Rail (JHR)
This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.
ERM


GIBRALTAR STREET
MAJARA STREET
GOULBURN BOMBALA RAILWAY
POWELL STREET
MALBON STREET
SS-STN-15
BSX37
BSX13
BSX36
SS-STN-14
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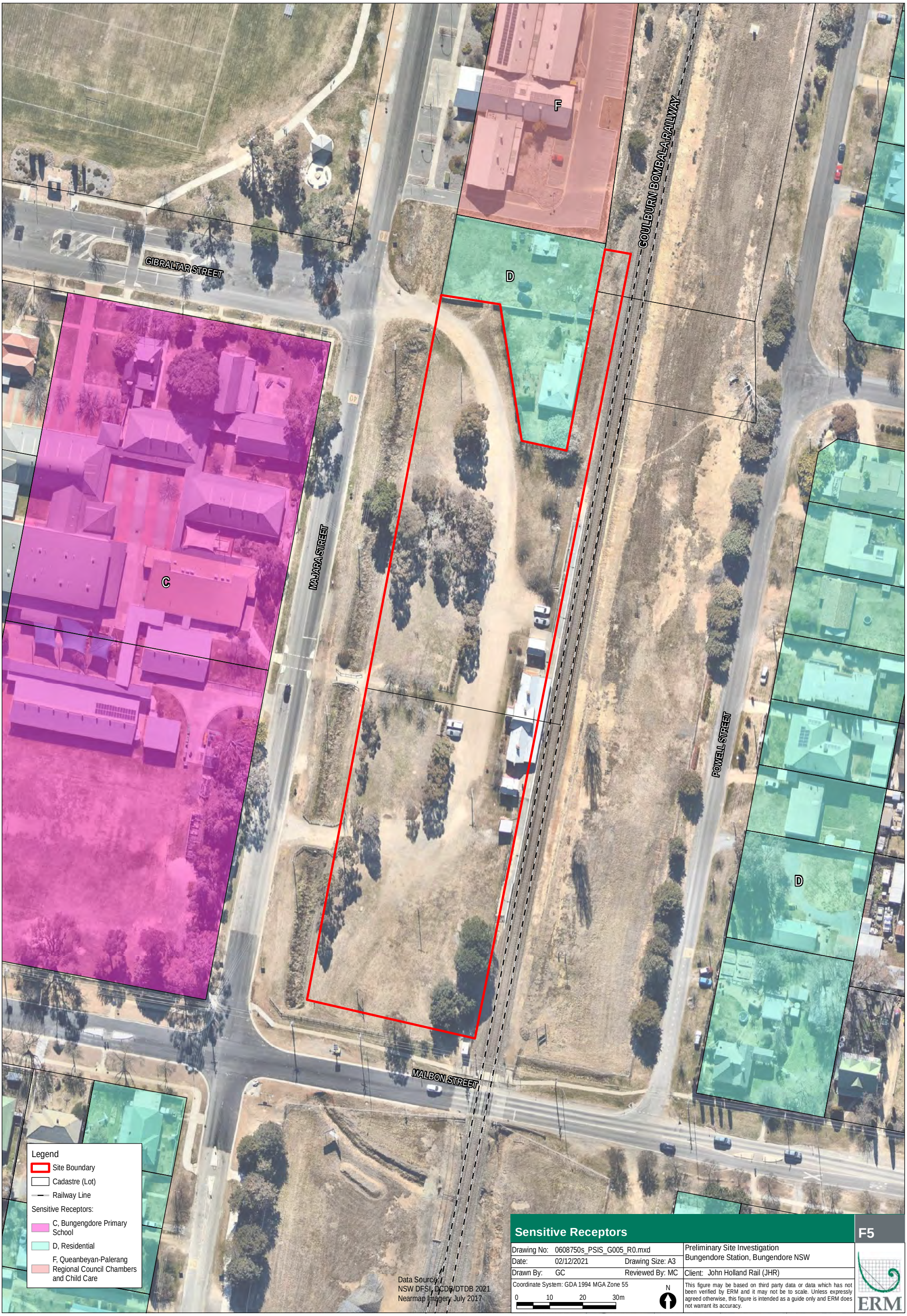
BSX05
SS-STN-06
BSX22
BSX28
BSX04
SS-STN-05
SS-STN-04
BSX23
BSX03
SS-STN-03
BSX27
BSX24
BSX02
BSX25
SS-STN-02
BSX01
BSX26
SS-STN-01
Notes:
Lead impact includes supplementary data obtained from "Bungendore Train Station, Environmental Site Assessment", Ramboll, October 2021.
Legend
Site Boundary
Railway Line
Watercourses
Shallow Soil Sample
Soil Sample (Ramboll, 2021)
Lead Results:
Exceeds NEPM 2013 Table 1A(1) HILs Res A Soil
Exceeds NEPM 2013 Table 1A(1) HILs Rec C Soil
< All Screening Criteria
Lead Impact:
<100 mg/kg
100 - 300 mg/kg
300 - 1500 mg/kg
1500 - 15000 mg/kg
Data Source:
NSW DFSI, DCDB/DTDB 2021
Nearmap Imagery July 2017
Lead Impact
F4
Drawing No: 0608750s_PSIS_G004_R0.mxd
Date: 02/12/2021
Drawing Size: A3
Drawn By: GC
Reviewed By: MC
Coordinate System: GDA 1994 MGA Zone 55
0 10 20 30m
N
Preliminary Site Investigation
Bungendore Station, Bungendore NSW
Client: John Holland Rail (JHR)
This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.
ERM



Sensitive Receptors

F5

Drawing No:	0608750s_PSIS_G005_R0.mxd		Preliminary Site Investigation Bungendore Station, Bungendore NSW
Date:	02/12/2021	Drawing Size: A3	
Drawn By:	GC	Reviewed By: MC	Client: John Holland Rail (JHR)

Coordinate System: GDA 1994 MGA Zone 55

0 10 20 30m

N

ERM

APPENDIX B DATA TABLES

Sampling Location	Duplicate/ Triplicate	Sample Type	Sampling Date	Sample Depth (m bgl)	Analysis
SS-STN-1	D01/T01-211007	Soil	7/Oct/21	0.1	Heavy Metals
SS-STN-2	-	Soil	7/Oct/21	0.1	Heavy Metals
SS-STN-3	-	Soil	7/Oct/21	0.1	Heavy Metals
SS-STN-4	-	Soil	7/Oct/21	0.1	Heavy Metals
SS-STN-5	-	Soil	7/Oct/21	0.1	Heavy Metals
SS-STN-6	-	Soil	7/Oct/21	0.1	Heavy Metals
SS-STN-7	-	Soil	7/Oct/21	0.1	Heavy Metals
SS-STN-8	-	Soil	7/Oct/21	0.1	Heavy Metals
SS-STN-9	-	Soil	7/Oct/21	0.1	Heavy Metals
SS-STN-10	-	Soil	7/Oct/21	0.1	Heavy Metals
SS-STN-11	-	Soil	7/Oct/21	0.1	Heavy Metals
SS-STN-12	-	Soil	7/Oct/21	0.1	Heavy Metals
SS-STN-13	-	Soil	7/Oct/21	0.1	Heavy Metals
SS-STN-14	-	Soil	7/Oct/21	0.1	Heavy Metals
SS-STN-15	-	Soil	7/Oct/21	0.1	Heavy Metals

Comments
Gravelly sandy silt fill, brown, underlain by natural yellow clayey sand with orange mottling. Minor organics.
Gravelly sandy silt fill, brown with orange. Minor organics, moist.
Silty sandy gravel fill, dark grey to brown with minor organics.
Silty sand, fill, light brown, with minor organics under grass.
Silt, fill, light brown, with minor organics under grass. Sample location adjacent to a silty windrow.
Gravelly sand with minor silt, fill, brown, with organics under grass, moist.
Sand with minor silt, fill, light brown, under grass, moist.
Natural light brown silt with sand, dry.
Gravelly silt fill, light brown, dry, compact.
Natural silt with gravels, grey/brown, dry, minor organics.
Natural sandy silt, dark brown, minor organics, moist, under grass.
Natural clayey silt, dark brown to 0.1m bgl. Clayey silt, orange, below 0.1m bgl. Bare patch.
Natural silt with clay and gravel, dark brown, minor organics, moist.
Silty clay fill, dark brown with yellow, minor organics, moist, under grass.
Sandy silt fill, brown to 0.03m bgl underlain by sandy gravel, light grey/blue, under grass.

Table 4. Soil Metals Analytical Results
Preliminary Site Investigation
Bungendore Station - 0608750-03

						Metals													
						Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium (III+VI)	Cobalt	Copper	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						5	10	1	50	1	2	2	5	5	5	0.1	2	5	5	5
NEPM (1999) EIL - Urban Residential & Open Space						*100*								*1100*						
NEPM (1999) EIL - Commercial/Industrial						**160**								**1800**						
NEPM 2013 Table 1A(1) HILs Res A Soil						100		60	4500	20		100	6000	300	3800	40	400	200		7400
NEPM 2013 Table 1A(1) HILs Rec C Soil						300		90	20000	90		300	17000	600	19000	80	1200	700		30000
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil						3000		500	300000	900		4000	240000	1500	60000	730	6000	10000		400000
Field_ID	**LocCode**	**Sampled_Date-Time**	**Lab_Report_Number**	**Purpose**	**Monitoring Zone**															
SS-STN-01	SS-STN-01	7/10/2021	ES2136206	Primary	Bungendore Station	19	60	<1	<50	1	16	3	70	978	146	0.2	5	<5	25	419
D01_211007	SS-STN-01	7/10/2021	ES2136205	Intralab Duplicate	Bungendore Station	12	40	<1	<50	<1	12	3	49	555	111	0.1	4	<5	22	335
T01_211007	SS-STN-01	7/10/2021	25/08/4178	Interlab Duplicate	Bungendore Station	17	67	<2	<10	1.2	32	11	78	770	240	0.2	12	-	81	650
SS-STN-02	SS-STN-02	7/10/2021	ES2136207	Primary	Bungendore Station	15	90	<1	<50	<1	28	6	58	680	267	0.1	11	<5	40	234
SS-STN-03	SS-STN-03	7/10/2021	ES2136208	Primary	Bungendore Station	<5	30	<1	<50	<1	6	<2	10	42	67	<0.1	3	<5	10	47
SS-STN-04	SS-STN-04	7/10/2021	ES2136209	Primary	Bungendore Station	6	60	<1	<50	<1	13	3	38	142	224	<0.1	5	<5	27	122
SS-STN-05	SS-STN-05	7/10/2021	ES2136210	Primary	Bungendore Station	<5	50	<1	<50	<1	15	2	10	42	134	<0.1	4	<5	20	50
SS-STN-06	SS-STN-06	7/10/2021	ES2136211	Primary	Bungendore Station	<5	30	<1	<50	<1	10	2	13	54	88	<0.1	5	<5	17	40
SS-STN-07	SS-STN-07	7/10/2021	ES2136212	Primary	Bungendore Station	<5	40	<1	<50	<1	7	2	6	27	164	<0.1	3	<5	11	28
SS-STN-08	SS-STN-08	7/10/2021	ES2136213	Primary	Bungendore Station	15	70	<1	<50	<1	25	5	25	35	185	<0.1	10	<5	30	55
SS-STN-09	SS-STN-09	7/10/2021	ES2136214	Primary	Bungendore Station	<5	100	<1	<50	<1	5	3	<5	12	79	<0.1	3	<5	12	14
SS-STN-10	SS-STN-10	7/10/2021	ES2136215	Primary	Bungendore Station	12	60	<1	<50	<1	19	4	41	183	290	<0.1	7	<5	33	220
SS-STN-11	SS-STN-11	7/10/2021	ES2136216	Primary	Bungendore Station	17	50	<1	<50	<1	29	2	35	282	189	<0.1	7	<5	26	237
SS-STN-12	SS-STN-12	7/10/2021	ES2136217	Primary	Bungendore Station	8	70	<1	<50	<1	21	5	14	35	676	<0.1	7	<5	26	64
SS-STN-13	SS-STN-13	7/10/2021	ES2136218	Primary	Bungendore Station	26	80	<1	<50	<1	16	4	35	515	243	0.1	5	<5	23	244
SS-STN-14	SS-STN-14	7/10/2021	ES2136219	Primary	Bungendore Station	8	120	<1	<50	<1	29	4	28	17	197	<0.1	12	<5	32	33
SS-STN-15	SS-STN-15	7/10/2021	ES2136220	Primary	Bungendore Station	<5	20	<1	<50	<1	23	9	12	14	235	<0.1	9	<5	46	32
Statistical Summary																				
Number of Results						17	17	17	17	17	17	17	17	17	17	17	17	16	17	17
Number of Detects						11	17	0	0	2	17	16	16	17	17	5	17	0	17	17
Minimum Concentration						<5	20	<1	<10	<1	5	<2	<5	12	67	<0.1	3	<5	10	14
Minimum Detect						6	20	ND	ND	1	5	2	6	12	67	0.1	3	ND	10	14
Maximum Concentration						26	120	<2	<50	1.2	32	11	78	978	676	0.2	12	<5	81	650
Maximum Detect						26	120	ND	ND	1.2	32	11	78	978	676	0.2	12	ND	81	650
Average Concentration						10	61	0.53	24	0.57	18	4.1	31	258	208	0.076	6.6	2.5	28	166
Median Concentration						8	60	0.5	25	0.5	16	3	28	54	189	0.05	5	2.5	26	64
Standard Deviation						7.3	26	0.12	4.9	0.2	8.7	2.6	23	316	138	0.05	3.1	0	17	175
Number of Guideline Exceedances						0	0	0	0	0	0	0	0	5	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)						0	0	0	0	0	0	0	0	5	0	0	0	0	0	0

APPENDIX C BACKGROUND INFORMATION

LOTSEARCH

LOTSEARCH ENVIRO PROFESSIONAL

Date: 11 Oct 2021 15:16:57

Reference: LS025190 EP

Address: Bungendore Railway Station, Bungendore, NSW 2621

Dataset Listing

Datasets contained within this report, detailing their source and data currency:

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	Dataset Buffer (m)	No. Features On-site	No. Features within 100m	No. Features within Buffer
Cadastre Boundaries	NSW Department of Finance, Services & Innovation	20/08/2021	20/08/2021	Quarterly	-	-	-	-
Topographic Data	NSW Department of Finance, Services & Innovation	25/06/2019	25/06/2019	As required	-	-	-	-
List of NSW contaminated sites notified to EPA	Environment Protection Authority	08/09/2021	08/09/2021	Monthly	1000m	0	0	1
Contaminated Land Records of Notice	Environment Protection Authority	08/10/2021	08/10/2021	Monthly	1000m	0	0	1
Former Gasworks	Environment Protection Authority	11/08/2021	11/10/2017	Quarterly	1000m	0	0	0
National Waste Management Facilities Database	Geoscience Australia	12/05/2021	07/03/2017	Annually	1000m	0	0	0
National Liquid Fuel Facilities	Geoscience Australia	15/02/2021	13/07/2012	Annually	1000m	0	0	3
EPA PFAS Investigation Program	Environment Protection Authority	27/09/2021	28/04/2021	Monthly	2000m	0	0	0
Defence PFAS Investigation & Management Program - Investigation Sites	Department of Defence	28/09/2021	28/09/2021	Monthly	2000m	0	0	0
Defence PFAS Investigation & Management Program - Management Sites	Department of Defence	28/09/2021	28/09/2021	Monthly	2000m	0	0	0
Airservices Australia National PFAS Management Program	Airservices Australia	08/10/2021	08/10/2021	Monthly	2000m	0	0	0
Defence 3 Year Regional Contamination Investigation Program	Department of Defence	19/08/2021	19/08/2021	Quarterly	2000m	0	0	0
EPA Other Sites with Contamination Issues	Environment Protection Authority	02/02/2021	13/12/2018	Annually	1000m	0	0	0
Licensed Activities under the POEO Act 1997	Environment Protection Authority	27/09/2021	27/09/2021	Monthly	1000m	1	1	1
Delicensed POEO Activities still regulated by the EPA	Environment Protection Authority	27/09/2021	27/09/2021	Monthly	1000m	0	0	0
Former POEO Licensed Activities now revoked or surrendered	Environment Protection Authority	27/09/2021	27/09/2021	Monthly	1000m	0	0	3
UBD Business Directories (Premise & Intersection Matches)	Hardie Grant			Not required	150m	0	0	0
UBD Business Directories (Road & Area Matches)	Hardie Grant			Not required	150m	-	112	114
UBD Business Directory Dry Cleaners & Motor Garages/Service Stations (Premise & Intersection Matches)	Hardie Grant			Not required	500m	0	0	1
UBD Business Directory Dry Cleaners & Motor Garages/Service Stations (Road & Area Matches)	Hardie Grant			Not required	500m	-	8	8
Points of Interest	NSW Department of Finance, Services & Innovation	19/08/2021	19/08/2021	Quarterly	1000m	0	5	36
Tanks (Areas)	NSW Department of Customer Service - Spatial Services	19/08/2021	19/08/2021	Quarterly	1000m	0	0	0
Tanks (Points)	NSW Department of Customer Service - Spatial Services	19/08/2021	19/08/2021	Quarterly	1000m	0	0	5
Major Easements	NSW Department of Finance, Services & Innovation	19/08/2021	19/08/2021	Quarterly	1000m	0	0	5
State Forest	Forestry Corporation of NSW	25/02/2021	14/02/2021	Annually	1000m	0	0	0
NSW National Parks and Wildlife Service Reserves	NSW Office of Environment & Heritage	22/01/2021	11/12/2020	Annually	1000m	0	0	0
Hydrogeology Map of Australia	Commonwealth of Australia (Geoscience Australia)	08/10/2014	17/03/2000	As required	1000m	1	1	1
Temporary Water Restriction (Botany Sands Groundwater Source) Order 2018	NSW Department of Planning, Industry and Environment	26/10/2020	21/02/2018	Annually	1000m	0	0	0
Groundwater Boreholes	NSW Dept. of Primary Industries - Water NSW; Commonwealth of Australia (Bureau of Meteorology)	24/07/2018	23/07/2018	Annually	2000m	0	0	68

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	Dataset Buffer (m)	No. Features On-site	No. Features within 100m	No. Features within Buffer
Geological Units 1:250,000	NSW Department of Planning, Industry and Environment	20/08/2014		Annually	1000m	1	2	4
Geological Structures 1:250,000	NSW Department of Planning, Industry and Environment	20/08/2014		Annually	1000m	0	0	0
Naturally Occurring Asbestos Potential	NSW Dept. of Industry, Resources & Energy	04/12/2015	24/09/2015	Unknown	1000m	0	0	0
Atlas of Australian Soils	Australian Bureau of Agriculture and Resource Economics and Sciences (ABARES)	19/05/2017	17/02/2011	As required	1000m	1	1	1
Soil Landscapes of Central and Eastern NSW	NSW Department of Planning, Industry and Environment	14/10/2020	27/07/2020	Annually	1000m	2	2	8
Environmental Planning Instrument Acid Sulfate Soils	NSW Department of Planning, Industry and Environment	19/08/2021	28/06/2021	Monthly	500m	0	-	-
Atlas of Australian Acid Sulfate Soils	CSIRO	19/01/2017	21/02/2013	As required	1000m	1	1	1
Dryland Salinity - National Assessment	National Land and Water Resources Audit	18/07/2014	12/05/2013	None planned	1000m	0	0	1
Mining Subsidence Districts	NSW Department of Customer Service - Subsidence Advisory NSW	19/08/2021	05/08/2021	Quarterly	1000m	0	0	0
Current Mining Titles	NSW Department of Industry	28/09/2021	28/09/2021	Monthly	1000m	0	0	0
Mining Title Applications	NSW Department of Industry	28/09/2021	28/09/2021	Monthly	1000m	0	0	0
Historic Mining Titles	NSW Department of Industry	28/09/2021	28/09/2021	Monthly	1000m	2	2	4
Environmental Planning Instrument SEPP State Significant Precincts	NSW Department of Planning, Industry and Environment	19/08/2021	07/12/2018	Monthly	1000m	0	0	0
Environmental Planning Instrument Land Zoning	NSW Department of Planning, Industry and Environment	19/08/2021	13/08/2021	Monthly	1000m	2	9	52
Commonwealth Heritage List	Australian Government Department of the Agriculture, Water and the Environment	18/05/2021	20/11/2019	Annually	1000m	0	0	0
National Heritage List	Australian Government Department of the Agriculture, Water and the Environment	18/05/2021	20/11/2019	Annually	1000m	0	0	0
State Heritage Register - Curtilages	NSW Department of Planning, Industry and Environment	19/08/2021	25/06/2021	Quarterly	1000m	1	1	1
Environmental Planning Instrument Local Heritage	NSW Department of Planning, Industry and Environment	19/08/2021	13/08/2021	Monthly	1000m	1	6	71
Bush Fire Prone Land	NSW Rural Fire Service	05/10/2021	23/08/2021	Weekly	1000m	0	0	4
Vegetation of Southern Forests	NSW Office of Environment & Heritage	09/12/2014	10/10/2011	Unknown	1000m	0	0	0
Ramsar Wetlands of Australia	Australian Government Department of Agriculture, Water and the Environment	24/02/2021	19/03/2020	Annually	1000m	0	0	0
Groundwater Dependent Ecosystems	Bureau of Meteorology	14/08/2017	15/05/2017	Annually	1000m	0	0	1
Inflow Dependent Ecosystems Likelihood	Bureau of Meteorology	14/08/2017	15/05/2017	Unknown	1000m	0	0	3
NSW BioNet Species Sightings	NSW Office of Environment & Heritage	11/10/2021	11/10/2021	Weekly	10000m	-	-	-

Site Diagram

Bungendore Railway Station, Bungendore, NSW 2621

Legend

- Site Boundary
- Internal Parcel Boundaries

Total Area: 15717m²

Total Perimeter: 754m

Scale: 0 25 50 Meters

Data Source Aerial Imagery:
© Aerometrex Pty Ltd

Disclaimers:

Measurements are approximate only and may have been simplified or smaller lengths removed for readability.

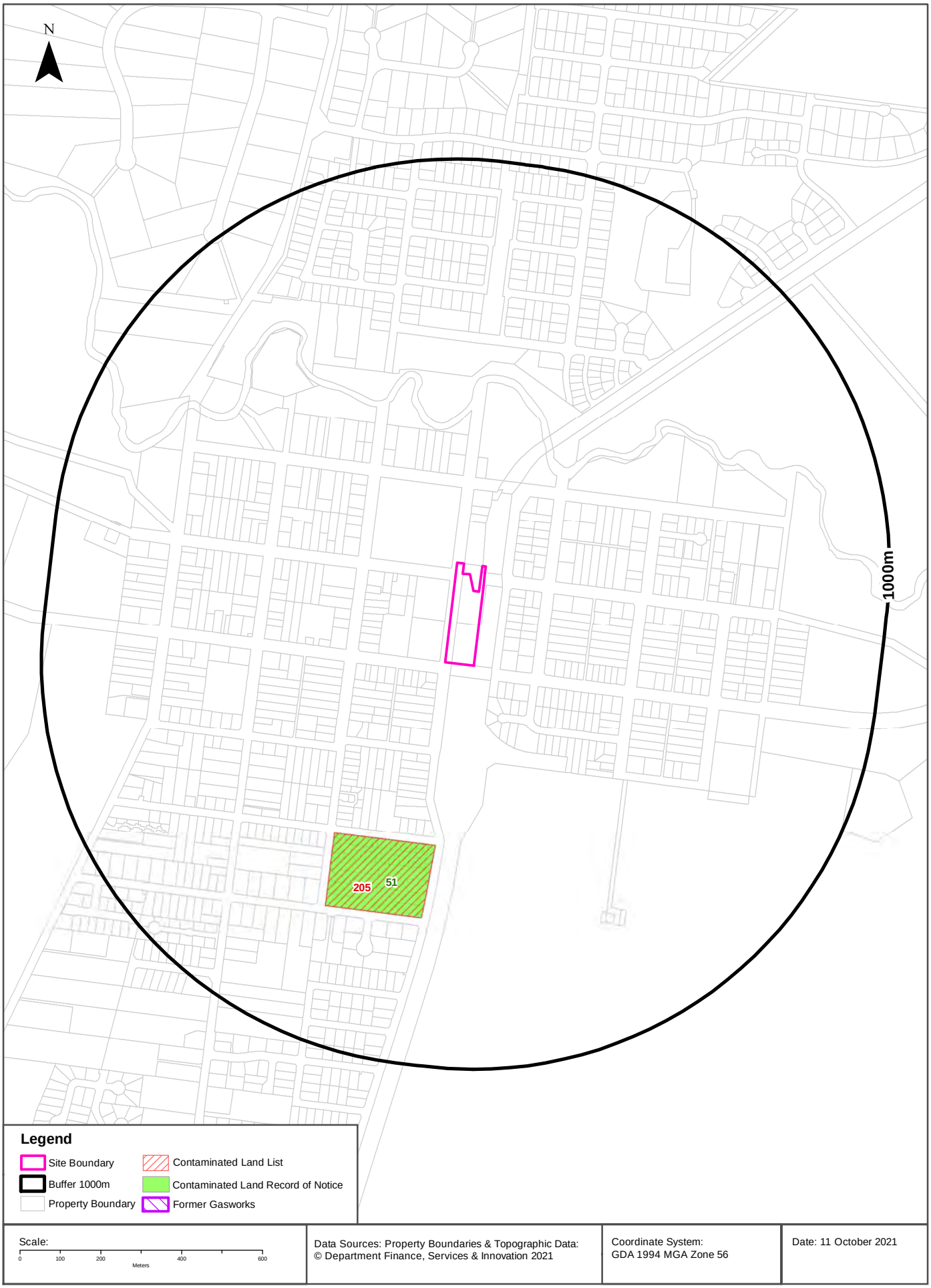
Parcels that make up a small percentage of the total site area have not been labelled for increased legibility.

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11 October 2021

Contaminated Land

Bungendore Railway Station, Bungendore, NSW 2621



Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2021

Coordinate System: GDA 1994 MGA Zone 56

Date: 11 October 2021

Contaminated Land

Bungendore Railway Station, Bungendore, NSW 2621

List of NSW contaminated sites notified to EPA

Records from the NSW EPA Contaminated Land list within the dataset buffer:

Map Id	Site	Address	Suburb	Activity	Management Class	Status	Location Confidence	Dist	Direction
205	Former Timber Treatment Plant	Corner King Street and Butmaroo Street	Bungendore	Other Industry	Contamination formerly regulated under the CLM Act	Current EPA List	Premise Match	454m	South

The values within the EPA site management class in the table above, are given more detailed explanations in the table below:

EPA site management class	Explanation
Contamination being managed via the planning process (EP&A Act)	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. The contamination of this site is managed by the consent authority under the Environmental Planning and Assessment Act 1979 (EP&A Act) planning approval process, with EPA involvement as necessary to ensure significant contamination is adequately addressed. The consent authority is typically a local council or the Department of Planning and Environment.
Contamination currently regulated under CLM Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the Contaminated Land Management Act 1997 (CLM Act). Management of the contamination is regulated by the EPA under the CLM Act. Regulatory notices are available on the EPA's Contaminated Land Public Record of Notices.
Contamination currently regulated under POEO Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. Management of the contamination is regulated under the Protection of the Environment Operations Act 1997 (POEO Act). The EPA's regulatory actions under the POEO Act are available on the POEO public register.
Contamination formerly regulated under the CLM Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation under the Contaminated Land Management Act 1997 (CLM Act). The contamination was addressed under the CLM Act.
Contamination formerly regulated under the POEO Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed under the Protection of the Environment Operations Act 1997 (POEO Act).
Contamination was addressed via the planning process (EP&A Act)	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed by the appropriate consent authority via the planning process under the Environmental Planning and Assessment Act 1979 (EP&A Act).
Ongoing maintenance required to manage residual contamination (CLM Act)	The EPA has determined that ongoing maintenance, under the Contaminated Land Management Act 1997 (CLM Act), is required to manage the residual contamination. Regulatory notices under the CLM Act are available on the EPA's Contaminated Land Public Record of Notices.
Regulation being finalised	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the Contaminated Land Management Act 1997. A regulatory approach is being finalised.
Regulation under the CLM Act not required	The EPA has completed an assessment of the contamination and decided that regulation under the Contaminated Land Management Act 1997 is not required.
Under assessment	The contamination is being assessed by the EPA to determine whether regulation is required. The EPA may require further information to complete the assessment. For example, the completion of management actions regulated under the planning process or Protection of the Environment Operations Act 1997. Alternatively, the EPA may require information via a notice issued under s77 of the Contaminated Land Management Act 1997 or issue a Preliminary Investigation Order.

NSW EPA Contaminated Land List Data Source: Environment Protection Authority

Contaminated Land

Bungendore Railway Station, Bungendore, NSW 2621

Contaminated Land: Records of Notice

Record of Notices within the dataset buffer:

Map Id	Name	Address	Suburb	Notices	Area No	Location Confidence	Distance	Direction
51	Former Timber Treatment Plant	Corner King Street and Butmaroo Street	Bungendore	1 former	990	Premise Match	454m	South

Contaminated Land Records of Notice Data Source: Environment Protection Authority

Terms of use and disclaimer for Contaminated Land: Record of Notices, please visit http://www.epa.nsw.gov.au/clm/clmdisclaimer.htm

Former Gasworks

Former Gasworks within the dataset buffer:

Map Id	Location	Council	Further Info	Location Confidence	Distance	Direction
N/A	No records in buffer					

Former Gasworks Data Source: Environment Protection Authority

Waste Management & Liquid Fuel Facilities

Bungendore Railway Station, Bungendore, NSW 2621

Waste Management & Liquid Fuel Facilities

Bungendore Railway Station, Bungendore, NSW 2621

National Waste Management Site Database

Sites on the National Waste Management Site Database within the dataset buffer:

Site Id	Owner	Name	Address	Suburb	Class	Landfill	Reprocess	Transfer	Comments	Loc Conf	Dist	Direction
N/A	No records in buffer											

National Liquid Fuel Facilities

National Liquid Fuel Facilties within the dataset buffer:

Map Id	Owner	Name	Address	Suburb	Class	Operational Status	Operator	Revision Date	Loc Conf	Dist	Direction
4202	Caltex	Caltex Bungendore	42-44 Malbon Street	Bungendore	Petrol Station	Operational		25/07/2011	Premise Match	248m	West
3483	Independent Fuel Supplies	BP Bungendore	1 Gibraltar Street	Bungendore	Petrol Station	Operational		25/07/2011	Premise Match	642m	West
4077	Independent Fuel Supplies	Independent Bungendore	2 Gibraltar Street	Bungendore	Petrol Station	Operational		25/07/2011	Premise Match	665m	West

PFAS Investigation & Management Programs

Bungendore Railway Station, Bungendore, NSW 2621

EPA PFAS Investigation Program

Sites that are part of the EPA PFAS investigation program, within the dataset buffer:

Map ID	Site	Address	Loc Conf	Dist	Dir
N/A	No records in buffer				

EPA PFAS Investigation Program: Environment Protection Authority

Defence PFAS Investigation Program

Sites being investigated by the Department of Defence for PFAS contamination within the dataset buffer:

Map ID	Base Name	Address	Loc Conf	Dist	Dir
N/A	No records in buffer				

Defence PFAS Investigation Program Data Custodian: Department of Defence, Australian Government

Defence PFAS Management Program

Sites being managed by the Department of Defence for PFAS contamination within the dataset buffer:

Map ID	Base Name	Address	Loc Conf	Dist	Dir
N/A	No records in buffer				

Defence PFAS Management Program Data Custodian: Department of Defence, Australian Government

Airservices Australia National PFAS Management Program

Sites being investigated or managed by Airservices Australia for PFAS contamination within the dataset buffer:

Map ID	Site Name	Impacts	Loc Conf	Dist	Dir
N/A	No records in buffer				

Airservices Australia National PFAS Management Program Data Custodian: Airservices Australia

Defence Sites

Bungendore Railway Station, Bungendore, NSW 2621

Defence 3 Year Regional Contamination Investigation Program

Sites which have been assessed as part of the Defence 3 Year Regional Contamination Investigation Program within the dataset buffer:

Property ID	Base Name	Address	Known Contamination	Loc Conf	Dist	Dir
N/A	No records in buffer					

Defence 3 Year Regional Contamination Investigation Program, Data Custodian: Department of Defence, Australian Government

EPA Other Sites with Contamination Issues

Bungendore Railway Station, Bungendore, NSW 2621

EPA Other Sites with Contamination Issues

This dataset contains other sites identified on the EPA website as having contamination issues. This dataset currently includes:

- James Hardie asbestos manufacturing and waste disposal sites
- Radiological investigation sites in Hunter's Hill
- Pasminco Lead Abatement Strategy Area

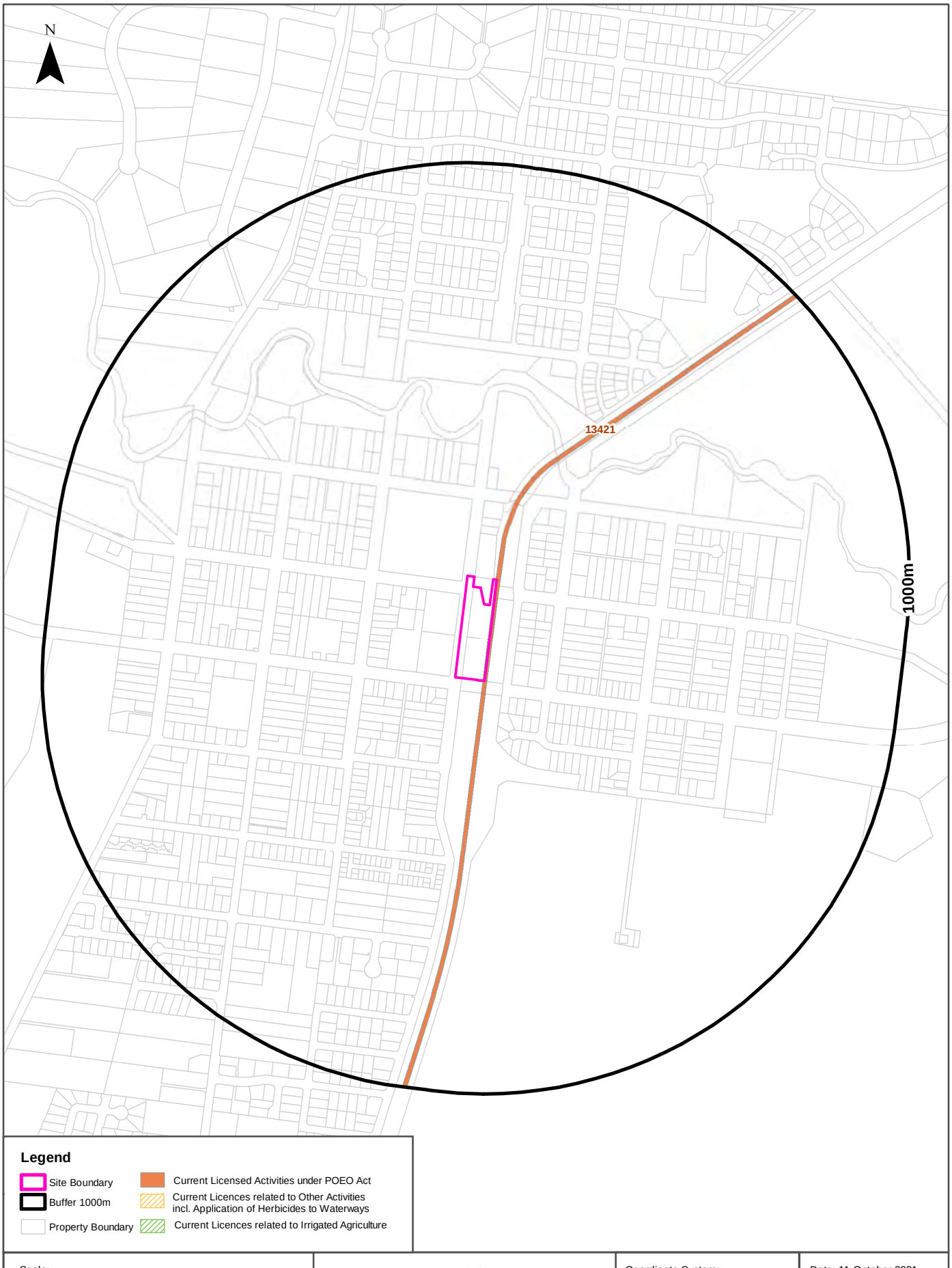
Sites within the dataset buffer:

Site Id	Site Name	Site Address	Dataset	Comments	Location Confidence	Distance	Direction
N/A	No records in buffer						

EPA Other Sites with Contamination Issues: Environment Protection Authority

Current EPA Licensed Activities

Bungendore Railway Station, Bungendore, NSW 2621



EPA Activities

Bungendore Railway Station, Bungendore, NSW 2621

Licensed Activities under the POEO Act 1997

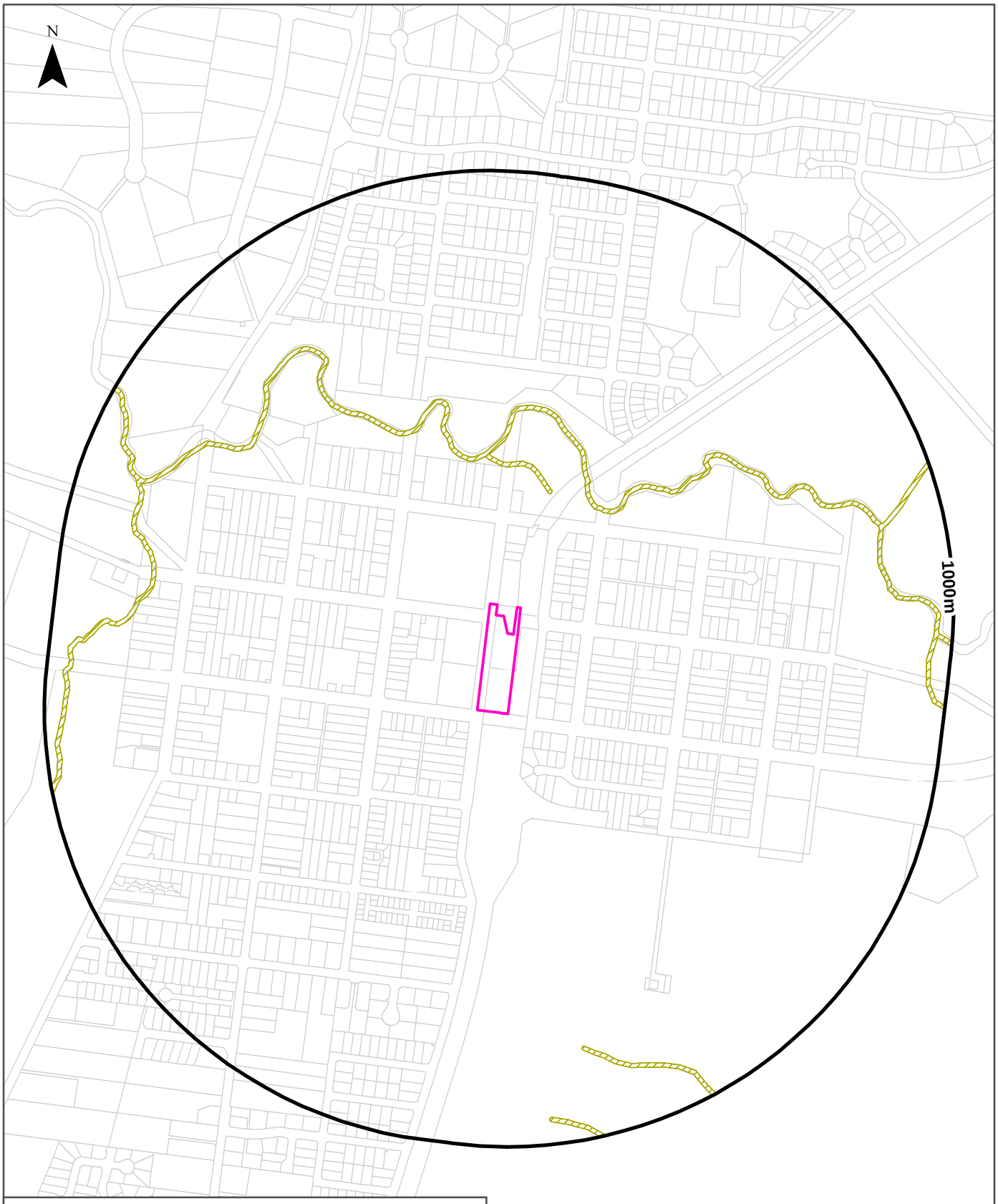
Licensed activities under the Protection of the Environment Operations Act 1997, within the dataset buffer:

EPL	Organisation	Name	Address	Suburb	Activity	Loc Conf	Distance	Direction
13421	JOHN HOLLAND RAIL PTY LTD		JOHN HOLLAND RAIL NETWORK, PARRAMATTA, NSW 2124		Railway systems activities	Network of Features	0m	On-site

POEO Licence Data Source: Environment Protection Authority

Delicensed & Former Licensed EPA Activities

Bungendore Railway Station, Bungendore, NSW 2621



EPA Activities

Bungendore Railway Station, Bungendore, NSW 2621

Delicensed Activities still regulated by the EPA

Delicensed activities still regulated by the EPA, within the dataset buffer:

Licence No	Organisation	Name	Address	Suburb	Activity	Loc Conf	Distance	Direction
N/A	No records in buffer							

Delicensed Activities Data Source: Environment Protection Authority

Former Licensed Activities under the POEO Act 1997, now revoked or surrendered

Former Licensed activities under the Protection of the Environment Operations Act 1997, now revoked or surrendered, within the dataset buffer:

Licence No	Organisation	Location	Status	Issued Date	Activity	Loc Conf	Distance	Direction
4653	LUHRMANN ENVIRONMENT MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW	Surrendered	06/09/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	272m	North
4838	Robert Orchard	Various Waterways throughout New South Wales - SYDNEY NSW 2000	Surrendered	07/09/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	272m	North
6630	SYDNEY WEED & PEST MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW - PROSPECT, NSW, 2148	Surrendered	09/11/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	272m	North

Former Licensed Activities Data Source: Environment Protection Authority

Historical Business Directories

Bungendore Railway Station, Bungendore, NSW 2621

Legend

- Site Boundary
- Buffer 150m
- Property Boundary
- Business directory records mapped to a specific premise
- Business directory records mapped to a road intersection
- Business directory records mapped to a road corridor
- Business directory records mapped to a general area

Scale: 0 30 60 90 120 Meters

Coordinate System: GDA 1994 MGA Zone 56

Date: 11 October 2021

Data Sources: Reproduced with permission of UBD and Hardie Grant Media Pty Ltd DD 01/08/2018

Historical Business Directories

Bungendore Railway Station, Bungendore, NSW 2621

Business Directory Records 1950-1991
Premise or Road Intersection Matches

Universal Business Directory records from years 1991, 1982, 1970, 1961 & 1950, mapped to a premise or road intersection within the dataset buffer:

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
N/A	No records in buffer						

Business Directory Records 1950-1991
Road or Area Matches

Universal Business Directory records from years 1991, 1982, 1970, 1961 & 1950, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
1	CARRIERS & CARTAGE CONTRACTORS	Cumberland, J. A., Majura St., Bungendore	192589	1961	Road Match	0m
2	NOT LISTED	Elder Smith Goldsborough Mort Co. Ltd., Gibraltar St	136674	1991	Road Match	13m
	NOT LISTED	Gardner's Motor Works., Gibraltar St	136677	1991	Road Match	13m
	NOT LISTED	Lake George Hotel Motel., Gibraltar St	136685	1991	Road Match	13m
	NOT LISTED	Police Station., Gibraltar St	136691	1991	Road Match	13m
	NOT LISTED	Post Office., Gibraltar St	136692	1991	Road Match	13m
	NOT LISTED	Ye Olde Wool Winkel (Trading For Aust-Ag. Industries), Gibraltar St	136704	1991	Road Match	13m
	NOT LISTED	Bungendore Bakery, Gibraltor St., Bungendore	146771	1982	Road Match	13m
	NOT LISTED	Bungendore Motel, Gibraltar St., Bungendore	146772	1982	Road Match	13m
	NOT LISTED	Elder Snnth Goldsborough Mort. Co. Ltd., Stk. 6 Stn. Agnt., Gibrahar St., Bungendore	146780	1982	Road Match	13m
	NOT LISTED	Gardner's Motor Works, Gibraltar St., Bungendore	146781	1982	Road Match	13m
	NOT LISTED	General Store, Gibraltar St., Bungendore	146782	1982	Road Match	13m
	NOT LISTED	Lake George Hotel Motel, Gibraltar St., Bungendore	146789	1982	Road Match	13m
	NOT LISTED	Lake George Nursery, Gibraltar St., Bungendore	146790	1982	Road Match	13m
	NOT LISTED	Police Station, Gibratlar St., Bungendore	146793	1982	Road Match	13m
	NOT LISTED	Post Office, Gibraltar St., Bungendore	146794	1982	Road Match	13m
	NOT LISTED	Royal Hotel, Gibraltar St., Bungendore	146795	1982	Road Match	13m
	BAKERS	Bungendore Bakery, Gibraltar St. Bungendore	583712	1970	Road Match	13m
	SCHOOLS & COLLEGES-PRIVATE & PUBLIC	Bungendore Public School, Gibraltar St. Bungendore	583733	1970	Road Match	13m
	AGRICULTURAL MACHINERY HIRERS &/OR D"LA,	Elder Smith Goldsbrough Mort Co. Ltd., Gibraltar Bungendore	583711	1970	Road Match	13m
	STOCK, STATION & REAL ESTATE AGENTS	Elder Smith Goldsbrough Mort Co. Ltd., Gibraltar St. Bungendore	583738	1970	Road Match	13m
	MOTOR GARAGES & ENGINEERS	Gallagher, R., Gibraltar St. Bungendore	583728	1970	Road Match	13m
	ELECTRICAL SUPPLIES & APPLIANCES-RETAILERS	Gardners Motor Works, Gibraltar St. Bungendore	583718	1970	Road Match	13m
	MOTOR GARAGES & ENGINEERS	Gardners Motor Works, Gibraltar St. Bungendore	583729	1970	Road Match	13m
	HOTELS-LICENSED	Lake George Hotel, Gibraltar St. Bungendore	583722	1970	Road Match	13m
	HOTELS	Lake George Motel, Gibraltar St. Bungendore	583726	1970	Road Match	13m
	GOVERNMENT DEPARTMENTS	Police Station, Gibraltar St. Bungendore	583719	1970	Road Match	13m
	GOVERNMENT DEPARTMENTS	Post Office, Gibraltar St. Bungendore	583720	1970	Road Match	13m
	HOTELS-LICENSED	Royal Hotel, Gibraltar St. Bungendore	583723	1970	Road Match	13m

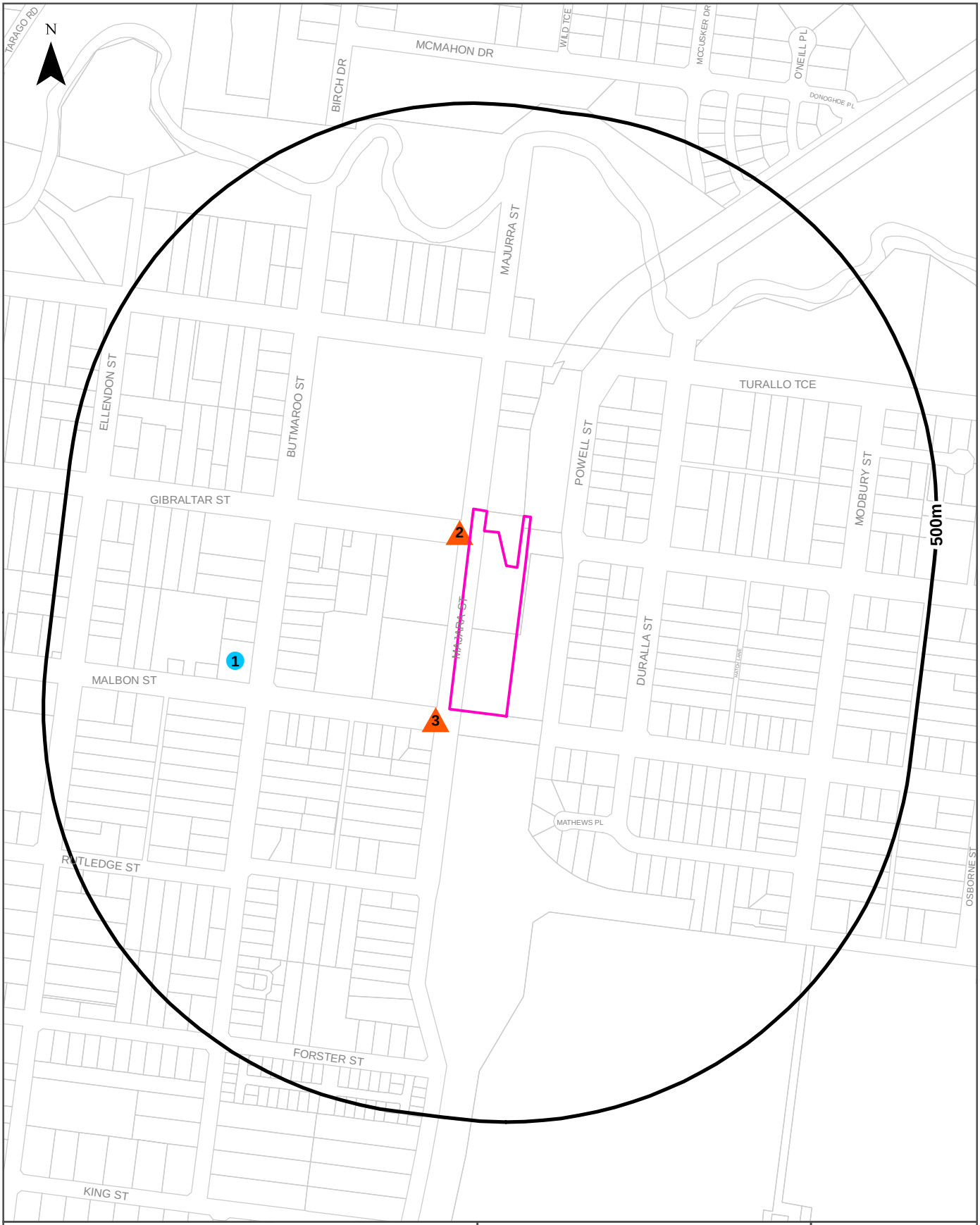
Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
2	GROCERS & SELF SERVICE STORES	Ryan, G. S., Gibraltar St. Bungendore	583721	1970	Road Match	13m
	NEWSAGENTS-GENERAL	Ryan, G. S., Gibraltar St. Bungendore	583731	1970	Road Match	13m
	PRODUCE MERCHANTS-GRAIN & SEED-RETAIL	Ryan, G. S., Gibraltar St. Bungendore	583732	1970	Road Match	13m
	BAKERS-BREAD	Bungendore Bakery, Gibraltar St., Bungendore	192583	1961	Road Match	13m
	SCHOOLS & COLLEGES-PRIVATE & PUBLIC	Bungendore Public School, Gibraltar St., Bungendore	192613	1961	Road Match	13m
	GROCERS & GENERAL STOREKEEPERS	Campbell, P. J., Gibraltar St., Bungendore	192599	1961	Road Match	13m
	FRUITERERS & GREENGROCERS	Coleman, L. C., Gibraltar St., Bungendore	192595	1961	Road Match	13m
	GROCERS & GENERAL STOREKEEPERS	Coleman, L. G,. Gibraltar St., Bungendore	192600	1961	Road Match	13m
	BANKS	Commonwealth Savings Bank of Australia, Gibraltar St., P.O., Bungendore	192585	1961	Road Match	13m
	MOTOR GARAGES & ENGINEERS	Gallagher, R,. Gibraltar St., Bungendore	192608	1961	Road Match	13m
	ELECTRICAL SUPPLIES & APPLIANCES-RETAILERS	Gardners Motor Works, Gibraltar St,. Bungendore	192593	1961	Road Match	13m
	MOTOR GARAGES & ENGINEERS	Gardners Motor Works, Gibraltar St., Bungendore	192609	1961	Road Match	13m
	AGRICULTURAL MACHINERY DEALERS	Goldsbrough Mort & Co. Ltd., Gibraltar St., Bungendore	192581	1961	Road Match	13m
	STOCK, STATION & REAL ESTATE AGENTS	Goldsbrough Mort St Co. Ltd., Gibraltar St., Bungendore	192618	1961	Road Match	13m
	HOTELS-LICENSED	Lake George Hotel, Gibraltar St., Bungendore	192605	1961	Road Match	13m
	GOVERNMENT DEPARTMENTS	Police Station. Gibraltar St., Bungendore	192597	1961	Road Match	13m
	GOVERNMENT DEPARTMENTS	Post Office, Gibraltar St,. Bungendore	192598	1961	Road Match	13m
	HOTELS-LICENSED	Royal Hotel, Gibraltar St., Bungendore	192606	1961	Road Match	13m
	GROCERS & GENERAL STOREKEEPERS	Ryan, W., Gibraltar St., Bungendore	192602	1961	Road Match	13m
	HARDWARE DEALERS &/OR IRONMONGERS	Ryan, W., Gibraltar St., Bungendore	192604	1961	Road Match	13m
	PRODUCE MERCHANTS-GRAIN & SEED-RETAIL	Ryan, W., Gibraltar St., Bungendore	192612	1961	Road Match	13m
	CARRIERS & CARTAGE CONTRACTORS	Taylor, K., Gibraltar St., Bungendore	192591	1961	Road Match	13m
	BAKERS &/OR PASTRYCOOKS	Bungendore Bakery, Gibraltar St., Bungendore	154829	1950	Road Match	13m
	SCHOOLS	Bungendore Public School, Gibraltar St., Bungendore	154873	1950	Road Match	13m
	INSURANCE AGENTS	Donelly, F. (Agent, N.Z. Insrnce.), Gibraltar St., Bungendore	154852	1950	Road Match	13m
	AGRICULTURAL MACHINERY DEALERS	Donelly, F. (Agent, Massey Harris), Gibraltar St., Bungendore	154828	1950	Road Match	13m
	AUCTIONEERS	Donelly, F. Gibraltar St., Bungendore	154826	1950	Road Match	13m
	REAL ESTATE AGENTS	Donelly, F., Gibraltar St., Bungendore	154872	1950	Road Match	13m
	STOCK & STATION AGENTS	Donnelly', J. F. Gibraltar St., Bungendore	154874	1950	Road Match	13m
	MOTOR OIL & SPIRIT MERCHANTS	Gardner Motor Works (Agents, Ampol), Gibraltar St., Bungendore	154863	1950	Road Match	13m
	RADIO DEALERS &/OR SERVICEMEN	Gardners Motor Works (Agents, Tasma and Breville, Bungendore Radio), Gibraltar St., Bungendore	154871	1950	Road Match	13m
	MOTOR ACCESSORIES DEALERS	Gardners Motor Works, Gibraltar St., Bungendore	154855	1950	Road Match	13m
	MOTOR GARAGES & ENGINEERS	Gardners Motor Works, Gibraltar St., Bungendore	154860	1950	Road Match	13m
	MOTOR PAINTERS & PANEL BEATERS	Gardners Motor Works, Gibraltar St., Bungendore	154864	1950	Road Match	13m

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
2	MOTOR SERVICE STATIONS	Gardners Motor Works, Gibraltar St., Bungendore	154866	1950	Road Match	13m
	MOTOR TOWING SERVICES	Gardners Motor Works, Gibraltar St., Bungendore	154868	1950	Road Match	13m
	WELDERS	Gardners Motor Works, Gibraltar St., Bungendore	154876	1950	Road Match	13m
	HOTELS	Lake George Hotel (James Butler), Gibraltar St., Bungendore	154850	1950	Road Match	13m
	FRUITERERS & GREENGROCERS	Lee, M. V., Gibraltar St., Bungendore	154839	1950	Road Match	13m
	BUTCHERS-RETAIL	Lee, T. M., Gibraltar St., Bungendore	154833	1950	Road Match	13m
	BUTCHERS-RETAIL	Lytham, C. J., Gibraltar St., Bungendore	154834	1950	Road Match	13m
	GOVERNMENT DEPARTMENTS	Pest Office, Gibraltar St., Bungendore	154843	1950	Road Match	13m
	GOVERNMENT DEPARTMENTS	Police Station, Gibraltar St., Bungendore	154842	1950	Road Match	13m
	FRUITERERS & GREENGROCERS	Raufell, J., Gibraltar St., Bungendore	154840	1950	Road Match	13m
	MERCERS & MEN'S OUTFITTERS	Ryan, W. Gibraltar St., Bungendore	154854	1950	Road Match	13m
	GROCERS & GENERAL STOREKEEPERS	Ryan, W., Gibraltar St., Bungendore	154845	1950	Road Match	13m
	HARDWARE' DEALERS & IRONMONGERS	Ryan, W., Gibraltar St., Bungendore	154848	1950	Road Match	13m
	PRODUCE MERCHANTS-RETAIL	Ryan, W., Gibraltar St., Bungendore	154870	1950	Road Match	13m
	TOY DEALERS-RETAIL	Ryan, W., Gibraltar St., Bungendore	154875	1950	Road Match	13m
3	NOT LISTED	Bundendore Motors (Ampol Service Station), Malbon St	136661	1991	Road Match	15m
	NOT LISTED	Bungendore Books Bungendore Village Sq., Malbon St	136662	1991	Road Match	15m
	NOT LISTED	Bungendore Bushrange Souvenier Shop Bungendore Village Sq., Malbon St	136663	1991	Road Match	15m
	NOT LISTED	Bungendore Village Pantry The Bungendore Village Sq., Malbon St	136667	1991	Road Match	15m
	NOT LISTED	Cafe Mezzes Bungendore Village Sq., Malbon St	136669	1991	Road Match	15m
	NOT LISTED	Feehely Barrow Bungendore Village Sq., Malbon St	136675	1991	Road Match	15m
	NOT LISTED	Gaelians Corner Ice-Cream Parlour Bungendore Village Sq., Malbon St	136676	1991	Road Match	15m
	NOT LISTED	Harrison G. L., Malbon St	136680	1991	Road Match	15m
	NOT LISTED	Hopperdon R. J., Malbon St	136682	1991	Road Match	15m
	NOT LISTED	Jacky Jacky Antiques Bungendore Village Sq., Malbon St	136683	1991	Road Match	15m
	NOT LISTED	Tea Cosy Cottage Bungendore Village Sq., Malbon St	136699	1991	Road Match	15m
	NOT LISTED	Toucan Pottery Bungendore Village Sq., Malbon St	136702	1991	Road Match	15m
	NOT LISTED	Ampol Service Station, Malbon St., Bungendore	146770	1982	Road Match	15m
	NOT LISTED	Harrison, G. L., Livestk.CarrierMalbon St., Bungendore	146783	1982	Road Match	15m
	NOT LISTED	Hopperdon, R. J., Bldr., Malbon St., Bungendore	146786	1982	Road Match	15m
	TIMBER MERCHANTS &/OR SAWMILLERS	Daniel, R., Malbon St. Bungendore	583740	1970	Road Match	15m
	BUILDERS &/OR BUILDING CONTRACTORS	Hopperdon, R. J., Malbon St. Bungendore	583714	1970	Road Match	15m
	BUTCHERS-RETAIL	Shumack, B. B., Malbon St. Bungendore	583715	1970	Road Match	15m
	BUTCHERS-RETAIL	Brown, V. R. & M., Malbon St., Bungendore	192588	1961	Road Match	15m

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
3	CARRIERS & CARTAGE CONTRACTORS	Daniel, R., Malbon St., Bungendore	192590	1961	Road Match	15m
	BUILDERS & CONTRACTORS	Hopperdon, R. J., Malbon St., Bungendore	192586	1961	Road Match	15m
	DRAPERS-RETAIL	Ryan, G, S., Malbon St., Bungendore	192592	1961	Road Match	15m
	GROCERS & GENERAL STOREKEEPERS	Ryan, G. S., Malbon St., Bungendore	192601	1961	Road Match	15m
	HARDWARE DEALERS &/OR IRONMONGERS	Ryan, G. S., Malbon St., Bungendore	192603	1961	Road Match	15m
	MERCERS-MEN'S & BOYS' OUTFITTERS	Ryan, G. S., Malbon St., Bungendore	192607	1961	Road Match	15m
	NEWSAGENTS	Ryan, G. S., Malbon St., Bungendore	192610	1961	Road Match	15m
	SHEARING CONTRACTORS	Sills, L. H., Malbon St., Bungendore	192617	1961	Road Match	15m
	TAXIS & HIRE CARS .	Thoms, W.,Malbon St, Bungendore	192619	1961	Road Match	15m
	HALLS	Gallagher M. M., Malbon St., Bungendore	154847	1950	Road Match	15m
	CARRIERS & CARTAGE CONTRACTORS	Kennedy, R. W., Malbon St., Bungendore	154837	1950	Road Match	15m
	MOTOR ACCESSORIES DEALERS	Raymond, A. and Son, Malbon St., Bungendore	154856	1950	Road Match	15m
	MOTOR PAINTERS & PANEL BEATERS	Raymond, A. and Son, Malbon St., Bungendore	154865	1950	Road Match	15m
	MOTOR SERVICE STATIONS	Raymond, A. and Son, Malbon St., Bungendore	154867	1950	Road Match	15m
	MOTOR GARAGES & ENGINEERS	Raymond, A. and Son,Malbon St., Bungendore	154861	1950	Road Match	15m
4	NOT LISTED	Sillis P. H., 12 Duralla St	136696	1991	Road Match	144m
	NOT LISTED	Silks, P. H., Livestk.Carrier, 12 Duralta St., Bungendore	146797	1982	Road Match	144m

Dry Cleaners, Motor Garages & Service Stations

Bungendore Railway Station, Bungendore, NSW 2621



Legend

- Site Boundary
- Buffer 500m
- Property Boundary
- Business directory records mapped to a specific premise
- Business directory records mapped to a road intersection
- Business directory records mapped to a road corridor
- Business directory records mapped to a general area

Scale: 0 90 180 270 360 Meters

Coordinate System: GDA 1994 MGA Zone 56

Date: 11 October 2021

Data Sources: Reproduced with permission of UBD and Hardie Grant Media Pty Ltd DD 01/08/2018

Historical Business Directories

Bungendore Railway Station, Bungendore, NSW 2621

Dry Cleaners, Motor Garages & Service Stations Premise or Road Intersection Matches

Dry Cleaners, Motor Garages & Service Stations from UBD Business Directories, mapped to a premise or road intersection, within the dataset buffer.

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
1	MOTOR GARAGES & ENGINEERS	Bungendore Motors, 42 Malbon St. Bungendore	583727	1970	Premise Match	248m	West

Dry Cleaners, Motor Garages & Service Stations Road or Area Matches

Dry Cleaners, Motor Garages & Service Stations from UBD Business Directories, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published.

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
2	MOTOR GARAGES & ENGINEERS	Gallagher, R., Gibraltar St. Bungendore	583728	1970	Road Match	13m
	MOTOR GARAGES & ENGINEERS	Gardners Motor Works, Gibraltar St. Bungendore	583729	1970	Road Match	13m
	MOTOR GARAGES & ENGINEERS	Gallagher, R,. Gibraltar St., Bungendore	192608	1961	Road Match	13m
	MOTOR GARAGES & ENGINEERS	Gardners Motor Works, Gibraltar St., Bungendore	192609	1961	Road Match	13m
	MOTOR GARAGES & ENGINEERS	Gardners Motor Works, Gibraltar St., Bungendore	154860	1950	Road Match	13m
	MOTOR SERVICE STATIONS	Gardners Motor Works, Gibraltar St., Bungendore	154866	1950	Road Match	13m
3	MOTOR SERVICE STATIONS	Raymond, A. and Son, Malbon St., Bungendore	154867	1950	Road Match	15m
	MOTOR GARAGES & ENGINEERS	Raymond, A. and Son,Malbon St., Bungendore	154861	1950	Road Match	15m

Aerial Imagery 2021

Bungendore Railway Station, Bungendore, NSW 2621

Scale:	Data Source Aerial Imagery:	Coordinate System:	Date: 11 October 2021
0 25 50 75 100 Meters	© Aerometrex Pty Ltd	GDA 1994 MGA Zone 56	

Aerial Imagery 2015

Bungendore Railway Station, Bungendore, NSW 2621

Scale: 0 25 50 75 100 Meters

Data Source Aerial Imagery: © 2021 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.

Coordinate System: GDA 1994 MGA Zone 56

Date: 08 October 2021

Aerial Imagery 2009

Bungendore Railway Station, Bungendore, NSW 2621

Scale:
0 25 50 75 100
Meters

Data Source Aerial Imagery: © 2021 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.

Coordinate System:
GDA 1994 MGA Zone 56

Date: 08 October 2021

Aerial Imagery 2002

Bungendore Railway Station, Bungendore, NSW 2621

Scale:	Data Source Aerial Imagery: © 2021 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.	Coordinate System: GDA 1994 MGA Zone 56	Date: 08 October 2021

0 25 50 75 100 Meters

Aerial Imagery 1997

Bungendore Railway Station, Bungendore, NSW 2621

Aerial Imagery 1992

Bungendore Railway Station, Bungendore, NSW 2621

Aerial Imagery 1985

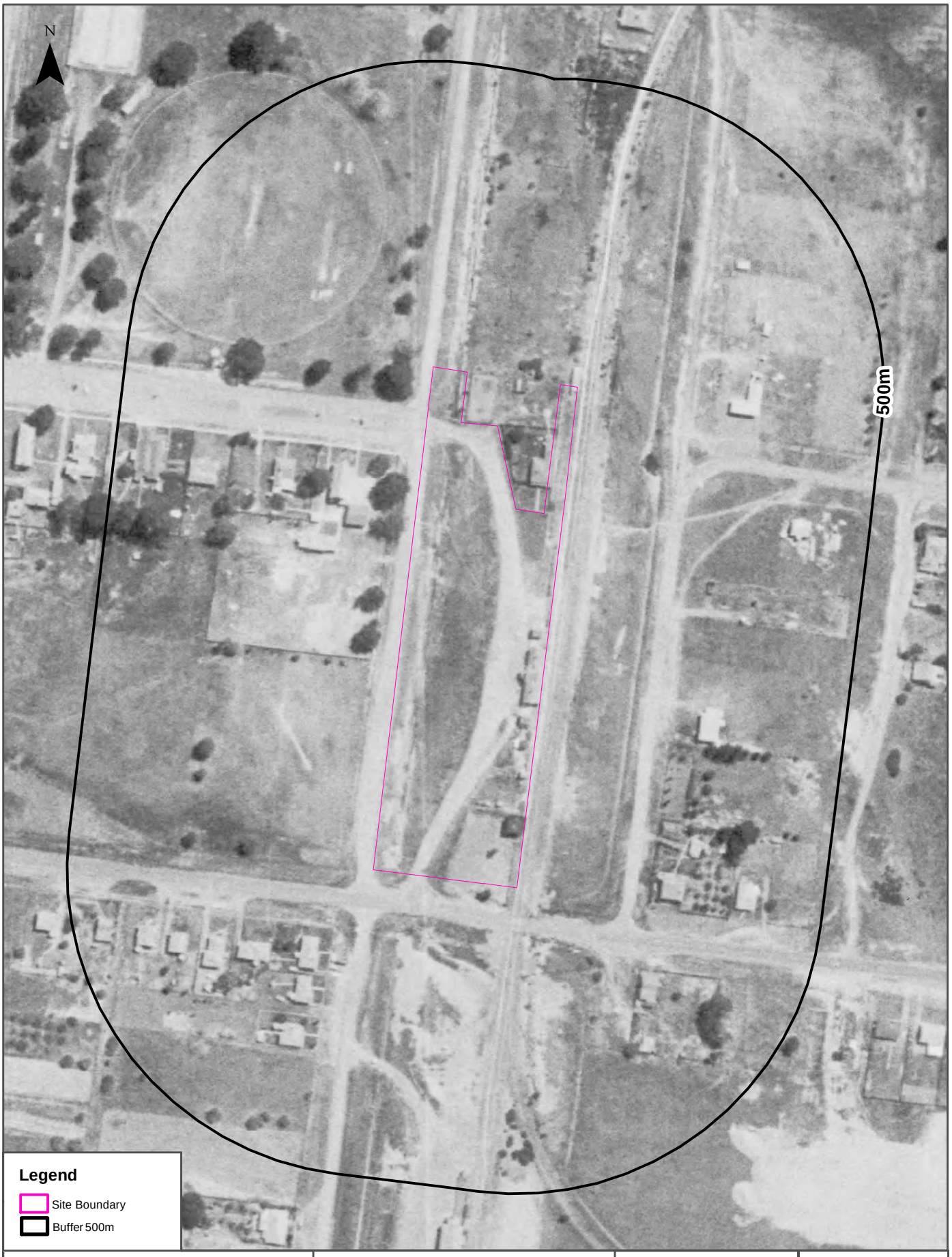
Bungendore Railway Station, Bungendore, NSW 2621

Aerial Imagery 1976

Bungendore Railway Station, Bungendore, NSW 2621

Aerial Imagery 1968

Bungendore Railway Station, Bungendore, NSW 2621



Aerial Imagery 1961

Bungendore Railway Station, Bungendore, NSW 2621

Aerial Imagery 1959

Bungendore Railway Station, Bungendore, NSW 2621

Aerial Imagery 1944

Bungendore Railway Station, Bungendore, NSW 2621

Topographic Map 2015

Bungendore Railway Station, Bungendore, NSW 2621

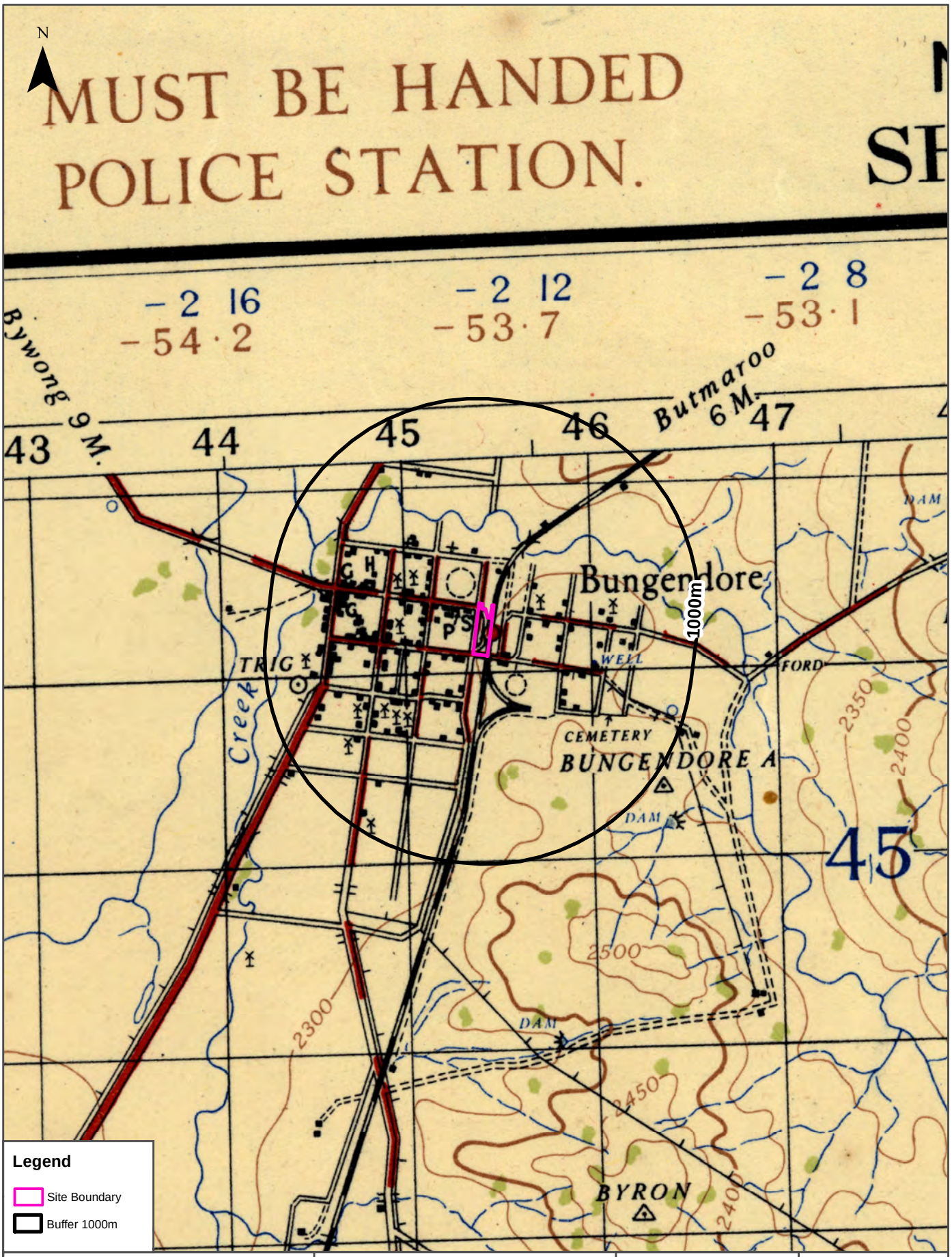
Historical Map 1987

Bungendore Railway Station, Bungendore, NSW 2621

Scale: 0 200 400 800 1,200 Metres	Data Sources: NATMAP 1:100,000 Topographic Maps Geoscience Australia	Coordinate System: GDA 1994 MGA Zone 56	Date: 07 October 2021

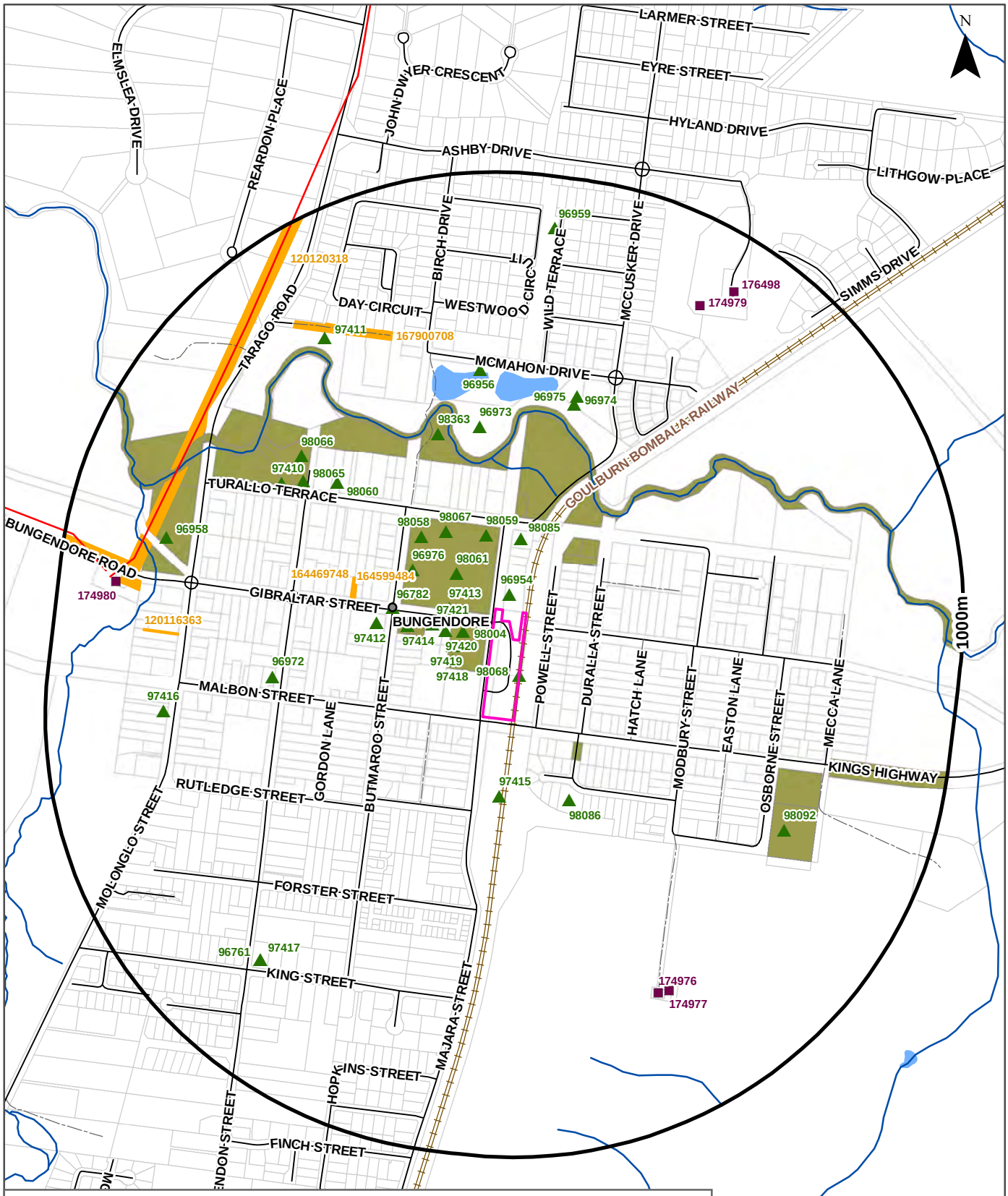
Historical Map c.1942

Bungendore Railway Station, Bungendore, NSW 2621



Topographic Features

Bungendore Railway Station, Bungendore, NSW 2621



Site Boundary	Easement	Watercourse	Heavy Rail
Buffer 1000m	NPWS Reserve	Pipeline	Light Rail
Property Boundary	State Forest	Major Road	Underground Rail
Place Name	Tank Area	Road	Runway
Point of Interest	Water Area	Pathway/Track/Lane	Major Electricity Transmission Line
Tank Point	Crown Land (data supplied 2014-15)		

Scale: 0 100 200 400 600 Meters	Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2021	Coordinate System: GDA 1994 MGA Zone 56	Date: 11 October 2021

Topographic Features

Bungendore Railway Station, Bungendore, NSW 2621

Points of Interest

What Points of Interest exist within the dataset buffer?

Map Id	Feature Type	Label	Distance	Direction
98068	Railway Station	BUNGENDORE RAILWAY STATION	0m	East
96954	Local Government Chambers	PALERANG COUNCIL	39m	North
98004	Primary School	BUNGENDORE PUBLIC SCHOOL	67m	North West
97418	Community Facility	BUNGENDORE MULTIPURPOSE HALL	84m	West
97419	Library	BUNGENDORE COMMUNITY LIBRARY	87m	North West
97413	Monument	BUNGENDORE AND DISTRICT WAR MEMORIAL	106m	North West
97420	Community Facility	BUNGENDORE SCHOOL OF ARTS	108m	North West
98061	Sports Field	MICK SHERD OVAL	120m	North West
97421	Post Office	BUNGENDORE POST OFFICE	139m	North West
98085	Community Facility	BUNGENDORE COMMUNITY CENTRE	167m	North
98059	Swimming Pool Facility	BUNGENDORE DISTRICT COMMUNITY SWIMMING POOL	170m	North
97415	Museum	BAYONETS AND BANDAGES WAR MUSEUM	176m	South
97414	Police Station	BUNGENDORE POLICE STATION	196m	North West
98067	Park	BUNGENDORE PARK	210m	North
96976	Picnic Area	PLAYGROUND	210m	North West
98086	Park	VAL GARDNER PARK	222m	South East
96782	Town	BUNGENDORE	234m	North West
98058	Sports Court	TENNIS COURTS	238m	North West
97412	Place Of Worship	ST PHILLIPS ANGLICAN CHURCH	267m	West
96973	Park	CRICKET	419m	North
98363	Park	BUNGENDORE COMMON	421m	North
98060	Place Of Worship	ST MARYS CATHOLIC CHURCH	464m	North West
96972	Art Gallery	BUNGENDORE WOOD WORKS GALLERY	489m	West
96974	Sports Court	BASKETBALL	491m	North
96975	Sports Court	BUNGENDORE SKATEPARK	510m	North
98065	Community Facility	BUNGENDORE BOWLING CLUB	528m	North West
96956	Picnic Area	Picnic Area	550m	North
98066	Sports Field	BOWLING GREEN	565m	North West
97410	Community Facility	YARRALUMLA SHIRE COUNCIL POUND	567m	North West
98092	Cemetery	BUNGENDORE CEMETERY	668m	South East
97416	Community Facility	BUNGENDORE WAR MEMORIAL HALL	730m	West

Map Id	Feature Type	Label	Distance	Direction
97411	Homestead	ELMSLEA HOMESTEAD	733m	North West
97417	SES Facility	BUNGENDORE SES	753m	South West
96761	Firestation - Bush	BUNGENDORE RFB	753m	South West
96958	Park	FROG HOLLOW RESERVE	770m	West
96959	Park	PLAYGROUND	883m	North

Topographic Features

Bungendore Railway Station, Bungendore, NSW 2621

Tanks (Areas)

What are the Tank Areas located within the dataset buffer?
Note. The large majority of tank features provided by LPI are derived from aerial imagery & are therefore primarily above ground tanks.

Map Id	Tank Type	Status	Name	Feature Currency	Distance	Direction
N/A	No records in buffer					

Tanks (Points)

What are the Tank Points located within the dataset buffer?
Note. The large majority of tank features provided by LPI are derived from aerial imagery & are therefore primarily above ground tanks.

Map Id	Tank Type	Status	Name	Feature Currency	Distance	Direction
174976	Water	Operational		23/09/2002	707m	South East
174977	Water	Operational		23/09/2002	714m	South East
174979	Water	Operational		23/09/2002	808m	North East
174980	Water	Operational		23/09/2002	869m	West
176498	Water	Operational		21/10/2010	875m	North East

Major Easements

What Major Easements exist within the dataset buffer?
Note. Easements provided by LPI are not at the detail of local governments. They are limited to major easements such as Right of Carriageway, Electrical Lines (66kVa etc.), Easement to drain water & Significant subterranean pipelines (gas, water etc.).

Map Id	Easement Class	Easement Type	Easement Width	Distance	Direction
164599484	Primary	Right of way	5m	322m	North West
164469748	Primary	Right of way	5m	327m	North West
167900708	Primary	Right of way	15.11m & 18.14m	660m	North West
120116363	Primary	Undefined		713m	West
120120318	Primary	Undefined		776m	North West

Topographic Features

Bungendore Railway Station, Bungendore, NSW 2621

State Forest

What State Forest exist within the dataset buffer?

State Forest Number	State Forest Name	Distance	Direction
N/A	No records in buffer		

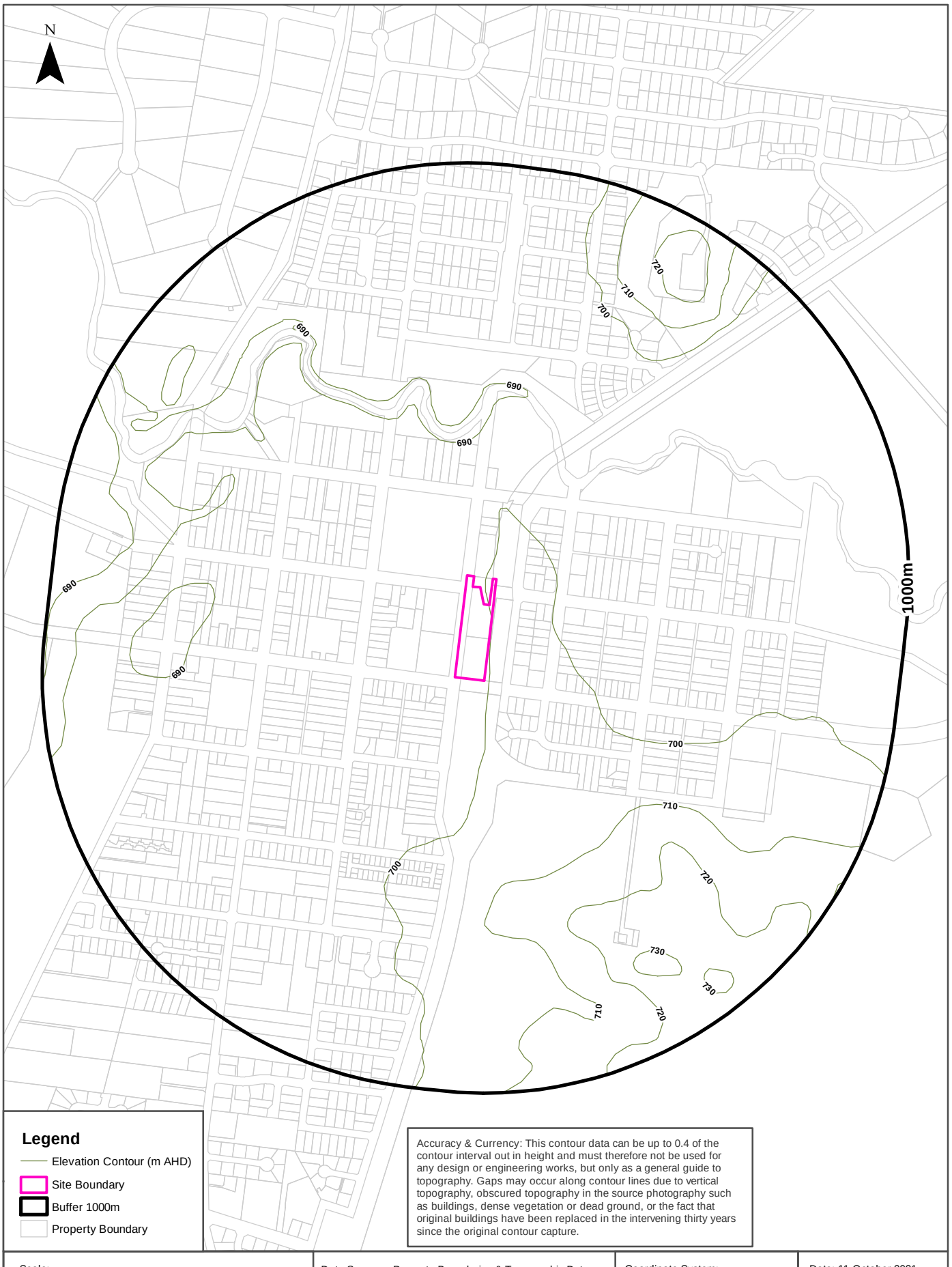
National Parks and Wildlife Service Reserves

What NPWS Reserves exist within the dataset buffer?

Reserve Number	Reserve Type	Reserve Name	Gazetted Date	Distance	Direction
N/A	No records in buffer				

Elevation Contours (m AHD)

Bungendore Railway Station, Bungendore, NSW 2621



Accuracy & Currency: This contour data can be up to 0.4 of the contour interval out in height and must therefore not be used for any design or engineering works, but only as a general guide to topography. Gaps may occur along contour lines due to vertical topography, obscured topography in the source photography such as buildings, dense vegetation or dead ground, or the fact that original buildings have been replaced in the intervening thirty years since the original contour capture.

Scale: 0 100 200 400 Meters	Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2021	Coordinate System: GDA 1994 MGA Zone 56	Date: 11 October 2021

Hydrogeology & Groundwater

Bungendore Railway Station, Bungendore, NSW 2621

Hydrogeology

Description of aquifers within the dataset buffer:

Description	Distance	Direction
Porous, extensive highly productive aquifers	0m	On-site

Hydrogeology Map of Australia : Commonwealth of Australia (Geoscience Australia)

Temporary Water Restriction (Botany Sands Groundwater Source) Order 2018

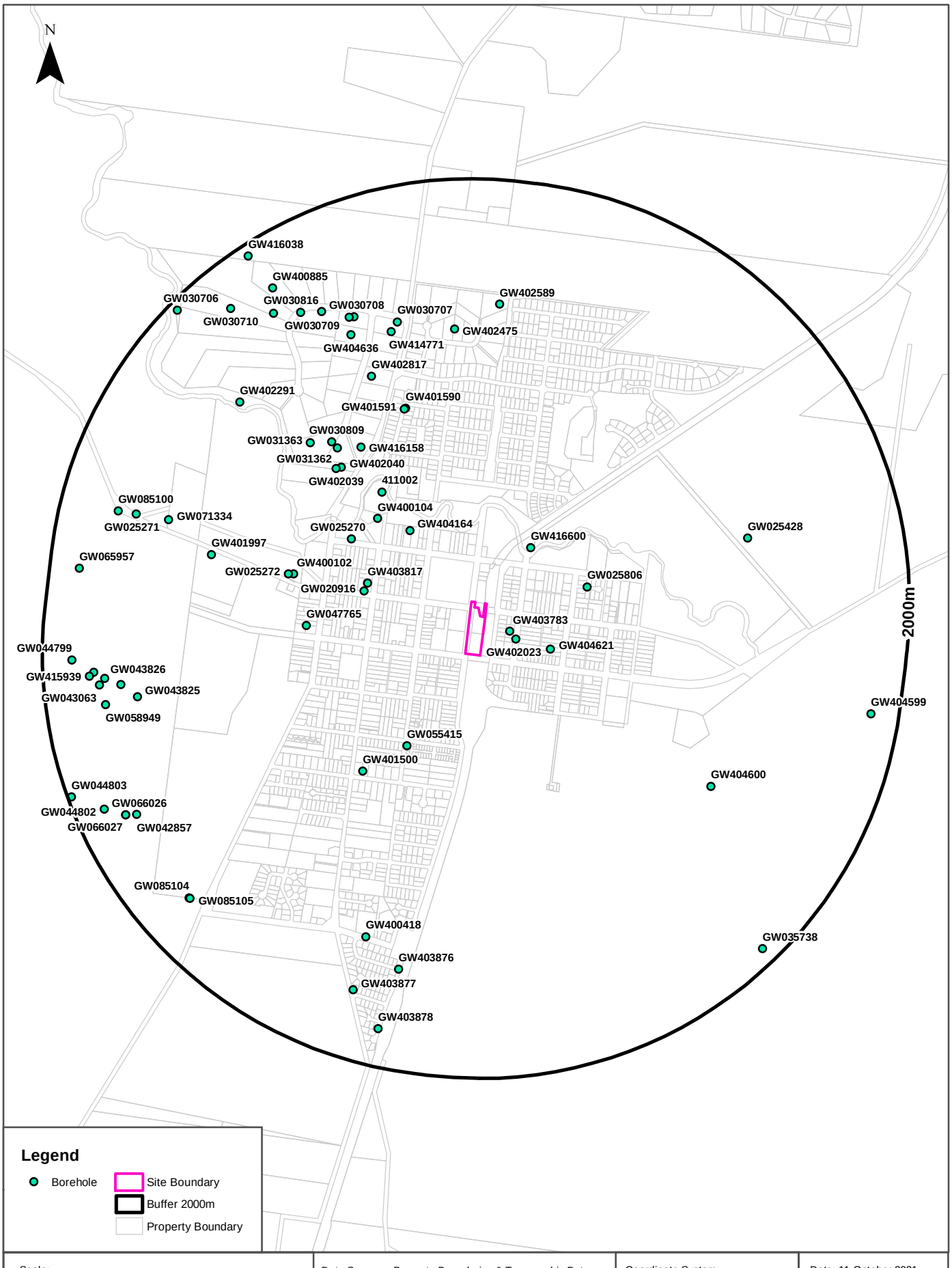
Temporary water restrictions relating to the Botany Sands aquifer within the dataset buffer:

Prohibition Area No.	Prohibition	Distance	Direction
N/A	No records in buffer		

Temporary Water Restriction (Botany Sands Groundwater Source) Order 2018 Data Source : NSW Department of Primary Industries

Groundwater Boreholes

Bungendore Railway Station, Bungendore, NSW 2621



Hydrogeology & Groundwater

Bungendore Railway Station, Bungendore, NSW 2621

Groundwater Boreholes

Boreholes within the dataset buffer:

GW No.	Licence No	Work Type	Owner Type	Authorised Purpose	Intended Purpose	Name	Complete Date	Final Depth (m)	Drilled Depth (m)	Salinity (mg/L)	SWL (m bgl)	Yield (L/s)	Elev (AHD)	Dist	Dir
GW403783	40BL189605	Bore	Private	Domestic	Domestic		09/02/2003	50.00	50.00		28.00	0.375		124m	East
GW402023	40BL188524, 40WA410095	Bore		Domestic	Domestic		15/10/2002	22.00	22.00		10.00	3.000		159m	East
GW404621	40BL191391	Bore	Private	Domestic	Domestic		16/07/2008	30.00	30.00	Good	10.00	0.260		326m	East
GW416600	40BL192199	Bore	Private	Monitoring Bore	Monitoring Bore	'The Village Estate'	15/01/2015	5.10	5.10		4.35			337m	North East
GW404164	40BL189356	Bore	Private	Domestic	Domestic		21/09/2004	42.00	42.00	200	2.00	0.750		444m	North West
GW025806	40BL016536, 40WA408171	Well	Private	Domestic, Stock	Domestic, Stock		01/01/1945	7.90	7.90	0-500 ppm				482m	East
GW403817	40BL191363	Bore	Private	Domestic	Domestic		27/07/2007	39.00	39.00	Fresh	6.00	3.000		498m	North West
GW020916		Bore open thru rock	Private		Domestic		01/06/1952	21.90	22.00					510m	West
GW055415	40BL120347	Bore	Private	Test Bore	G/water Xplore		01/09/1981	45.70	45.70					516m	South West
GW400104	40BL151830	Bore		Test Bore	Test Bore		24/01/1995	73.00	73.00	Fresh				592m	North West
GW025270	40BL024229	Bore	Local Govt	Town Water Supply	Public/municipl		01/07/1969	42.60	42.70	0-500 ppm				639m	North West
411002					UNK								693.12	667m	North West
GW401500	40BL144242	Bore		Domestic, Stock	Domestic, Farming		02/10/1991	9.14	9.14	Good	0.91	1.000		737m	South West
GW047765	40BL106091, 40BL139683	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/04/1978	15.20	15.20	Fair				762m	West
GW400102	40BL151830	Bore		Test Bore			14/04/1993	60.00	60.00	325		3.750		850m	West
GW025272	40BL024231	Bore	Local Govt	Town Water Supply	Public/municipl		01/02/1969	47.80	51.80	0-500 ppm				875m	West
GW402040	40BL188634	Bore		Test Bore	Test Bore		15/03/2002	84.00	100.00	0.71	8.00	19.000		883m	North West
GW402039	40BL188635	Bore		Test Bore	Test Bore		15/03/2002	84.00	84.00	0.34	6.00	0.800		897m	North West
GW416158	40WA405768	Bore	Private	Domestic, Stock	Domestic, Stock		07/12/2012	31.00	31.00		9.00	1.263		898m	North West
GW031362	40BL024232	Bore	Local Govt	Monitoring Bore	Not Known		01/01/1965	45.70	52.40					962m	North West
GW401591	40BL188226	Bore		Domestic, Stock	Town Water Supply		01/10/2000	72.00	72.00		7.00	7.900		962m	North
GW401590	40BL188227	Bore		Domestic, Stock	Town Water Supply		26/03/2001	115.00	115.00			5.100		966m	North
GW030809		Bore	Local Govt		G/water Xplore		01/08/1980	0.00	55.50					1002m	North West
GW031363	40BL024233	Bore	Local Govt	Town Water Supply	Public/municipl		01/01/1965	111.90	111.90					1069m	North West
GW402817	40BL188341	Bore		Domestic			20/07/2004	90.00	90.00	Fresh	15.00	1.000		1165m	North

GW No.	Licence No	Work Type	Owner Type	Authorised Purpose	Intended Purpose	Name	Complete Date	Final Depth (m)	Drilled Depth (m)	Salinity (mg/L)	SWL (m bgl)	Yield (L/s)	Elev (AHD)	Dist	Dir
GW401997	40BL188636	Bore		Test Bore	Test Bore, Town Water Supply		15/03/2002	43.00	43.00		3.70	1.500		1248m	West
GW404600	40BL190475	Bore	Private	Test Bore	Test Bore		07/11/2005	79.00	79.00		3.00	0.900		1255m	South East
GW025428	40BL023591, 40WA408450	Bore	Private	Domestic, Stock	Domestic, Stock		01/08/1969	10.10	10.10					1274m	East
GW402475	40BL188504	Bore		Domestic	Domestic		18/07/2003	18.00	18.00		9.10	1.500		1290m	North
GW414771	40BL189099	Bore	Private	Domestic	Domestic		01/01/2002	8.00						1330m	North
GW030707		Bore	Local Govt		Stock		01/01/1976	22.00	22.00	0-500 ppm	3.30	0.760		1367m	North
GW404636	40BL187383	Bore	Private	Domestic	Domestic		01/12/1998	26.00	26.00		3.00	15.000		1384m	North West
GW402589	40BL189056, 40WA410259	Bore		Domestic	Domestic		14/10/2003	54.00	54.00		11.00	1.188		1411m	North
GW400418	40BL186662, 40WA409685	Bore		Domestic	Domestic		01/01/1978	45.73			7.00			1419m	South
GW402291	40BL188771	Bore		Town Water Supply	Town Water Supply		15/01/2003	49.00	50.00		9.70	12.000		1445m	North West
GW030708		Bore	Local Govt		Stock		01/02/1976	24.50	24.50	0-500 ppm	7.40			1454m	North
GW416189	40WA412232	Bore	Private	Domestic	Domestic, Irrigation, Stock		18/12/2012	36.00	36.00		10.00	4.000		1462m	North
GW071334	40BL151830	Bore		Test Bore			06/04/1993	69.20	69.20	450	2.00			1483m	West
GW403876	40BL188672	Bore	Private	Domestic	Domestic		06/03/2007	48.00	48.00		20.00	0.880		1525m	South
GW030816		Bore	Local Govt		G/water Xplore		01/07/1980	0.00	55.00					1542m	North West
GW043825	40BL101570	Bore	Private	Test Bore	G/water Xplore			30.50						1563m	West
GW030709		Bore	Local Govt		Stock		01/02/1976	42.00	42.00	0-500 ppm	5.00	0.320		1588m	North West
GW043827	40BL101572	Bore	Private	Test Bore	G/water Xplore			22.20						1634m	West
GW025271	40BL024230	Bore	Local Govt	Town Water Supply	Public/municipl		01/07/1969	38.10	38.10	0-500 ppm				1637m	West
GW030823		Bore	Local Govt		G/water Xplore		01/08/1980	0.00	35.20					1652m	North West
GW403877	40BL188671	Bore	Private	Domestic	Domestic		06/03/2007	54.00	54.00		31.00	1.260		1675m	South
GW043826	40BL101571	Bore	Private	Test Bore	G/water Xplore			60.90	61.00	Good				1708m	West
GW058949	40BL128265	Bore	Private	Test Bore	G/water Xplore		01/01/1984	57.00	57.00					1717m	West
GW085100		Bore	NSW Office of Water		Monitoring Bore		27/06/1999	66.00	66.00		9.00	1.000	691.00	1724m	West
GW042857	40BL104713	Bore	Private	Domestic, Irrigation, Stock	Irrigation		01/03/1976	34.70	34.80					1731m	South West
GW043063	40BL040129	Bore	Private	Domestic, Stock	Domestic, Stock		01/04/1974	60.90	61.00	Good				1735m	West
GW085105		Bore	NSW Office of Water		Monitoring Bore		24/07/1999	5.00	5.00		1.30	0.500		1741m	South West
GW085104		Bore	NSW Office of Water				23/07/1999	67.00	67.00		2.00	0.800		1744m	South West

GW No.	Licence No	Work Type	Owner Type	Authorised Purpose	Intended Purpose	Name	Complete Date	Final Depth (m)	Drilled Depth (m)	Salinity (mg/L)	SWL (m bgl)	Yield (L/s)	Elev (AHD)	Dist	Dir
GW400885	40BL187012	Bore		Domestic, Stock	Domestic, Stock		28/05/1998	26.00	26.00	Brackish	8.20			1756m	North West
GW037371	40BL031474	Bore	Private	Irrigation, Stock	Irrigation		01/10/1973	32.90	32.90					1758m	West
GW066026	40BL153681	Bore	Private	Irrigation	Irrigation		12/10/1992	61.50						1777m	South West
GW066027	40BL145601	Bore	Private	Test Bore	Monitoring Bore		01/03/1992	64.00		0-500 ppm				1777m	South West
GW415939	40BL191475	Bore	Private	Irrigation	Irrigation		26/07/2008	49.50	49.50		4.50	10.000		1780m	West
GW030710		Bore	Local Govt		Stock		01/03/1976	40.00	40.00	0-500 ppm	3.10	0.630		1793m	North West
GW403878	40BL188670	Bore	Private	Domestic	Domestic		07/03/2007	78.00	78.00		48.00	0.240		1821m	South
GW044799	40BL100754	Bore	Private	Test Bore	G/water Xplore		01/10/1975	33.50	33.50					1859m	West
GW044802	40BL100758	Bore	Private	Test Bore	G/water Xplore		01/03/1976	29.00	29.00					1859m	South West
GW065957	40BL131956	Bore	Private	Irrigation, Stock	Irrigation		03/06/1985	62.00						1859m	West
GW404599	40BL190475, 40BL191912	Bore	Private	Irrigation, Test Bore	Irrigation		04/11/2005	100.00	100.00		10.00	4.700		1869m	East
GW035738	40BL028444, 40WA408609	Bore open thru rock	Private	Domestic, Stock	Domestic, Stock		01/02/1973	82.20	82.30	Fresh				1924m	South East
GW416038	40BL190293, 40WA412625	Bore	Private	Domestic, Stock	Domestic, Stock		31/05/2005	42.00	42.00	good	16.00	4.000		1945m	North West
GW030706		Bore	Local Govt		Stock		01/12/1975	30.00	30.00	0-500 ppm				1957m	North West
GW044803	40BL100759	Bore	Private	Test Bore	G/water Xplore		01/03/1976	32.20	32.20					1981m	West

Hydrogeology & Groundwater

Bungendore Railway Station, Bungendore, NSW 2621

Driller's Logs

Drill log data relevant to the boreholes within the dataset buffer:

Groundwater No	Drillers Log	Distance	Direction
GW403783	0.00m-1.00m TOPSOIL 1.00m-50.00m YELLOW SHALE	124m	East
GW402023	0.00m-9.00m Clay, soil 9.00m-15.00m Silt, gravel 15.00m-22.00m Gravel, sand clay	159m	East
GW404621	0.00m-0.10m TOPSOIL 0.10m-6.00m SANDY CLAYS 6.00m-30.00m SAND - FINE - COARSE	326m	East
GW416600	0.00m-1.00m sandy clay 1.00m-2.20m fine sand 2.20m-5.10m gravel, medium	337m	North East
GW404164	0.00m-1.00m SOIL 1.00m-9.00m CLAYS - SOFT AND LARGE GRAVELLY SAND 9.00m-42.00m SHALES/QUARTZ/SILTSTONE - WEATHERED	444m	North West
GW025806	0.00m-5.49m Loam Sandy 5.49m-7.92m Sand Wet Water Supply	482m	East
GW403817	0.00m-1.00m BLACK SOIL 1.00m-26.00m FINE SAND LOAMY CLAYS 26.00m-34.00m YELLOW WHITE GRAVELLY SANDS 34.00m-39.00m BLACK SHALE	498m	North West
GW020916	0.00m-1.83m Clay Sandy 1.83m-11.58m Quartz Decomposed Clay 11.58m-14.33m Quartz 14.33m-17.68m Quartz Decomposed Clay 17.68m-21.95m Quartz Decomposed Water Supply	510m	West
GW055415	0.00m-0.30m Topsoil 0.30m-25.90m Clay 25.90m-45.70m Shale Soft	516m	South West
GW400104	0.00m-2.50m RED/BR CLAY; BLACK AT TOP 2.50m-4.00m GRAVEL, 2-10 MM AV 5MM 4.00m-15.50m SANDSTONE, WH. KAOLINITIC, VERY FRACTURED, F.G-MG 15.50m-21.00m CLAYSTONE, WH-LT GREY 21.00m-33.00m SHALE, SOFT WH-LT GREY 33.00m-65.50m SANDSTONE, WH. KAOLINITIC TENDING SILTY; RED/BR AT TOP; F.G. M.G. 65.50m-73.00m SANDSTONE, OR/BR - PINK QTZ M-C.G	592m	North West

Groundwater No	Drillers Log	Distance	Direction
GW025270	0.00m-1.52m Soil 1.52m-2.13m Clay Dark Khaki Gravel 2.13m-2.44m Gravel Dry Medium 2.44m-4.27m Clay Gravel 4.27m-4.88m Sand Gravel Fine 4.27m-4.88m Very Clayey 4.88m-6.40m Clay Light Grey Sticky Sandy 6.40m-7.62m Clay Light Yellow Sticky Sandy 7.62m-14.02m Clay Dark Yellow Gravel 14.02m-14.63m Clay Light Grey Gravel 14.63m-17.37m Clay White Sticky 17.37m-19.51m Clay Light Grey Light Brown Sandy 19.51m-20.42m Clay Reddish Light Grey Light Brown Sandy 20.42m-23.47m Clay Variegated 23.47m-23.77m Clay Grey Gravel 23.77m-25.30m Gravel Cemented 23.77m-25.30m Silt Sandy Fine 25.30m-25.60m Silt Sandy Fine 25.30m-25.60m Gravel Cemented 25.30m-25.60m Sand Dark Yellow Clay 25.60m-26.82m Gravel Cemented Clay 25.60m-26.82m Sand Dark Yellow 26.82m-28.65m Clay Yellow Gravel 28.65m-31.09m Clay Light Yellow Gravel 31.09m-31.70m Gravel Silty Medium Water Supply 31.70m-32.00m Sand Yellow Cemented Gravel 32.00m-32.31m Sand Yellow Gravel Fine 32.31m-32.61m Sand Yellow Large Gravel 32.61m-33.22m Sand Yellow Small Gravel 33.22m-35.05m Clay Sandy 35.05m-36.58m Sand Rock Light Yellow 36.58m-36.88m Clay Grey Sticky 36.88m-39.01m Clay Sticky 36.88m-39.01m Conglomerate Very Hard Cemented Seams 39.01m-42.67m Conglomerate Very Hard Cemented Seams 39.01m-42.67m Clay Grey Sticky	639m	North West
GW401500	0.00m-1.52m CLAY, BROWN 1.52m-3.66m GRAVEL 3.66m-5.18m CLAY 5.18m-6.70m DECOMPOSED SHALE 6.70m-7.62m CLAY, BROWN 7.62m-9.14m SHALE, BROKEN	737m	South West
GW047765	0.00m-0.30m Topsoil 0.30m-7.60m Clay 7.60m-13.70m Gravel River Water Supply 13.70m-15.20m Clay	762m	West
GW400102	0.00m-1.00m TOPSOIL 1.00m-2.50m YELLOW & BROWN CLAY 2.50m-9.00m GRAVEL TO 25MM YELLOW GREY 9.00m-12.00m YELLOW, SILTY CLAY SANDSTONE TOP OF CARWOOLA BED 12.00m-21.00m GREY - PINK & YELLOW SILTY CLAY SANDSTONE - GRAVEL 21.00m-35.40m GREY SILTY CLAY 35.40m-38.40m DARK GREY SILTY CLAY 38.40m-45.70m YELLOW SILTY CLAY - SANDSTONE 45.70m-45.73m BASE OF CARWOOLA BEDS 45.73m-60.00m EXTREMELY WEATHERED TO SLIGHTLY WEATHERED DARK GREY TUFFACECUS SILTSTONE OF CAPTAINS FLAT FORMATION	850m	West

Groundwater No	Drillers Log	Distance	Direction
GW025272	0.00m-1.22m Topsoil 1.22m-1.83m Clay Gravel 1.83m-5.18m Clay Yellow Grey 5.18m-10.36m Clay Gravel 10.36m-10.97m Sand Gravel Water Supply 10.97m-12.50m Clay Grey Yellow Gravel 12.50m-13.11m Gravel Very Clayey Fine-coarse 13.11m-14.63m Gravel Sandy Clay Fine-coarse 14.63m-15.85m Clay Yellow Sandy 15.85m-16.15m Clay Gravel 16.15m-16.76m Sand Gravel 16.76m-19.81m Gravel Fine-coarse Water Supply 16.76m-19.81m Clay 19.81m-20.12m Clay Grey Sandy 20.12m-20.73m Sand Yellow Water Supply 20.73m-21.64m Clay Yellow Grey Sandy 21.64m-22.56m Sand Gravel 21.64m-22.56m Clay Yellow 22.56m-23.47m Clay Yellow Sandy 23.47m-26.52m Sand Water Supply 23.47m-26.52m Clay Yellow 26.52m-27.74m Clay Yellow Grey 27.74m-28.96m Clay Yellow Grey Sandy 28.96m-29.57m Sand Fine-coarse 29.57m-31.39m Clay Grey Yellow Sandy 31.39m-35.66m Sand 31.39m-35.66m Silt 31.39m-35.66m Clay Heavy 35.66m-36.58m Clay Grey Yellow 36.58m-37.19m Clay Yellow Sandy 37.19m-38.40m Sand Small Gravel Water Supply 38.40m-39.01m Clay Yellow Sandy 39.01m-39.93m Clay Yellow Gravel 39.93m-45.42m Sand Gravel Water Supply 39.93m-45.42m Clay Sandy Bands 45.42m-46.63m Clay Yellow Sandy Gravel 46.63m-47.85m Gravel Sand Fine-coarse Water Supply 47.85m-50.90m Shale Yellow Grey 50.90m-51.82m Phyllite Decomposed	875m	West
GW402040	0.00m-7.00m Clay, yellow brown 7.00m-22.50m Gravel, very coarse, quartzose, angular 22.50m-45.00m Siltstone, weathered with abundent quartz veins 45.00m-60.00m Siltstone, less weathered, fractured, light brown 60.00m-100.00m Siltstone, light grey, quartz veins	883m	North West
GW402039	0.00m-7.50m Clay, and silt, interbedded (buff-it orange) 7.50m-15.00m Sand, coarse interbedded with gravel fine to coarse and clay, thin 15.00m-27.00m Clay, sand thin, gravel minor 27.00m-37.00m Sand, coarse interbedded, gravel fine, clay 37.00m-46.50m Gravel, coarse, quartz and red siltstone pebbles 46.50m-48.50m Clay 48.50m-49.50m Gravel, medium to coarse, white quartz 49.50m-84.00m Bedrock, deeply weathered with claystones	897m	North West
GW416158	0.00m-1.00m topsoil 1.00m-28.00m clay 28.00m-31.00m sand, and clay - water supply	898m	North West
GW031362	0.00m-2.44m Sand 2.44m-4.57m Clay Sandy 4.57m-6.10m Gravel 6.10m-7.62m Clay Sandy 7.62m-10.67m Clay 10.67m-16.76m Gravel 16.76m-19.81m Sand Water Bearing 19.81m-21.34m Clay 21.34m-22.86m Sand Water Bearing 22.86m-25.91m Clay 25.91m-47.24m Sand Coarse Water Bearing 47.24m-50.60m Clay 50.60m-52.43m Sand Coarse Siltstone	962m	North West
GW401591	0.00m-5.00m Clay 5.00m-8.00m Gravel 8.00m-14.00m Ckat 14.00m-31.00m Siliceous phullite with quartz veins 31.00m-41.00m Siliceous phyllite 41.00m-47.00m Grantie dyke 47.00m-68.00m Siliceous phullite 68.00m-72.00m Medium grained sandstone	962m	North
GW401590	0.00m-7.00m Clay 7.00m-8.00m Coarse sand 8.00m-8.90m Gravel 8.90m-46.00m Siliceous phyllite with quartz veins 46.00m-50.00m Siliceous phyllite 50.00m-56.00m Granite dyke 56.00m-115.00m Siliceous phullite with minor quartz veins	966m	North

Groundwater No	Drillers Log	Distance	Direction
GW030809	0.00m-0.80m Topsoil 0.80m-2.50m Clay White Gravel 2.50m-4.50m Clay Yellow White 4.50m-6.00m Clay Yellow Gravel 6.00m-7.00m Clay Gravel 7.00m-8.00m Clay White 8.00m-10.00m Clay Yellow Gravel 10.00m-18.00m Clay Reddish Gravel 18.00m-19.00m Clay White Sticky 19.00m-21.00m Clay Red White Sticky 21.00m-22.00m Clay Grey Yellow Sticky 22.00m-22.50m Sand Gravel Water Bearing Bands 22.50m-24.50m Clay Grey Yellow Sandy 24.50m-25.00m Sand Water Bearing Clay 25.00m-28.00m Clay White Sandy 28.00m-30.00m Clay White Sticky 30.00m-39.00m Sand Coarse 30.00m-39.00m Clay Yellow Water Bearing Bands 39.00m-41.00m Gravel Yellow Water Bearing Clay Bands 41.00m-42.00m Clay Grey 42.00m-47.00m Gravel Water Bearing Large Clay Bands 47.00m-49.50m Clay Yellow Grey 49.50m-50.50m Gravel Water Bearing Large 50.50m-51.00m Gravel Water Bearing Cemented Large 51.00m-52.00m Gravel Cemented Large 52.00m-55.50m Slate Black Hard 55.50m-55.51m Bedrock	1002m	North West
GW031363	0.00m-3.05m Clay Sandy 3.05m-6.10m Gravel Sandy 6.10m-10.97m Clay 10.97m-11.58m Gravel Water Bearing 11.58m-16.76m Clay Large Gravel Seams 16.76m-18.29m Sand Coarse 18.29m-24.38m Clay Sandy 24.38m-32.00m Sand Firm 32.00m-33.53m Clay Sandy 33.53m-35.05m Clay 35.05m-38.10m Sand 38.10m-39.62m Sand Clay 39.62m-44.20m Sand Coarse 44.20m-64.01m Clay 44.20m-64.01m Or Weathered Rock 64.01m-74.98m Or Weathered Rock 64.01m-74.98m Clay Some Sand 74.98m-86.87m Clay 74.98m-86.87m Or Weathered Rock 86.87m-111.86m Or Weathered Rock 86.87m-111.86m Silt Sandy	1069m	North West
GW402817	0.00m-5.00m brown sticky clay 5.00m-15.00m Gravels sand 15.00m-60.00m weathered grey/black shale 60.00m-90.00m hard blackshale/siltstone	1165m	North
GW401997	0.00m-2.50m Clay, soil 2.50m-8.00m Clay, and silt 8.00m-17.00m Gravel, silt, clays, gravels dominated by red siltstone, quartz and slatey pebbles to 3 cm 17.00m-43.00m Siltstone, reddish brown, pink, very clayey	1248m	West
GW404600	0.00m-1.00m SOIL - BLACK 1.00m-3.00m LOAM SOIL - BROWN 3.00m-5.00m GRAVEL AND SAND 5.00m-42.00m SILTSTONE - YELLOW/WHITE, WEATHERED 42.00m-79.00m SILTSTONE - LIGHT GREY, DARK QUARTZ BANDS	1255m	South East
GW025428	0.00m-0.30m Loam Sandy 0.30m-0.91m Clay Dark Grey 0.91m-1.22m Clay Yellow Sandy 1.22m-3.05m Sand Yellow Gravel 3.05m-3.66m Sand Medium Gravel 3.66m-5.18m Gravel Grey Clay 5.18m-5.49m Gravel Fine Medium 5.49m-7.01m Gravel Clay 7.01m-7.16m Sand Fine Gravel 7.16m-7.92m Clay Grey Gravel 7.92m-8.23m Sand Fine Medium 7.92m-8.23m Sandstone Gravel 8.23m-10.06m Sand Rock Green Dark Blue	1274m	East
GW402475	0.00m-5.00m Soil, loamy clays 5.00m-12.00m Sand, weathered and loamy 12.00m-18.00m Sand, large gravel	1290m	North
GW402589	0.00m-9.00m Soil, loamy clay 9.00m-28.00m Shale, yellow brown, weathered 28.00m-54.00m Shale, grey blue, quartz bands	1411m	North

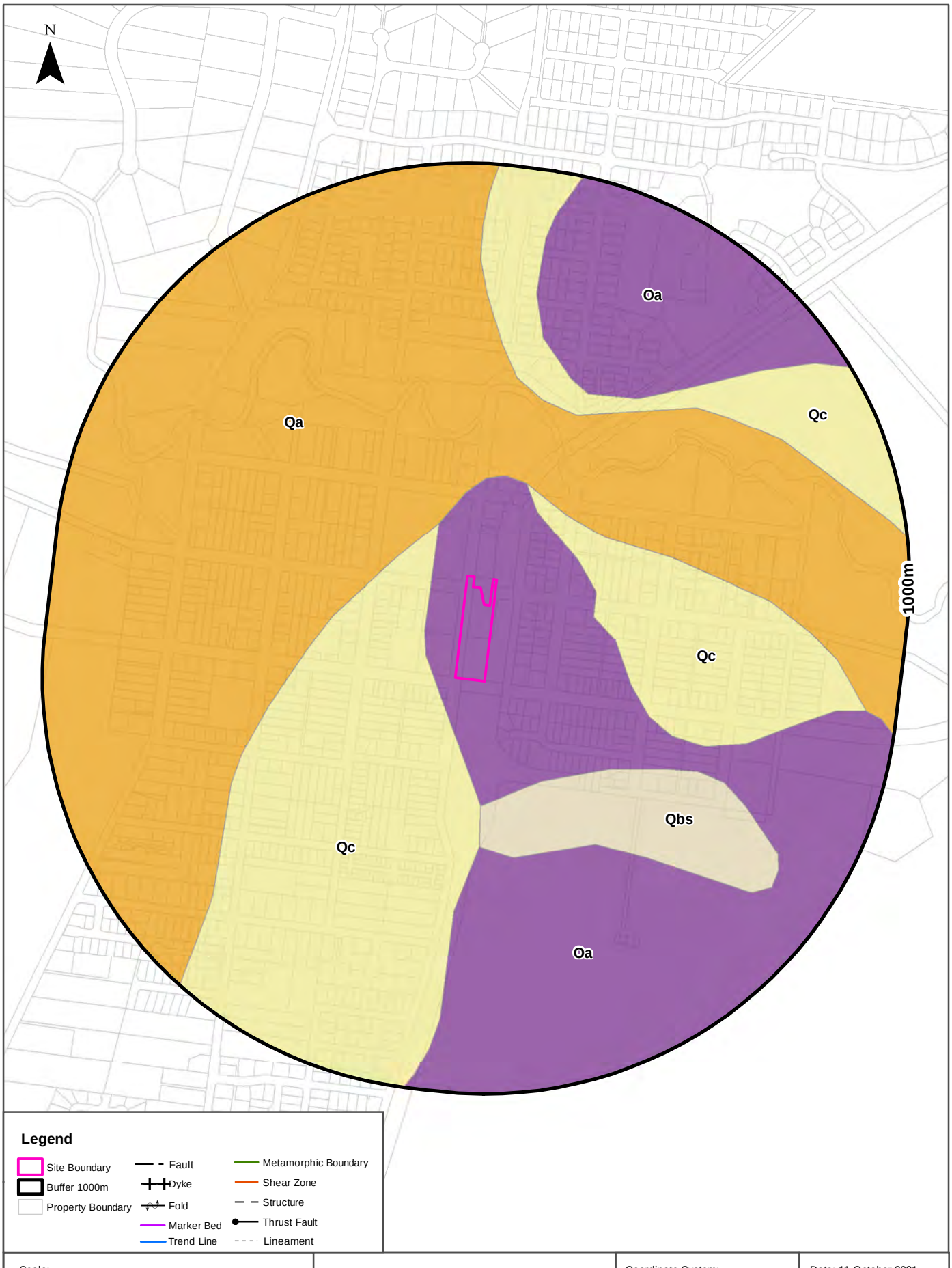
Groundwater No	Drillers Log	Distance	Direction
GW402291	0.00m-7.50m Clay, and silts, interbedded 7.70m-15.00m Sand, coarse interbedded, with fine to coarse gravel and clay 15.00m-27.00m Clay, with thin sand and minor gravel 27.00m-33.00m Sand, coarse and fine gravel 33.00m-37.00m Clay, with coarse sand interbed 37.00m-47.00m Gravel, fine to medium,white 47.00m-50.00m Claystones, silty sandy, light grey	1445m	North West
GW416189	0.00m-1.00m soil with sand and clay 1.00m-6.00m clay, grey 6.00m-36.00m clay, with sand and gravel	1462m	North
GW071334	0.00m-11.00m BRWON CLAY & SUB ROUNDED GRAVEL IE LAKE GEORGE SEDIMENTS 11.00m-12.00m GRAVEL UP TO 12MM ANGULAR IE TOP OF CARWOOLA BEDS 12.00m-55.50m CARWOOLA BEDS YELLOW MINOR PINK SANDSTONE FARCTURED WITH GRAVEL MINOR THROUGHOUT 55.50m-69.20m CLAY COMPTELY WEATHERED PHYLLI BIRKENBURN BEDS	1483m	West
GW403876	0.00m-18.00m CLAY - YELLOW 18.00m-48.00m SHALE - BROWN	1525m	South
GW030816	0.00m-0.50m Topsoil 0.50m-3.00m Sand Dry 3.00m-5.00m Clay Grey Sandy 5.00m-14.00m Clay Large Gravel 14.00m-17.50m Gravel Sand 17.50m-21.00m Clay Reddish Stones Large Bands 21.00m-24.00m Sand Dry Medium Clay Bands 24.00m-33.00m Clay Grey Yellow Sand Small Bands 33.00m-39.00m Clay White 39.00m-55.00m Clay White Yellow	1542m	North West
GW025271	0.00m-1.22m Driller 1.22m-6.40m Clay Dark Brown Waddy 6.40m-7.01m Clay Yellow Gravel Sandy 7.01m-7.62m Sand Gravel Water Supply 7.62m-9.75m Clay Grey Gravel 9.75m-11.89m Clay Grey 11.89m-12.19m Sand Gravel Water Supply 12.19m-13.11m Sand Gravel Water Supply 12.19m-13.11m Silt Heavy 13.11m-13.72m Gravel Silt Water Supply 13.72m-15.24m Clay Yellow Grey Gravel 15.24m-21.34m Clay Light Grey Slightly Gravel 21.34m-24.69m Clay Yellow Grey Red Swelling 24.69m-25.91m Clay Red Yellow 25.91m-28.96m Clay Yellow Sandy Fine 28.96m-33.53m Clay Red Yellow 33.53m-35.36m Clay Yellow Purple Grey Slightly Gravel 35.36m-38.10m Conglomerate Cemented	1637m	West
GW030823	0.00m-0.30m Topsoil 0.30m-1.00m Clay White Sandy 1.00m-3.00m Clay Grey White 3.00m-4.00m Clay Grey 4.00m-7.00m Clay Gravel 7.00m-8.50m Clay Gravel Stones Large 8.50m-10.00m Gravel Medium Water Bearing Clay Bands 10.00m-12.00m Clay Grey 12.00m-13.00m Clay Grey Sandy 13.00m-14.00m Clay Grey Stones 14.00m-15.00m Clay Yellow Grey 15.00m-16.00m Gravel Water Bearing Medium Clay Bands 16.00m-18.50m Gravel Water Bearing Large Clay Bands 18.50m-20.00m Clay Large Gravel 20.00m-27.00m Sand Water Bearing Dirty Clay Bands 27.00m-30.50m Clay White Sand Small Bands 30.50m-35.20m Clay White Shaley 35.20m-35.21m Bedrock	1652m	North West
GW403877	0.00m-21.00m SHALE - WHITE 21.00m-54.00m SHALE - BROWN	1675m	South

Groundwater No	Drillers Log	Distance	Direction
GW043826	0.00m-0.61m Clay Black 0.61m-1.52m Clay 1.52m-3.66m Gravel Nominal Pipe Clay 3.66m-6.10m Clay Gravel 6.10m-8.53m Clay Grey 8.53m-8.84m Clay 8.84m-13.11m Gravel 13.11m-15.54m Clay 15.54m-16.76m Clay Gravel 16.76m-21.34m Gravel 21.34m-21.95m Sand 21.95m-25.60m Gravel 25.60m-32.00m Clay 32.00m-32.92m Shale 32.92m-35.66m Clay 35.66m-42.06m Shale Grey 42.06m-45.42m Clay Grey 45.42m-51.21m Shale Grey 51.21m-53.34m Quartz 53.34m-60.96m Shale Grey	1708m	West
GW058949	0.00m-0.90m Topsoil 0.90m-3.30m Clay 3.30m-5.20m Shale 5.20m-7.30m Sand Clay 7.30m-8.80m Clay 8.80m-11.00m Shale Broken 11.00m-38.70m Clay Bands Shale 38.70m-56.00m Sand White Coarse Water Supply 56.00m-57.00m Clay Or Shale	1717m	West
GW042857	0.00m-0.01m Soil 0.01m-1.52m Clay Plastic 1.52m-2.44m Gravel Dry 2.44m-5.18m Clay Gravel 5.18m-6.71m Gravel 6.71m-8.53m Clay Light Brown 8.53m-9.75m Clay Gravel 9.75m-10.67m Clay 10.67m-13.72m Gravel Coarse 13.72m-14.33m Clay 14.33m-20.73m Gravel Some Clayey Seam Water Supply 20.73m-26.35m Clay 26.35m-26.52m Clay White 26.52m-26.82m Gravel Water Supply 26.52m-26.82m Sand 26.82m-31.39m Sand Coarse 26.82m-31.39m Gravel Water Supply 31.39m-34.75m Clay Hard	1731m	South West
GW043063	0.00m-1.52m Clay Black 1.52m-3.35m Gravel 3.35m-3.65m Pipe Clay 3.65m-6.09m Clay Gravel 6.09m-8.53m Clay Grey 8.53m-8.83m Clay 8.83m-13.10m Gravel Water Supply 13.10m-15.54m Clay 15.54m-16.76m Clay Gravel 16.76m-21.33m Gravel Water Supply 21.33m-21.94m Sand 21.94m-25.60m Gravel 25.60m-32.00m Clay 32.00m-32.91m Slate 32.91m-33.83m Clay 33.83m-42.06m Slate Grey 42.06m-45.41m Clay Grey 45.41m-51.20m Shale Grey 51.20m-53.34m Quartz 53.34m-60.96m Shale Grey	1735m	West
GW085105	0.00m-2.00m Topsoil 2.00m-5.00m Brown clay and gravel	1741m	South West
GW085104	0.00m-2.00m Topsoil 2.00m-11.00m Brown clay and gravel 11.00m-16.00m Sand and gravel 16.00m-30.00m Brown clay and gravel 30.00m-37.00m Yellow clay and gravel 37.00m-41.00m Brown clay 41.00m-48.00m Yellow clay and gravel 48.00m-67.00m Black rock	1744m	South West
GW400885	0.00m-2.00m Sand 2.00m-4.00m Clay 4.00m-9.00m Large gravel & sand 9.00m-20.00m Washed river gravel 20.00m-24.00m Sand 24.00m-26.00m Clay	1756m	North West

Groundwater No	Drillers Log	Distance	Direction
GW037371	0.00m-0.61m Clay Black 0.61m-9.45m Clay Sand Fine Bands 9.45m-14.33m Clay Gravel Bands 14.33m-23.77m Sand Coarse Water Supply 23.77m-24.69m Clay White Hard 24.69m-31.09m Gravel White Water Supply 31.09m-32.92m Clay Red White	1758m	West
GW415939	0.00m-1.00m Soil, brown loam 1.00m-28.00m Clay, orange brown, yellow red 28.00m-42.00m Sands, with sandy clay 42.00m-49.50m Gravel with quartz	1780m	West
GW403878	0.00m-6.00m CLAY - RED 6.00m-24.00m SHALE - WHITE 24.00m-78.00m SHALE - BROWN	1821m	South
GW044799	0.00m-0.61m Clay Dark 0.61m-10.06m Clay Light Brown Gravel Plastic Water Supply 10.06m-19.20m Clay Reddish Gravel Water Supply 19.20m-33.53m Clay White Pink Plastic Water Supply	1859m	West
GW044802	0.00m-0.30m Soil 0.30m-2.44m Clay Plastic 2.44m-2.74m Gravel Dry Clay 2.74m-5.49m Clay Grey Plastic 5.49m-6.40m Gravel Water Supply 6.40m-7.32m Clay 7.32m-9.14m Gravel Water Supply 9.14m-10.67m Clay Light Brown 10.67m-10.97m Gravel 10.97m-11.58m Clay Plastic 11.58m-11.89m Gravel 11.89m-15.85m Clay Plastic 15.85m-17.37m Gravel Water Supply 17.37m-18.59m Clay Gravel 18.59m-20.42m Gravel Water Supply 20.42m-21.34m Clay White 21.34m-24.38m Clay Pink 24.38m-25.91m Clay Plastic 25.91m-28.96m Clay Pink Plastic	1859m	South West
GW404599	0.00m-2.00m CLAY - ORANGE/BROWN 2.00m-14.00m SILTSTONE - LIGHT BROWN, WEATHERED 14.00m-100.00m SILTSTONE - MEDIUM GREY - THIN FINE GRAINED SANDSTONES	1869m	East
GW035738	0.00m-0.91m Topsoil 0.91m-7.92m Topsoil Clay 7.92m-20.11m Shale Grey Decomposed 20.11m-24.38m Quartz Gravel Water Supply 24.38m-38.10m Shale Grey Decomposed 38.10m-71.62m Basalt 71.62m-76.20m Basalt Fractured Seams Water Supply 76.20m-82.29m Basalt Black Hard	1924m	South East
GW044803	0.00m-0.30m Soil 0.30m-3.05m Clay Plastic 3.05m-3.66m Gravel Dirty 3.66m-5.49m Clay Gravel 5.49m-8.23m Gravel Coarse 8.23m-9.14m Clay Gravel Plastic 9.14m-9.75m Gravel Water Supply 9.75m-10.36m Gravel Clay 10.36m-12.50m Clay Soft 12.50m-13.11m Gravel Water Supply 13.11m-14.33m Clay Plastic 14.33m-14.48m Gravel 14.48m-15.54m Clay Plastic 15.54m-16.15m Gravel 16.15m-18.90m Clay White 18.90m-19.20m Gravel Water Supply 19.20m-19.81m Clay Pink 19.81m-20.42m Gravel Large Water Supply 20.42m-22.86m Clay Pink 22.86m-23.47m Clay Yellow 23.47m-24.08m Gravel Water Supply 24.08m-24.54m Clay White 24.54m-24.84m Gravel 24.84m-24.99m Clay Light Brown 24.99m-27.74m Clay White 27.74m-28.35m Gravel 28.35m-28.65m Clay White 28.65m-29.87m Gravel Water Supply 29.87m-30.02m Clay 30.02m-31.85m Gravel Water Supply 31.85m-32.16m Clay	1981m	West

Geology

Bungendore Railway Station, Bungendore, NSW 2621



Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2021

Coordinate System: GDA 1994 MGA Zone 56

Date: 11 October 2021

Geology

Bungendore Railway Station, Bungendore, NSW 2621

Geological Units 1:250,000

What are the Geological Units within the dataset buffer?

Symbol	Description	Unit Name	Group	Sub Group	Age	Dist	Dir
Oa	Turbiditic sequence; sandstone, mudstone, shale; quartzite, quartz phyllite, phyllite, slate	Adaminaby Group	Adaminaby Group		Palaeozoic	0m	On-site
Qc	Fanglomerate and poorly cemented conglomerate, gravel and sand: colluvium				Cainozoic	50m	South West
Qa	Alluvium, fluvial deposits: gravel, sand, silt and clay	undifferentiated			Cainozoic	144m	North West
Qbs	Coarse sand and gravel in strandlines				Cainozoic	277m	South East

Geological Structures 1:250,000

What are the Geological Structures within the dataset buffer?

Feature	Name	Description	Map Sheet	Distance	Direction
N/A	No records in buffer				

Geological Data Source : NSW Department of Industry, Resources & Energy

Naturally Occurring Asbestos Potential

Bungendore Railway Station, Bungendore, NSW 2621

Naturally Occurring Asbestos Potential

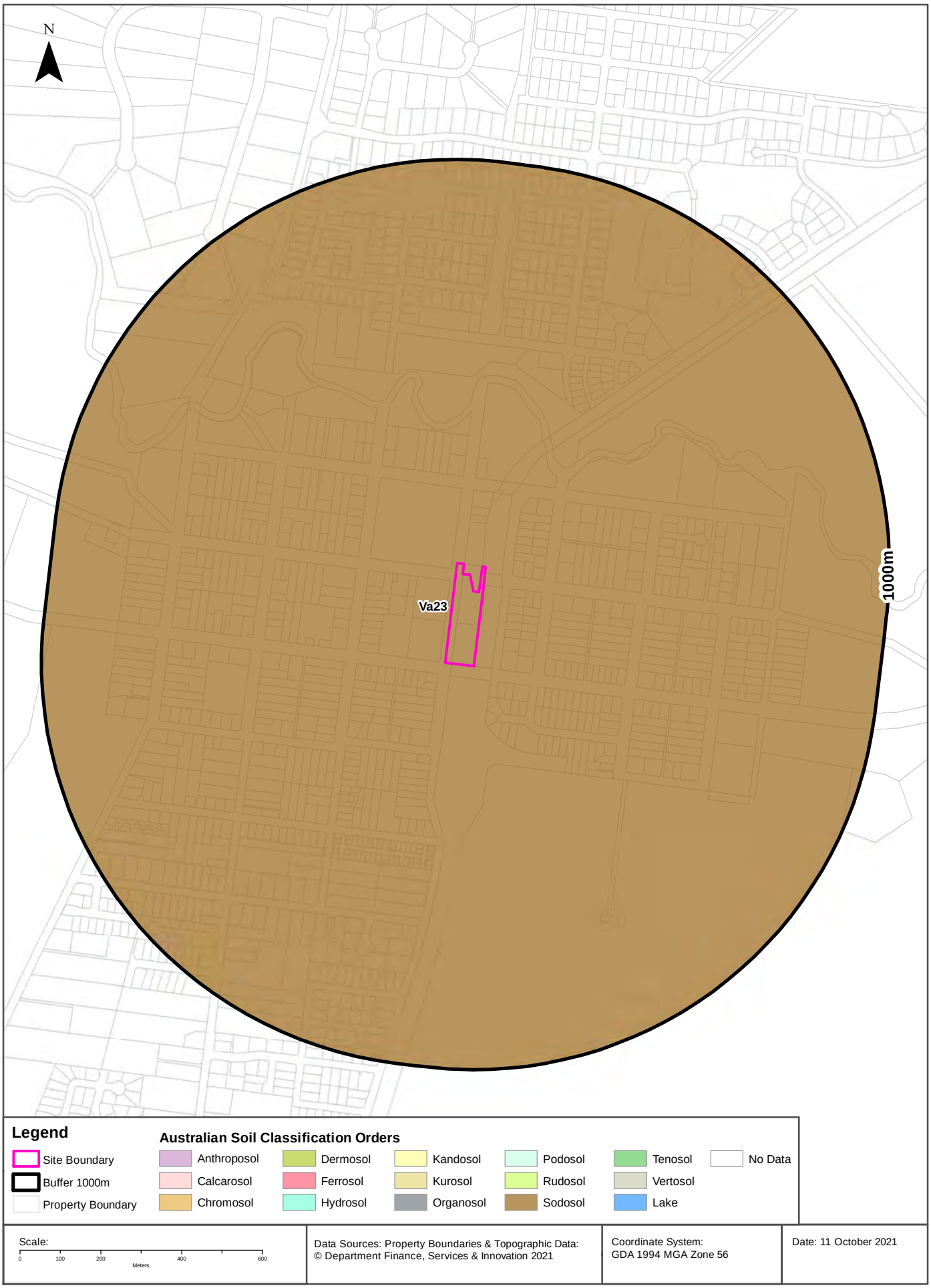
Naturally Occurring Asbestos Potential within the dataset buffer:

Potential	Sym	Strat Name	Group	Formation	Scale	Min Age	Max Age	Rock Type	Dom Lith	Description	Dist	Dir
No records in buffer												

Naturally Occurring Asbestos Potential Data Source: © State of New South Wales through NSW Department of Industry, Resources & Energy

Atlas of Australian Soils

Bungendore Railway Station, Bungendore, NSW 2621



Soils

Bungendore Railway Station, Bungendore, NSW 2621

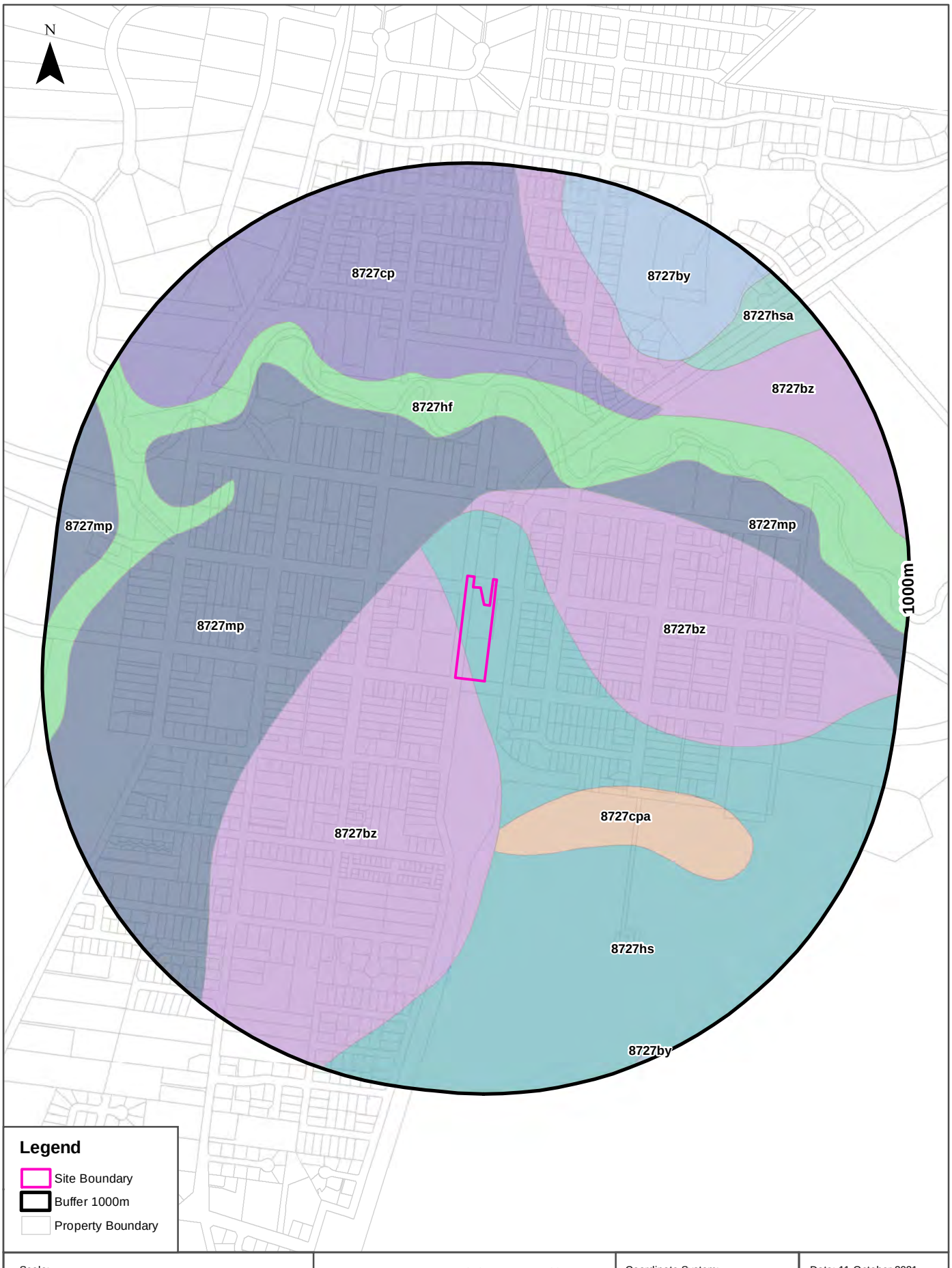
Atlas of Australian Soils

Soil mapping units and Australian Soil Classification orders within the dataset buffer:

Map Unit Code	Soil Order	Map Unit Description	Distance	Direction
Va23	Sodosol	Basin plains at moderate elevations (> 2000 ft) with lakes, swamps, lunettes, small stream valleys, and low residual hills and ridges; some buried layered soil materials: basin plains of hard alkaline and neutral yellow mottled soils (Dy3.43 and Dy3.42) with other undescribed soils. Associated are (i) lunettes and/or levee-like ridges of red earths (Gn2.15) and possibly some sand sheets of (Uc) soils; (ii) narrow depressions of (Dd1.43) soils; (iii) ?old terrace remnants of (Dr2.41) soils above which some gravel fills may occur; and (iv) broken by some undulating to low hilly areas of (Dy3.42) soils with (Gn2.25 and Gn2.75) soils.	0m	On-site

Soil Landscapes of Central and Eastern NSW

Bungendore Railway Station, Bungendore, NSW 2621



Soils

Bungendore Railway Station, Bungendore, NSW 2621

Soil Landscapes of Central and Eastern NSW

Soil Landscapes of Central and Eastern NSW within the dataset buffer:

Soil Code	Name	Distance	Direction
8727hs	Hoskinstown	0m	On-site
8727bz	Bungendore	0m	On-site
8727mp	Millpost	130m	West
8727hf	Halfway Creek	285m	North
8727cpa	Coopers variant a	330m	South East
8727cp	Coopers	481m	North
8727by	Bywong	650m	North East
8727hsa	Hoskinstown variant a	694m	North East

Acid Sulfate Soils

Bungendore Railway Station, Bungendore, NSW 2621

Environmental Planning Instrument - Acid Sulfate Soils

What is the on-site Acid Sulfate Soil Plan Class that presents the largest environmental risk?

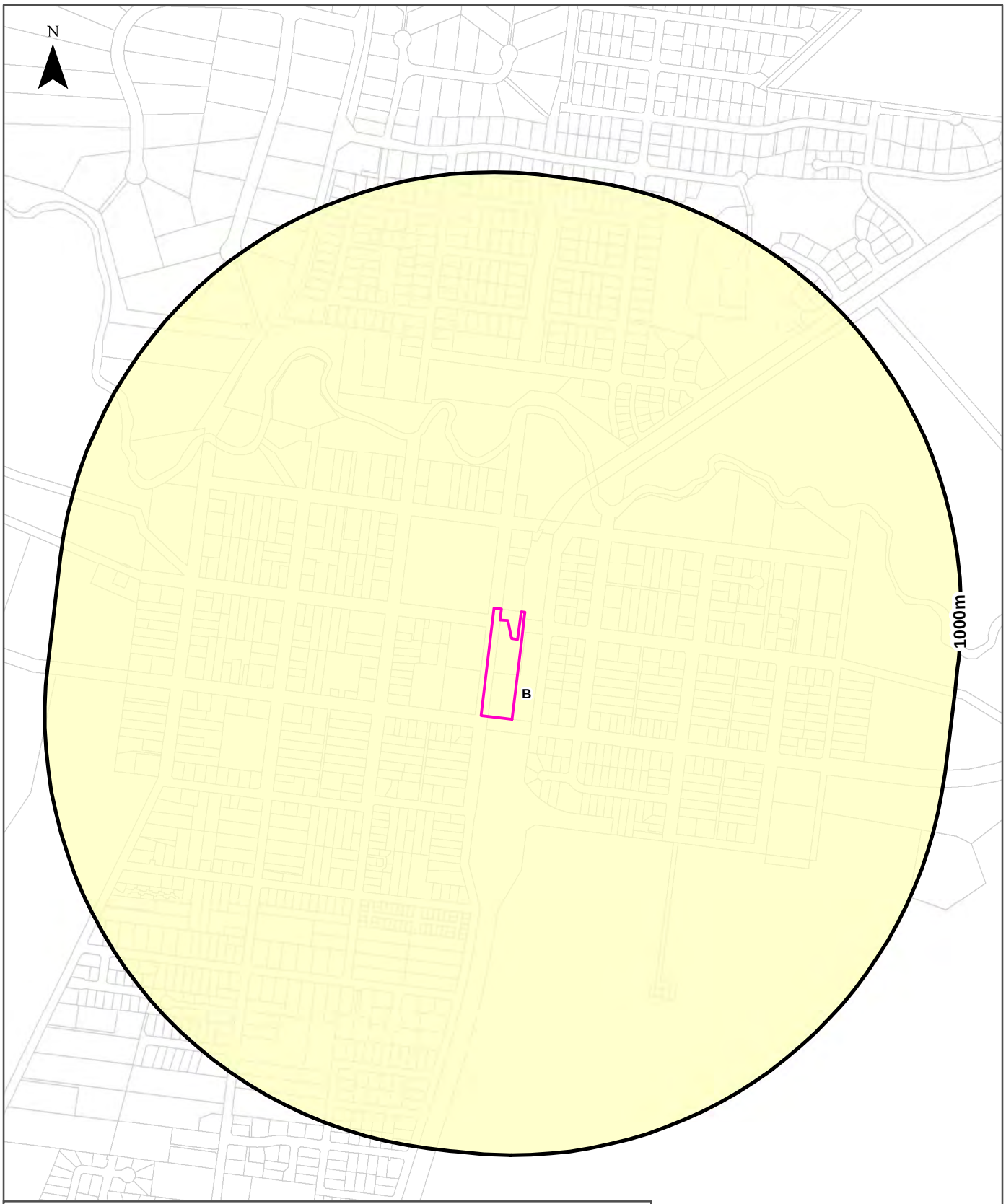
Soil Class	Description	EPI Name
N/A		

If the on-site Soil Class is 5, what other soil classes exist within 500m?

Soil Class	Description	EPI Name	Distance	Direction
N/A				

Atlas of Australian Acid Sulfate Soils

Bungendore Railway Station, Bungendore, NSW 2621



Legend

- Site Boundary
- Buffer 1000m
- Property Boundary

Probability of occurrence of Acid Sulfate Soils

- A. High (>70%)
- B. Low (6-70%)
- C. Extremely Low (1-5%)
- D. No Chance (0%)
- No Data

Scale: 0 100 200 400 600 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2021

Coordinate System: GDA 1994 MGA Zone 56

Date: 11October 2021

Acid Sulfate Soils

Bungendore Railway Station, Bungendore, NSW 2621

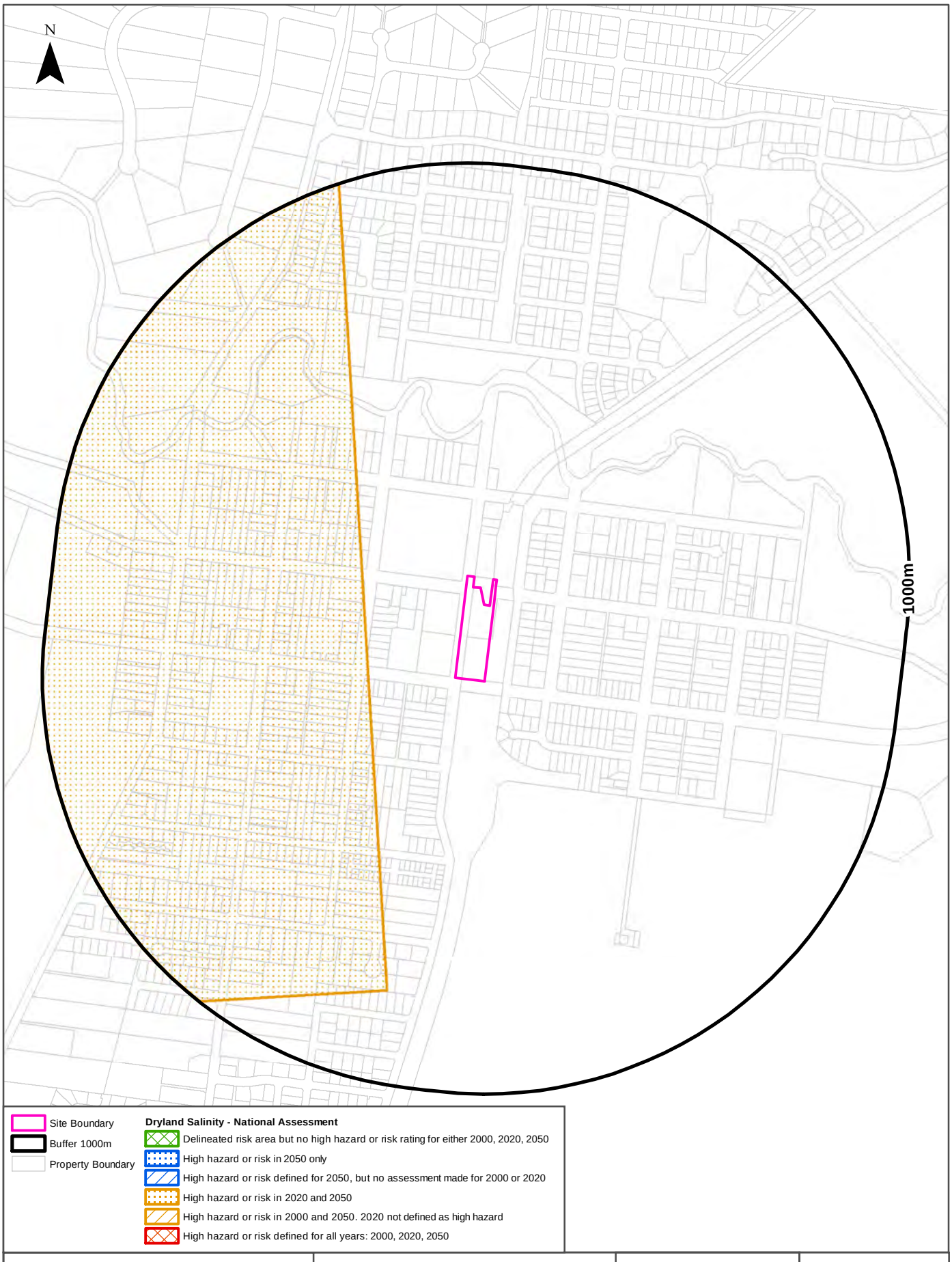
Atlas of Australian Acid Sulfate Soils

Atlas of Australian Acid Sulfate Soil categories within the dataset buffer:

Class	Description	Distance	Direction
B	Low Probability of occurrence. 6-70% chance of occurrence.	0m	On-site

Dryland Salinity

Bungendore Railway Station, Bungendore, NSW 2621



Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2021

Coordinate System: GDA 1994 MGA Zone 56

Date: 11 October 2021

Dryland Salinity

Bungendore Railway Station, Bungendore, NSW 2621

Dryland Salinity - National Assessment

Is there Dryland Salinity - National Assessment data onsite?

No

Is there Dryland Salinity - National Assessment data within the dataset buffer?

Yes

What Dryland Salinity assessments are given?

Assessment 2000	Assessment 2020	Assessment 2050	Distance	Direction
-	High hazard or risk	High hazard or risk	211m	West

Dryland Salinity Data Source : National Land and Water Resources Audit
The Commonwealth and all suppliers of source data used to derive the maps of "Australia, Forecast Areas Containing Land of High Hazard or Risk of Dryland Salinity from 2000 to 2050" do not warrant the accuracy or completeness of information in this product. Any person using or relying upon such information does so on the basis that the Commonwealth and data suppliers shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information. Any persons using this information do so at their own risk.
In many cases where a high risk is indicated, less than 100% of the area will have a high hazard or risk.

Mining

Bungendore Railway Station, Bungendore, NSW 2621

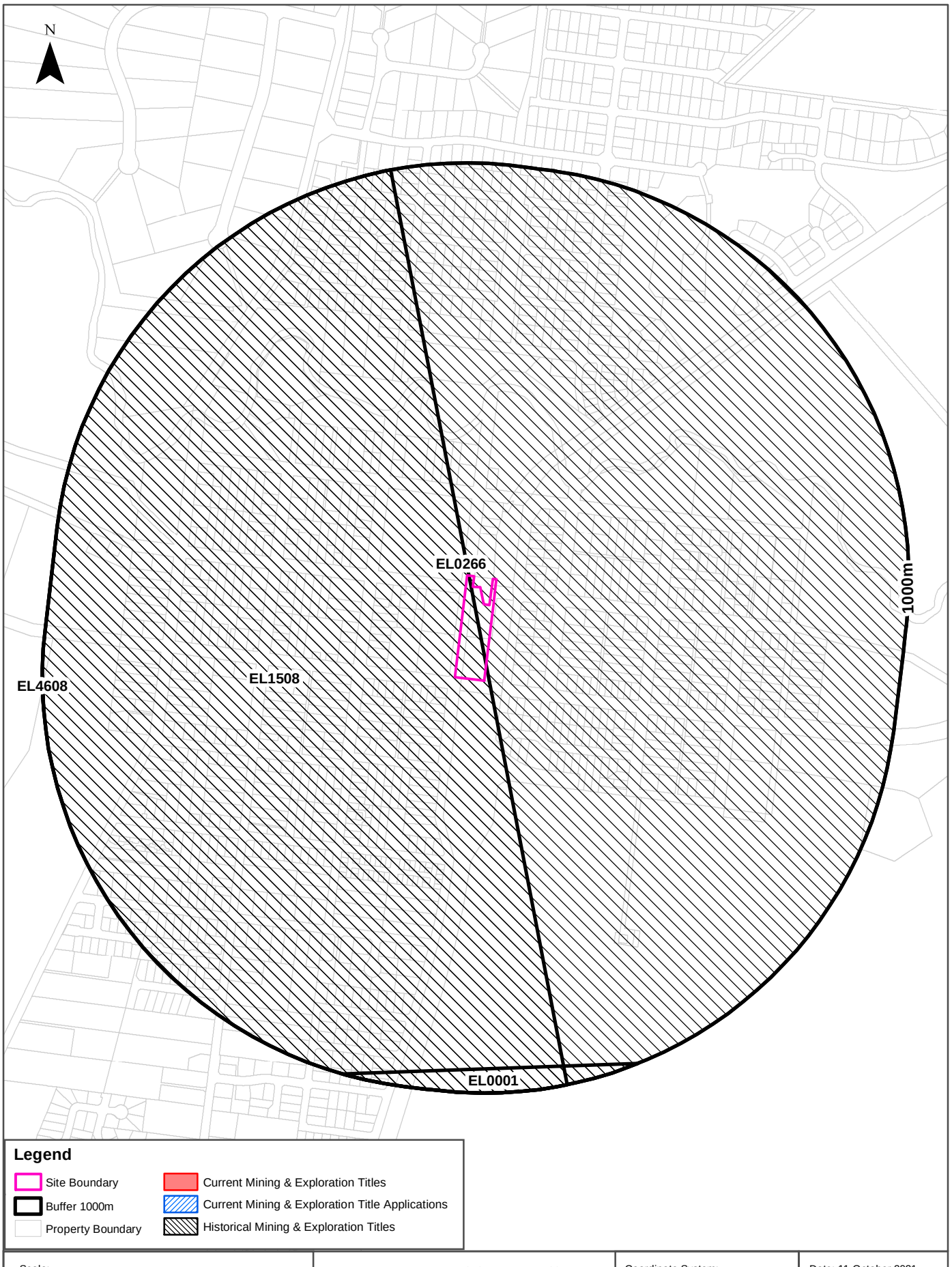
Mining Subsidence Districts

Mining Subsidence Districts within the dataset buffer:

District	Distance	Direction
There are no Mining Subsidence Districts within the report buffer		

Mining & Exploration Titles

Bungendore Railway Station, Bungendore, NSW 2621



Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2021

Coordinate System: GDA 1994 MGA Zone 56

Date: 11 October 2021

Mining

Bungendore Railway Station, Bungendore, NSW 2621

Current Mining & Exploration Titles

Current Mining & Exploration Titles within the dataset buffer:

Title Ref	Holder	Grant Date	Expiry Date	Last Renewed	Operation	Resource	Minerals	Dist	Dir
N/A	No records in buffer								

Current Mining & Exploration Titles Data Source: © State of New South Wales through NSW Department of Industry

Current Mining & Exploration Title Applications

Current Mining & Exploration Title Applications within the dataset buffer:

Application Ref	Applicant	Application Date	Operation	Resource	Minerals	Dist	Dir
N/A	No records in buffer						

Current Mining & Exploration Title Applications Data Source: © State of New South Wales through NSW Department of Industry

Mining

Bungendore Railway Station, Bungendore, NSW 2621

Historical Mining & Exploration Titles

Historical Mining & Exploration Titles within the dataset buffer:

Title Ref	Holder	Start Date	End Date	Resource	Minerals	Dist	Dir
EL0266	JODODEX AUSTRALIA PTY LIMITED	01 Mar 1970	01 Mar 1972	MINERALS	Cu Pb Zn Ni	0m	On-site
EL1508	TECK EXPLORATIONS LIMITED	01 Dec 1980	01 Dec 1982	MINERALS	Cu Pb Zn	0m	On-site
EL0001	ELECTROLYTIC ZINC COMPANY OF AUSTRALASIA LIMITED	01 Mar 1965	01 Sep 1966	MINERALS	Cu Pb Zn	940m	South
EL4608	ORION RESOURCES NL	20 Oct 1993	19 Oct 1995	MINERALS	Au Ag In Mn	999m	West

State Environmental Planning Policy

Bungendore Railway Station, Bungendore, NSW 2621

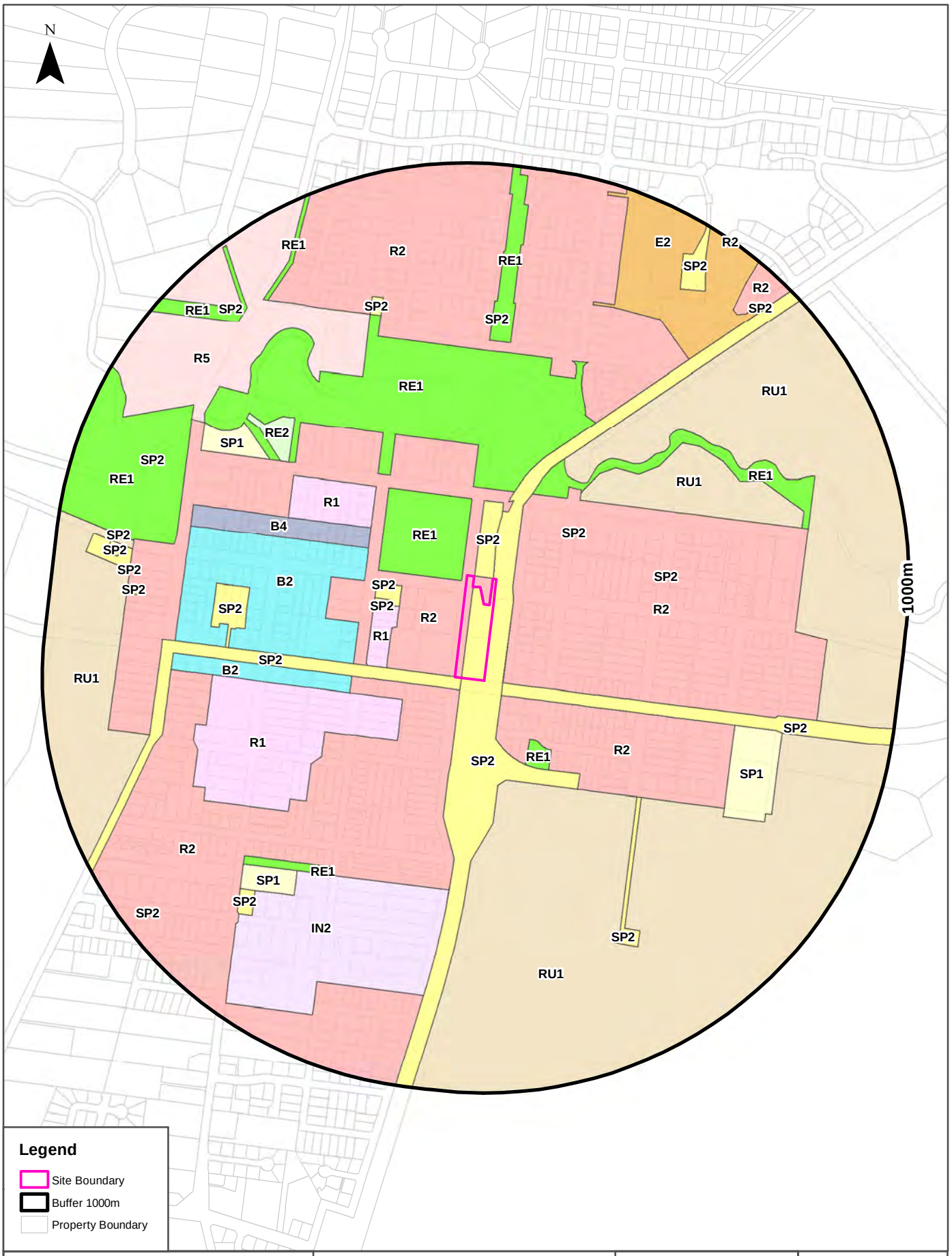
State Significant Precincts

What SEPP State Significant Precincts exist within the dataset buffer?

Map Id	Precinct	EPI Name	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
N/A	No records in buffer							

EPI Planning Zones

Bungendore Railway Station, Bungendore, NSW 2621



Legend

- Site Boundary
- Buffer 1000m
- Property Boundary

Scale: 0 100 200 400 600 Meters	Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2021 Planning: NSW Crown Copyright - Planning & Environment	Coordinate System: GDA 1994 MGA Zone 56	Date: 11 October 2021

Environmental Planning Instrument

Bungendore Railway Station, Bungendore, NSW 2621

Land Zoning

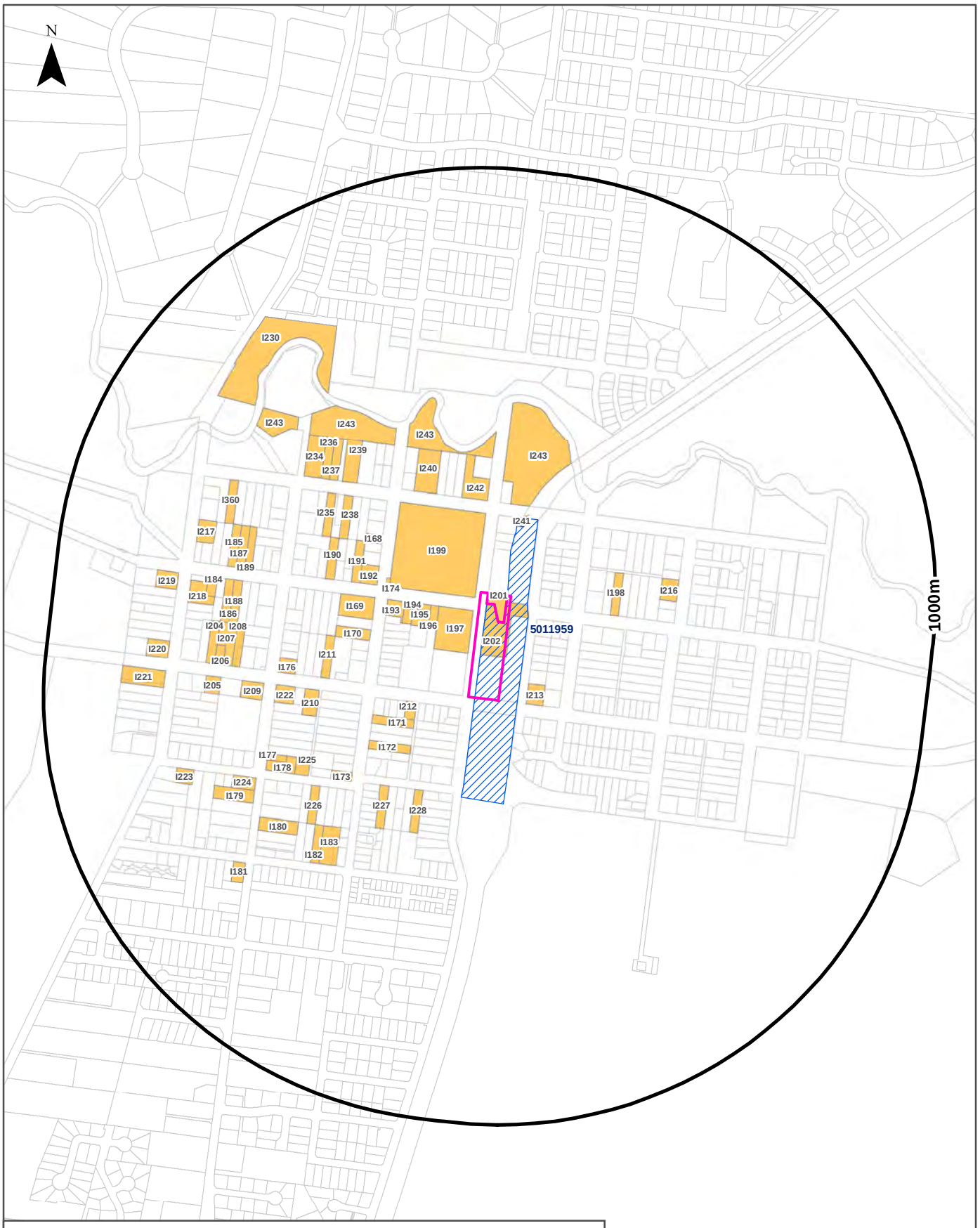
What EPI Land Zones exist within the dataset buffer?

Zone	Description	Purpose	EPI Name	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
SP2	Infrastructure	Rail Infrastructure Facility	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		0m	On-site
R2	Low Density Residential		Palerang Local Environmental Plan 2014	22/06/2018	22/06/2018	30/10/2020	Amendment No 7	0m	On-site
SP2	Infrastructure	Classified Road	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		0m	West
SP2	Infrastructure	Public Administration Building	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		0m	North
RE1	Public Recreation		Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		13m	North West
R2	Low Density Residential		Palerang Local Environmental Plan 2014	22/06/2018	22/06/2018	30/10/2020	Amendment No 7	30m	South West
R2	Low Density Residential		Palerang Local Environmental Plan 2014	22/06/2018	22/06/2018	30/10/2020	Amendment No 7	40m	East
SP2	Infrastructure	Classified Road	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		45m	East
R2	Low Density Residential		Palerang Local Environmental Plan 2014	22/06/2018	22/06/2018	30/10/2020	Amendment No 7	54m	South East
R1	General Residential		Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		139m	South West
R1	General Residential		Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		155m	West
SP2	Infrastructure	Emergency Services Facility	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		155m	North West
RE1	Public Recreation		Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		179m	South East
SP2	Infrastructure	Telecommunications	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		180m	West
RE1	Public Recreation		Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		216m	North
SP2	Infrastructure	Sewerage System	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		216m	North East
RE1	Public Recreation		Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		225m	North East
B2	Local Centre		Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		246m	West
RU1	Primary Production		Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		247m	South East
B4	Mixed Use		Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		249m	North West
B2	Local Centre		Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		251m	West
R1	General Residential		Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		261m	North West
RU1	Primary Production		Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		279m	North East
RU1	Primary Production		Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		304m	East
SP2	Infrastructure	Sewerage System	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		410m	East
R2	Low Density Residential		Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		450m	North
SP2	Infrastructure	Water Supply System	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		464m	South East

Zone	Description	Purpose	EPI Name	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
RE2	Private Recreation		Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		513m	North West
IN2	Light Industrial		Palerang Local Environmental Plan 2014	22/06/2018	22/06/2018	30/10/2020	Amendment No 7	514m	South West
SP2	Infrastructure	Public Car Park	Palerang Local Environmental Plan 2014	19/05/2017	19/05/2017	30/10/2020	Amendment No 4	520m	West
R5	Large Lot Residential		Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		544m	North West
RE1	Public Recreation		Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		550m	South West
SP1	Special Activities	Pound	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		555m	North West
RE1	Public Recreation		Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		572m	North
SP1	Special Activities	Depot	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		606m	South West
SP1	Special Activities	Cemetery	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		616m	South East
SP2	Infrastructure	Sewerage System	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		621m	North
SP2	Infrastructure	Sewerage System	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		664m	North
E2	Environmental Conservation		Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		706m	North East
SP2	Infrastructure	Emergency Services Facility	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		709m	South West
RE1	Public Recreation		Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		711m	North West
RU1	Primary Production		Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		754m	West
SP2	Infrastructure	Sewerage System	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		781m	West
SP2	Infrastructure	Water Supply System	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		811m	North West
SP2	Infrastructure	Electricity Transmission & Distribution	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		813m	West
RE1	Public Recreation		Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		824m	North West
SP2	Infrastructure	Water Supply System	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		833m	North East
SP2	Infrastructure	Water Supply System	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		838m	West
SP2	Infrastructure	Water Supply System	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		839m	West
SP2	Infrastructure	Water Supply System	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		857m	North West
SP2	Infrastructure	Sewerage System	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		908m	North East
SP2	Infrastructure	Sewerage System	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	30/10/2020		931m	South West

Heritage Items

Bungendore Railway Station, Bungendore, NSW 2621



Legend

Property Boundary	Site Boundary	Commonwealth Heritage List	State Heritage Items
	Buffer 1000m	National Heritage List	EPI Heritage Items

Scale: 0 100 200 400 600 Meters	Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2021 Heritage - NSW Crown Copyright - Planning & Environment	Coordinate System: GDA 1994 MGA Zone 56	Date: 11 October 2021

Heritage

Bungendore Railway Station, Bungendore, NSW 2621

Commonwealth Heritage List

What are the Commonwealth Heritage List Items located within the dataset buffer?

Place Id	Name	Address	Place File No	Class	Status	Register Date	Distance	Direction
N/A	No records in buffer							

National Heritage List

What are the National Heritage List Items located within the dataset buffer?
Note. Please click on Place Id to activate a hyperlink to online website.

Place Id	Name	Address	Place File No	Class	Status	Register Date	Distance	Direction
N/A	No records in buffer							

State Heritage Register - Curtilages

What are the State Heritage Register Items located within the dataset buffer?

Map Id	Name	Address	LGA	Listing Date	Listing No	Plan No	Distance	Direction
5011959	Bungendore Railway Station & Yard Group	Gibraltar Street, Bungendore	QUEANBEYAN-PALERANG REGIONAL	02/04/1999	01105	2776	0m	On-site

Environmental Planning Instrument - Heritage

What are the EPI Heritage Items located within the dataset buffer?

Map Id	Name	Classification	Significance	EPI Name	Published Date	Commenced Date	Currency Date	Distance	Direction
I202	Railway station and yard, including station building, signal box, trolley shed, goods shed etc	Item - General	State	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	0m	On-site
I201	Bungendore Stationmasters Cottage	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	0m	North

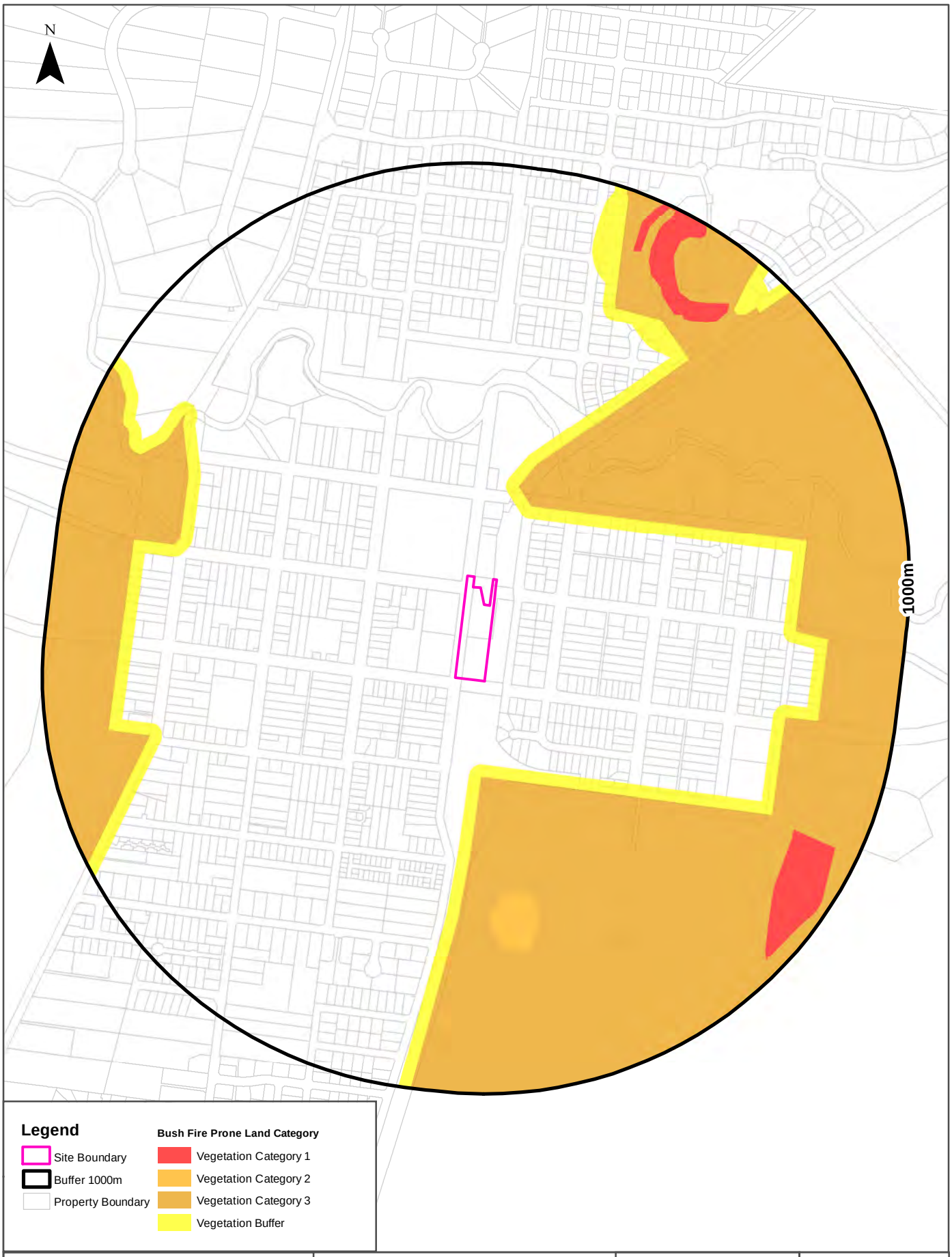
Map Id	Name	Classification	Significance	EPI Name	Published Date	Commenced Date	Currency Date	Distance	Direction
I199	Bungendore Soldiers Memorial	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	13m	North West
I197	Public School Original Buildings	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	14m	North West
I213	Weatherboard Federation cottage, including verandahs, chimneys and windows	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	65m	South East
I196	School of Arts	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	94m	North West
I195	Post Office and shop	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	115m	North West
I212	Weatherboard Cottage	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	124m	South West
I171	St Johns Uniting Church (former)	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	139m	South West
I194	Police residence, including windows and arched lintels	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	155m	North West
I241	Railway signalmans cottage	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	167m	North
I193	Courthouse	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	176m	North West
I172	Weatherboard Cottage	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	178m	South West
I174	P.J.B. Osborne Memorial Fountain	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	195m	North West
I242	Preschool	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	216m	North
I243	Bungendore Common	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	217m	North
I198	Stone barn (former)	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	235m	North East
I192	Stone stables	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	246m	North West
I228	Cottage	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	246m	South West
I169	St Philips Anglican Church, including stained glass windows and 4 gargoyles	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	247m	West
I170	Church hall, including decorative treatments	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	248m	West
I240	St Josephs Convent (former)	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	255m	North
I168	Cottage	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	261m	North West
I227	The Atelier, including verandah and frieze	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	282m	South West

Map Id	Name	Classification	Significance	EPI Name	Published Date	Commenced Date	Currency Date	Distance	Direction
I191	CWA building	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	287m	North West
I243	Bungendore Common	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	317m	North
I173	Rendered cottage, including iron columns on verandah	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	328m	South West
I211	Inter-war weatherboard cottage	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	330m	West
I238	Old Royal Inn	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	339m	North West
I190	Royal Hotel, including iron lacework	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	347m	North West
I216	Cottage, including bush pole posts and roof structure	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	349m	East
I210	Weatherboard Cottage	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	352m	West
I235	Weatherboard Cottage	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	378m	North West
I239	Birchfield	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	389m	North West
I225	Cottage	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	401m	South West
I243	Bungendore Common	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	402m	North West
I226	Weatherboard cottage, including internal pressed tin panelling	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	408m	South West
I222	Village Square, including complex of buildings	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	409m	West
I176	Corner Shop	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	412m	West
I237	Roman Catholic Church Hall	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	427m	North West
I178	Stone Dwelling	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	429m	South West
I183	Weatherboard Cottage	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	431m	South West
I236	St Marys Catholic Church	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	445m	North West
I177	Dwelling	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	450m	South West
I182	Weatherboard Cottage	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	456m	South West
I234	Catholic Presbytery	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	463m	North West
I209	Carrington Inn, including brickwork	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	483m	West
I180	Weatherboard cottage	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	498m	South West

Map Id	Name	Classification	Significance	EPI Name	Published Date	Commenced Date	Currency Date	Distance	Direction
I224	Doctors House (former), including leadlight windows	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	536m	South West
I208	Cottage	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	542m	West
I189	2-storey stone shop	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	543m	North West
I179	St Michael	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	550m	South West
I187	Single-storey shop	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	559m	North West
I188	Strathmore, including iron columns, balustrade and frieze	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	560m	West
I207	Dwelling, including bargeboards and fireplaces	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	561m	West
I243	Bungendore Common	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	579m	North West
I186	Brick dwelling	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	580m	West
I185	Duart, including windows and door	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	580m	North West
I206	House	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	582m	West
I205	Dwelling, including verandah	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	585m	West
I230	Elmslea, including leadlighting and art deco glazing	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	591m	North West
I204	Karingal, including decorative verandah trim and weatherboard cladding	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	602m	West
I360	Weatherboard Cottage	Item - General	Local	Palerang Local Environmental Plan 2014	01/06/2018	01/06/2018	01/06/2018	606m	North West
I218	Beehive Hotel (former), including chimneys and french doors	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	621m	West
I184	Former stone barn	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	621m	West
I217	Deniston, including verandah	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	641m	North West
I181	Thornleigh	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	655m	South West
I223	House	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	669m	West
I219	Commercial Bank (former)	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	712m	West
I220	Elms Villa	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	714m	West
I221	Brick semi detached cottages	Item - General	Local	Palerang Local Environmental Plan 2014	19/09/2014	31/10/2014	01/06/2018	716m	West

Natural Hazards - Bush Fire Prone Land

Bungendore Railway Station, Bungendore, NSW 2621



Data Sources: Bush Fire Prone Land: © NSW Rural Fire Service 2021. Property Boundaries: © Department Finance, Services & Innovation 2021

Coordinate System: GDA 1994 MGA Zone 56

Date: 11 October 2021

Natural Hazards

Bungendore Railway Station, Bungendore, NSW 2621

Bush Fire Prone Land

What are the nearest Bush Fire Prone Land Categories that exist within the dataset buffer?

Bush Fire Prone Land Category	Distance	Direction
Vegetation Buffer	167m	North East
Vegetation Category 3	197m	South East
Vegetation Category 2	514m	South
Vegetation Category 1	774m	North East

Ecological Constraints

Bungendore Railway Station, Bungendore, NSW 2621

Vegetation of the Southern Forests

What vegetation of the Southern Forests exists within the dataset buffer?

Veg Code	Formation	Class	Group	Distance	Direction
N/A	No records in buffer				

Vegetation of the Southern Forests: NSW Office of Environment and Heritage

Ramsar Wetlands

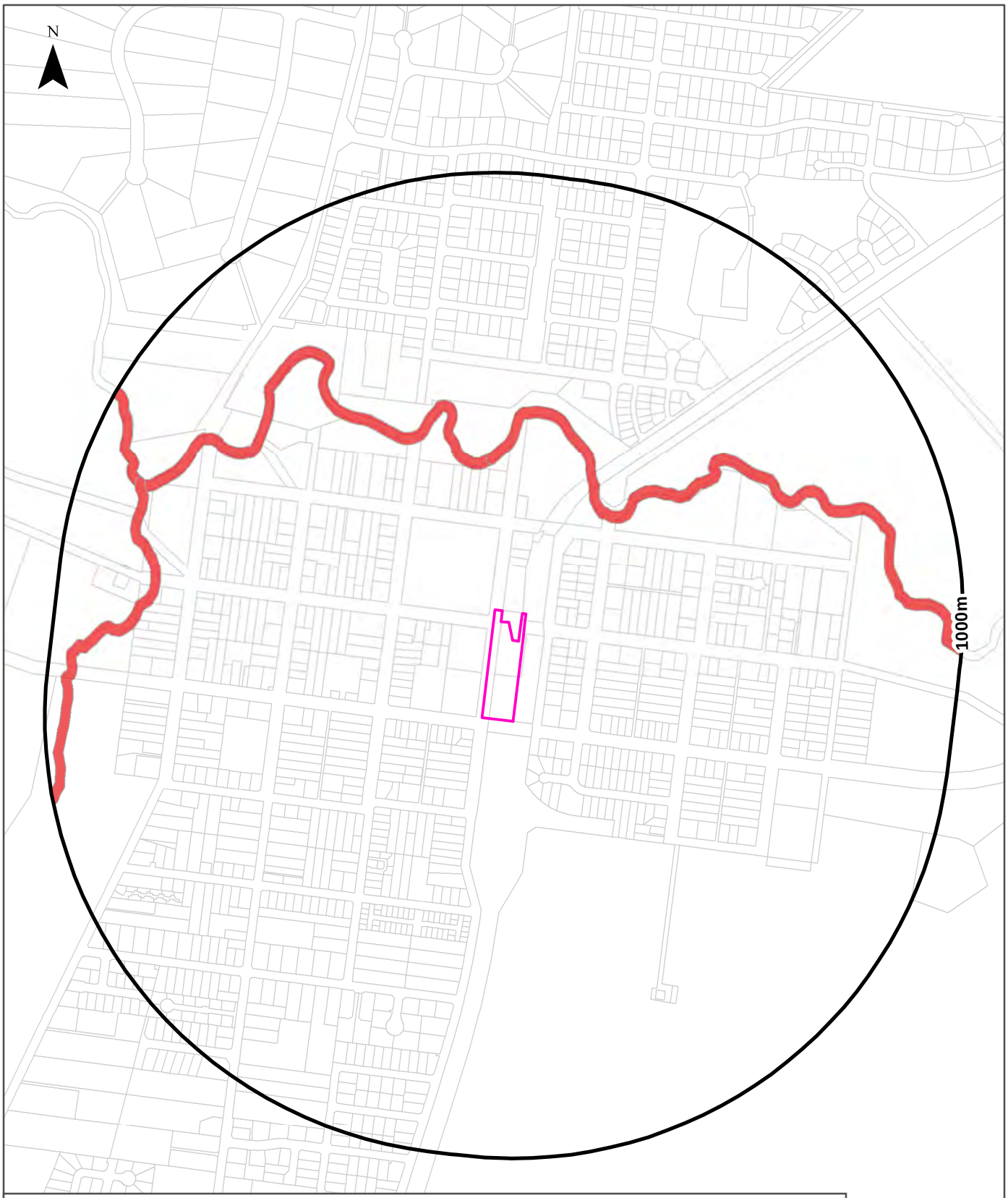
What Ramsar Wetland areas exist within the dataset buffer?

Map Id	Ramsar Name	Wetland Name	Designation Date	Source	Distance	Direction
N/A	No records in buffer					

Ramsar Wetlands Data Source: © Commonwealth of Australia - Department of Agriculture, Water and the Environment

Ecological Constraints - Groundwater Dependent Ecosystems Atlas

Bungendore Railway Station, Bungendore, NSW 2621



Ecological Constraints

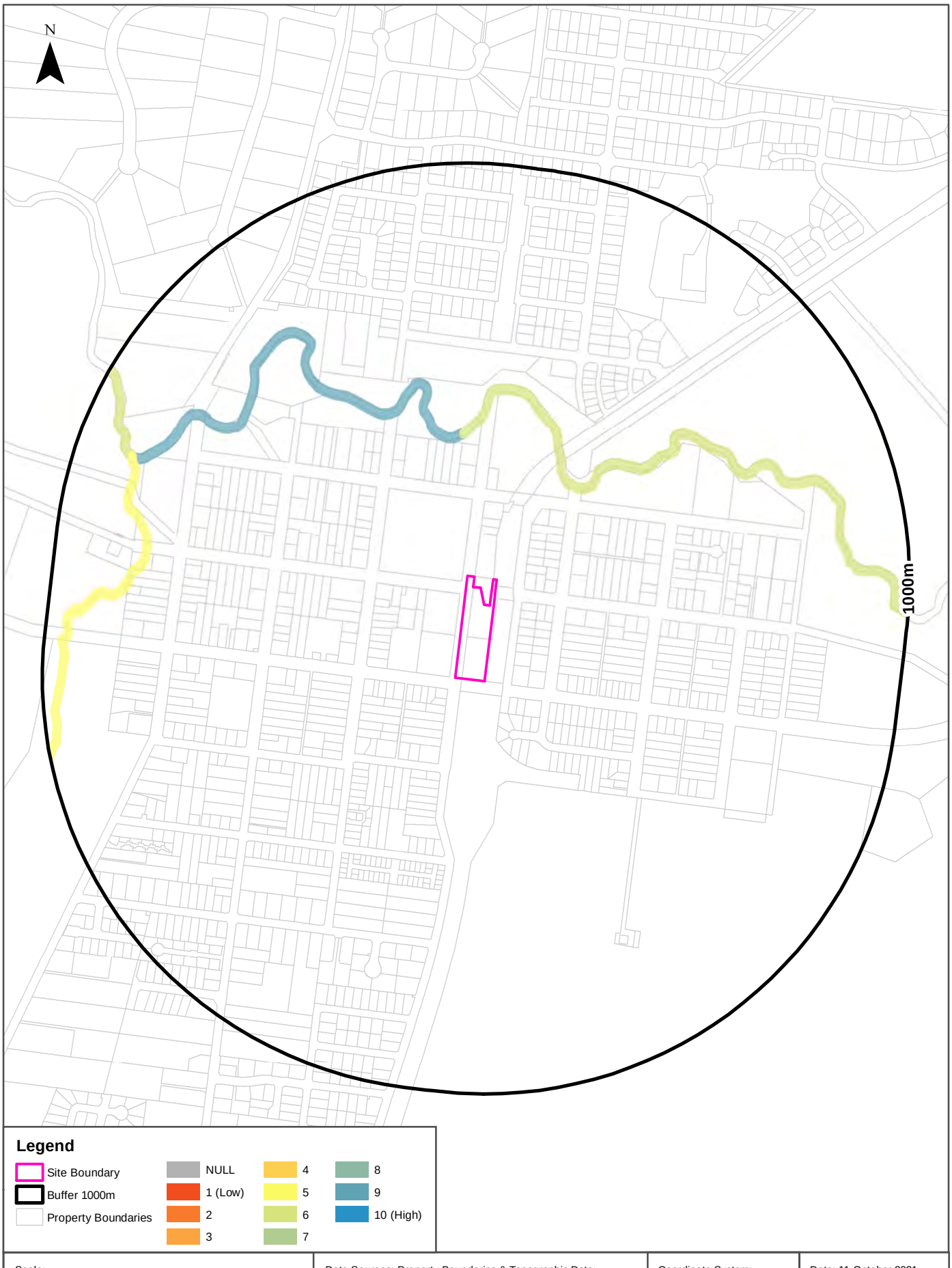
Bungendore Railway Station, Bungendore, NSW 2621

Groundwater Dependent Ecosystems Atlas

Type	GDE Potential	Geomorphology	Ecosystem Type	Aquifer Geology	Distance	Direction
Aquatic	High potential GDE - from national assessment	Upland plains with separating strike-aligned hills, closed lake basins.	River		277m	North East

Ecological Constraints - Inflow Dependent Ecosystems Likelihood

Bungendore Railway Station, Bungendore, NSW 2621



Data Sources: Property Boundaries & Topographic Data:
© Department Finance, Services & Innovation 2021

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11 October 2021

Ecological Constraints

Bungendore Railway Station, Bungendore, NSW 2621

Inflow Dependent Ecosystems Likelihood

Type	IDE Likelihood	Geomorphology	Ecosystem Type	Aquifer Geology	Distance	Direction
Aquatic	6	Upland plains with separating strike-aligned hills, closed lake basins.	River		277m	North East
Aquatic	9	Upland plains with separating strike-aligned hills, closed lake basins.	River		322m	North West
Aquatic	5	Upland plains with separating strike-aligned hills, closed lake basins.	River		768m	West

Ecological Constraints

Bungendore Railway Station, Bungendore, NSW 2621

NSW BioNet Atlas

Species on the NSW BioNet Atlas that have a NSW or federal conservation status, a NSW sensitivity status, or are listed under a migratory species agreement, and are within 10km of the site?

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Amphibia	Litoria castanea	Yellow-spotted Tree Frog	Critically Endangered	Not Sensitive	Endangered	
Animalia	Aves	Anthochaera phrygia	Regent Honeyeater	Critically Endangered	Not Sensitive	Critically Endangered	
Animalia	Aves	Artamus cyanopterus cyanopterus	Dusky Woodswallow	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Calidris acuminata	Sharp-tailed Sandpiper	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Callocephalon fimbriatum	Gang-gang Cockatoo	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Calyptorhynchus lathami	Glossy Black-Cockatoo	Vulnerable	Category 2	Not Listed	
Animalia	Aves	Chthonicola sagittata	Speckled Warbler	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Circus assimilis	Spotted Harrier	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Daphoenositta chrysoptera	Varied Sittella	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Epthianura albifrons	White-fronted Chat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Falco subniger	Black Falcon	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Gallinago hardwickii	Latham's Snipe	Not Listed	Not Sensitive	Not Listed	ROKAMBA;JAMBA
Animalia	Aves	Hieraaetus morphnoides	Little Eagle	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Hirundapus caudacutus	White-throated Needletail	Not Listed	Not Sensitive	Vulnerable	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Pachycephala olivacea	Olive Whistler	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Petroica boodang	Scarlet Robin	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Petroica phoenicea	Flame Robin	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Polytelis swainsonii	Superb Parrot	Vulnerable	Category 3	Vulnerable	
Animalia	Aves	Rostratula australis	Australian Painted Snipe	Endangered	Not Sensitive	Endangered	
Animalia	Aves	Stagonopleura guttata	Diamond Firetail	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Stictonetta naevosa	Freckled Duck	Vulnerable	Not Sensitive	Not Listed	
Animalia	Insecta	Synemon plana	Golden Sun Moth	Endangered	Not Sensitive	Critically Endangered	
Animalia	Mammalia	Petaurus norfolcensis	Squirrel Glider	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Reptilia	Caretta caretta	Loggerhead Turtle	Endangered	Not Sensitive	Endangered	
Animalia	Reptilia	Suta flagellum	Little Whip Snake	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Calotis glandulosa	Mauve Burr-daisy	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Eucalyptus aggregata	Black Gum	Vulnerable	Not Sensitive	Vulnerable	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Plantae	Flora	Eucalyptus leucoxylon subsp. pruinosa	Yellow Gum	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Eucalyptus macarthurii	Paddys River Box, Camden Woollybutt	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Lepidium hyssopifolium	Aromatic Peppercress	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Leucochrysum albicans var. tricolor	Hoary Sunray	Not Listed	Not Sensitive	Endangered	
Plantae	Flora	Senecio macrocarpus		Not Listed	Not Sensitive	Vulnerable	
Plantae	Flora	Swainsona recta	Small Purple-pea	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Wilsonia rotundifolia	Round-leafed Wilsonia	Endangered	Not Sensitive	Not Listed	

Data does not include NSW category 1 sensitive species.

Location Confidences

Where Lotsearch has had to georeference features from supplied addresses, a location confidence has been assigned to the data record. This indicates a confidence to the positional accuracy of the feature. Where applicable, a code is given under the field heading “LC” or “LocConf”. These codes lookup to the following location confidences:

LC Code	Location Confidence
Premise Match	Georeferenced to the site location / premise or part of site
Area Match	Georeferenced to an approximate or general area
Road Match	Georeferenced to a road or rail corridor
Road Intersection	Georeferenced to a road intersection
Buffered Point	A point feature buffered to x metres
Adjacent Match	Land adjacent to a georeferenced feature
Network of Features	Georeferenced to a network of features
Suburb Match	Georeferenced to a suburb boundary
As Supplied	Spatial data supplied by provider

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APPENDIX D DQO'S

D1. DATA QUALITY OBJECTIVES

Data quality objectives (DQOs) were developed to define the type and quality of data required to achieve the project objectives outlined in *Section 1.2*. The DQOs have been prepared in line with the seven-step approach outlined in National Environment Protection (Assessment of Site Contamination) Measure (the ASC NEPM) (NEPC, 1999) (as amended 2013), and with reference to relevant guidelines published by the ACT EPA, specifically the Contaminated Sites Environment Protection Policy (December 2017).

The DQO process is validated, in part, by the quality assurance and quality control (QA/QC) procedures and assessment presented in *Section 6.6* of this report. The seven steps of the DQO process, and how they were applied to this assessment, are presented in the following subsections.

D1.1 STEP 1: STATE THE PROBLEM

The site is currently owned by the Transport for NSW (TfNSW) via the Transport Assets Holding Entity (TAHE) and is managed by Sydney Trains. JHR are currently managing rail operations and maintenance services for the Country Regional Rail Network (CRN) on behalf of TfNSW, which includes the rail corridor adjacent to the Site. ERM understands that TfNSW and JHR would like to understand the likelihood of the presence of contamination at the Site and whether any identified contamination may present a risk of on or offsite receptors.

D1.2 STEP TWO: IDENTIFY THE DECISIONS

Overall the principal decision to be made is whether potential risk to human health or the environment exists as a result of historical site activities. In order to inform this decision, the following questions need to be considered:

- What potential sources of contamination are or were present at the site?
- Is the sampling pattern adequate to collect the required data to achieve the PSI objectives?
- What is the nature and extent of COPCs in near surface soils at the site?
- Is contamination in excess of relevant guideline values present?
- What receptors are potentially at risk of exposure?
- What potential exposure scenarios should be considered?
- Does the contamination likely warrant notification under the Environment Protection Act 1997?
- Is material remediation or management likely to be required?

D1.3 STEP 3: IDENTIFY INPUTS TO DECISION

The primary inputs required to make the above decisions are as follows:

- general observations of the Site;
- review of historical information pertaining to the site;
- the type, number and location of sampling points;

- direct measurement and observation of environmental variables;
- laboratory measurement of soil samples for the identified COPCs;
- field and laboratory quality assurance/quality control data;
- assessment of concentrations of COPCs against relevant published human health and ecological risk screening criteria; and
- Likelihood of identified receptors being exposed to concentrations of COPCs above the relevant adopted criteria.

D1.4 STEP 4: DEFINE THE STUDY BOUNDARIES

D1.4.1 Spatial Boundaries

The spatial boundary of the investigation is limited to the site and specifically the soil investigation locations presented on Figure 2. The investigation included the surface soils (to ~0.1m) within the investigation area.

D1.4.2 Temporal Boundaries

Temporally, the investigation was intended to provide a preliminary assessment the nature and extent of potential soil lead contamination across the investigation area. The preliminary investigation occurred on the 7th & 8th of October 2021

D1.5 STEP FIVE: DEVELOP A DECISION RULE

The DQOs have been developed to facilitate the collection of adequate soil data to address the decisions outlined in Step 2 of the DQO process. The potential significance of field observations / measurement have been considered throughout this investigation, however the primary decision rule utilised for this assessment was comparison of analytical data with relevant published human health and ecological risk screening criteria, and consideration of background conditions.

Individual soil data were compared to the relevant screening criteria. Exceedance of the screening criteria does not necessarily indicate the requirement for remediation or a risk to human health and / or the environment through the qualitative assessment of the potential linkage between the source and the receptor via a pathway and described through the initial conceptual site model (CSM). If individual concentrations exceeded the screening criteria, consideration of the extent of the impact, the potential for receptors to be exposed and regulatory compliance was considered.

D1.5.1 Screening Criteria

The Tier 1 screening criteria for soil data has been selected based on a review of the following reference documents:

- the ASC NEPM: Schedule B1: Guideline on the Investigation Levels for Soil and Groundwater.

Screening criteria were selected with consideration of the following items:

- the Site has been used as an operational railway station (considered to be commercial/industrial);
- ongoing commercial/ industrial use of the Site;

- a school is located across the road from the Site;
- a residence is located on the northern boundary of the Site;
- recreational and communal walking tracks and areas are present onsite;
- primary lithology – range from sands to clays; and
- depth of media under assessment (i.e. <0.1m bgl).

Relevant screening criteria selected for comparison against the soil results are discussed in *Section 5.9* of this report.

D1.5.2 Appropriateness of Laboratory Limit of Reporting

Laboratory analytical techniques have limits to their precision, and the Limit of Reporting (LOR) describes the lowest concentration that can be reported with confidence. Where a given assessment criteria is lower than the LOR concentration, a meaningful comparison generally cannot be made.

This investigation has employed standard LORs. Comparison of the LOR with the assessment criteria will be undertaken to confirm that the assessment criteria are less than the laboratory LOR and any exceptions to this shall be appropriately noted and justified.

D1.6 STEP 6: SPECIFY LIMITS ON DECISION ERRORS

The acceptable limits on decision errors applied during the review of the results will be based on the Data Quality Indicators (DQIs) of Precision, Accuracy, Representativeness, Comparability and Completeness (PARCC) in accordance with the ASC NEPM, Schedule B(3) - Guidelines on Laboratory Analysis.

The potential for significant decision errors will be reduced by:

- completing a robust QA/QC assessment of the data, requiring that 95% of data satisfy the DQIs and therefore placing a limit on the decision error of 5% (see *Section* 5.11 and *Appendix E*);
- assessing whether appropriate sampling and analytical density has been achieved for the purposes of meeting the project objectives; and
- ensuring that the assessment criteria selected are appropriate for the current and future commercial/industrial and open space land uses, as well as potential ecological and residential receptors.

D1.7 STEP 7: DEVELOP (OPTIMISE) THE PLAN FOR COMPLETING THE WORKS

The investigation scope was tailored to match DQOs with project objectives, to combine targeted investigation based on existing knowledge and discussions with JHR. During the site inspection the scope was continuously reviewed to accommodate new information such as potential sources of site contamination (e.g. areas of staining or topography).

APPENDIX E QUALITY ASSURANCE AND QUALITY CONTROL

E1. QUALITY ASSURANCE AND QUALITY CONTROL ASSESSMENT

The objective of this data assessment is to evaluate the quality of data gathered during the investigation detailed in the main body of this report. This process has been undertaken to assess whether the sample data is of a suitable standard to be utilised in this report. The data assessment consists of comparing field and laboratory QA/QC results to documented guidelines outlined in *Section 1.3*. The data assessment has been prepared in accordance with the ASC NEPM – Schedule B2: Guideline on Site Characterisation. Particular reference is made to the PARCC parameters (precision, accuracy, representativeness, completeness and comparability) in evaluating the data quality.

Table E1 presents the degree of QA/QC pertinent to the field investigations.

Table E1 Field QA/QC Assessment

QA/QC Criterion	Comments
QA/QC program includes duplicate samples.	In order to demonstrate the suitability of the 15 primary soil samples analysed, field quality control samples included 1 intra-laboratory duplicate and 1 inter-laboratory duplicates. The Relative Percentage Difference (RPDs) of the soil sample duplicate pair had a number of RDPs outside of the acceptable range for metals. RPDs as presented in *Table E4*. It is considered that the outlying RPD results are likely due to the heterogeneous nature of the materials sampled a potential heterogeneous distribution of contaminants throughout the soil profile. As a conservative measure both the parent and duplicate samples have been presented against the adopted Tier 1 screening criteria.
Appropriate decontamination procedures were adopted.	Decontamination procedures were implemented between collections of samples in accordance with ERM SOPs. Samples were collected from a hand trowel which was decontaminated between each sample location. All non-dedicated sampling equipment was decontaminated between sampling locations where designated disposable materials are not used. Decontamination procedures were as follows: ■ all loose soil removed with a stiff brush; ■ washed in potable (tap) water and brush scrubbing using tap water and a non-phosphate detergent (Decon 90®); ■ rinsed with potable water; and ■ air dried. Field QAQC measures (including the use of new disposable nitrile gloves between samples, and decontamination of sampling tools) were considered appropriate to minimise cross-contamination between samples. The rinsate blank sample did not provide any readings above the EQL (*Table E5*), indicating decontamination measures appropriately mitigated cross contamination.
All relevant media assessed	Soil was collected from near surface materials and submitted for laboratory analysis. This was considered appropriate for the preliminary nature of the investigation.

QA/QC Criterion	Comments
Appropriateness of sampling strategy	The spatial coverage achieved was considered to be suitable in achieving the project objectives, in the context of the preliminary nature of the assessment. In addition to comprehensive spatial coverage, sample locations were distributed across the area of investigation to target historical potential sources of impact to ensure coverage of the area's most likely to be contaminated.
Sample collection, handling and transportation procedures.	Samples were collected, handled and transported in line with ERM SOP's. Soil samples were placed in laboratory supplied sample bags, stored in a cool box, and forwarded to the NATA accredited laboratory under COC conditions. The methods used to collect the samples, the types of sample containers, preservation techniques and custody protocols were documented appropriately.
Field QA/QC plan	The sampling team was suitably qualified and experienced to conduct the required works. Field reports describing the media sampled, any indication of potential contamination, duplicate samples and sampling locations were completed.

Table E2 presents the degree of QA/QC pertinent to the laboratory program.

Table E2 Laboratory QA/QC Assessment

QA/QC Criterion	Comments
Appropriate methodologies used for sample analyses	The laboratory used for the investigation works were NATA accredited All laboratory reports were NATA stamped and signed by a NATA signatory. All methodologies were considered appropriate for the identified contaminants of concern in the matrix.
Appropriate Limit of Reporting (LOR)	The laboratory LOR for each analyte is presented in the laboratory reports and summary tables. Soil samples results were reported with LORs below the relevant site assessment criteria.
Laboratory QA/QC plan	Copies of signed chain of custody forms were returned by the laboratory. The primary laboratory and secondary laboratory were both NATA accredited. All laboratory certificates are provided in *Appendix G.* It is noted that the analytical methods completed were NATA approved as documented on the laboratory reports. Samples were received and analysed within specified laboratory holding times. The types of QA/QC samples analysed by the laboratory for the documented samples were considered sufficient to assess the precision and accuracy of the laboratory methods used. The statistical data presented in the laboratory QA/QC report was considered adequate in demonstrating the precision and accuracy of the methods used to analyse field samples. Any QA/QC outliers are reported in laboratory documentation included in Appendix G and were considered appropriate by the laboratory.

Table E3 below summarises the QA/QC results in relation to the data quality indicators of precision, accuracy, representativeness, comparability and completeness for the investigation sampling program.

Table E3 Overall Sampling and Analysis Methodology Assessment

Field Considerations	Laboratory Considerations
Precision Requirements	
The soil sampling was conducted following ERM SOPs and any variations from these procedures were documented.	Analysis of the following were reported: ■ Laboratory duplicates; and ■ Field intra and inter-laboratory duplicates; and ■ Rinsate blanks.
Precision Comments	
No significant variations from ERM SOPs were noted. As reported in Table E4 Field inter and intra-laboratory duplicates were generally within the acceptance limits, with few exceptions.	
Accuracy Requirements	
The soil sampling was conducted following ERM SOPs and any variations from these procedures were documented.	Analysis of the following were reported where applicable: ■ Laboratory duplicates; ■ Field intra and inter-laboratory duplicates; ■ method blanks; ■ Laboratory control samples.
Accuracy Comments	
No significant variations from ERM SOPs were noted. Laboratory QA/QC samples were generally reported within the acceptance limits specified in the laboratory reports with the exception of those noted above.	
Representativeness Requirements	
Appropriate media were identified and sampled according to ERM SOPs and laboratory standards.	All primary samples were analysed according to the proposed Sampling and Analysis Plan
Representativeness Comments	
The number and type of samples collected as part of investigation works was considered to be representative of the areas of concern**.** The number of sample locations was in accordance with the Sampling and Analysis. Given the investigation density achieved over the site ERM considers that sufficient data is available to establish a suitable assessment of near surface soil conditions at the site.	
Comparability Requirements	
The same SOPs were used during each sampling event. All sampling was conducted by an appropriately qualified and experienced sampler. Impacts of climatic conditions on sample integrity were minimised by storing samples in a chilled cooler. The types of samples collected were consistent.	Analytical methods suitable for the target media were used. The laboratory LORs used to report analyte concentrations were generally less than the adopted investigation criteria for significant contaminants of concern. The same units were used to report analyte concentrations where applicable. Results of laboratory analysis comparable with field screening results where applicable.

Field Considerations	Laboratory Considerations
Comparability Comments	
No significant outliers from the requirements were noted.	
Completeness Requirements	
All relevant locations were sampled, with the exception of locations which were abandoned due to insufficient space for sampling. The sampling program was conducted following ERM SOPs and any variations from these procedures were documented as appropriate. All sampling was conducted by an appropriately qualified and experienced sampler. Documentation of field works was provided.	All critical samples were analysed according to the proposed Sampling and Analysis Plan in ERM proposal C0612302 Appropriate analysis methods and laboratory LORs were used. Sample documentation was provided. Sample holding times were complied with.
Completeness Comments	
The specified requirements for completeness of the dataset were met. The quality of the dataset and overall outcomes of the investigation remain unaffected by the noted RPD and laboratory QA/QC outliers and is considered suitable for the purposes of this investigation.	

Table E.4 - Field Duplicates
Preliminary Site Investigation
Bungendore Station - 0608750

SDG					ALSE-Sydney 08-Oct-21	ALSE-Sydney 08-Oct-21		ALSE-Sydney 08-Oct-21	11-Oct-21	
Field ID				**RPD**	SS-STN-01	D01_211007	**RPD**	SS-STN-01	T01_211007	**RPD**
Sampled Date/Time					7/10/2021 15:00	7/10/2021 15:00		7/10/2021 15:00	7/10/2021 15:00	
Chem_Gr	**ChemNam**	**Units**	**EQL**							
	Moisture C	%	1	17	15.9	15.1	5	15.9		
Metals	Arsenic	mg/kg	5 (Primary): 2 (Interlab)	27	19.0	12.0	45	19.0	17.0	11
	Barium	mg/kg	10	26	60.0	40.0	40	60.0	67.0	11
	Beryllium	mg/kg	1 (Primary): 2 (Interlab)	0	<1.0	<1.0	0	<1.0	<2.0	0
	Boron	mg/kg	50 (Primary): 10 (Interla	0	<50.0	<50.0	0	<50.0	<10.0	0
	Cadmium	mg/kg	1 (Primary): 0.4 (Interlab	**67**	1.0	<1.0	0	1.0	1.2	18
	Chromium	mg/kg	2 (Primary): 5 (Interlab)	13	16.0	12.0	29	**16.0**	**32.0**	**67**
	Cobalt	mg/kg	2 (Primary): 5 (Interlab)	40	3.0	3.0	0	**3.0**	**11.0**	**114**
	Copper	mg/kg	5	17	**70.0**	**49.0**	**35**	70.0	78.0	11
	Lead	mg/kg	5	8	**978.0**	**555.0**	**55**	978.0	770.0	24
	Manganes	mg/kg	5	23	146.0	111.0	27	**146.0**	**240.0**	**49**
	Mercury	mg/kg	0.1	11	**0.2**	**0.1**	**67**	0.2	0.2	0
	Nickel	mg/kg	2 (Primary): 5 (Interlab)	15	5.0	4.0	22	**5.0**	**12.0**	**82**
	Selenium	mg/kg	5 (Primary): 2 (Interlab)	0	<5.0	<5.0	0	<5.0		
	Vanadium	mg/kg	5 (Primary): 10 (Interlab	17	25.0	22.0	13	**25.0**	**81.0**	**106**
	Zinc	mg/kg	5	9	419.0	335.0	22	**419.0**	**650.0**	**43**

*RPDs have only been considered where a concentration is greater than 1 times the EQL.
**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 50 (1-10 x EQL); 30 (10-30 x EQL); 30 (> 30 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Table E.5 - Rinsate Blanks
Preliminary Site Investigation
Bungendore Station - 0608750

SDG	ALSE-Sydney 08-Oct-21
Field ID	R01_211007
Sampled_Date/Time	7/10/2021 15:00
Sample Type	Rinsate

Chem_Group	ChemName	Units	EQL	
Metals	Arsenic	mg/l	0.001	<0.001
	Barium	mg/l	0.001	<0.001
	Beryllium	mg/l	0.001	<0.001
	Boron	mg/l	0.05	<0.05
	Cadmium	mg/l	0.0001	<0.0001
	Chromium (III+VI)	mg/l	0.001	<0.001
	Cobalt	mg/l	0.001	<0.001
	Copper	mg/l	0.001	<0.001
	Lead	mg/l	0.001	<0.001
	Manganese	mg/l	0.001	<0.001
	Mercury	mg/l	0.0001	<0.0001
	Nickel	mg/l	0.001	<0.001
	Selenium	mg/l	0.01	<0.01
	Vanadium	mg/l	0.01	<0.01
	Zinc	mg/l	0.005	<0.005

APPENDIX F PHOTOLOG

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.:
John Holland Rail / Transport for NSW	Bungendore Station	0608750-03

Photo No.	Date:
1	

Direction Photo Taken:
South

Description:

Temporary fencing erected to prevent parking and access to the southern portion of the Site.

Photo No.	Date:
2	

Direction Photo Taken:
North-east

Description:

Patchy long grass looking towards the station building.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.:
John Holland Rail / Transport for NSW	Bungendore Station	0608750-03

Photo No.	Date:
3	

Direction Photo Taken:
South-east

Description:

Patchy long grass looking towards temporary fencing erected in the south east of the site, near to SS-STL-01

Photo No.	Date:
4	

Direction Photo Taken:
West

Description:

Patchy long grass in the south-western extent of the Site.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.:
John Holland Rail / Transport for NSW	Bungendore Station	0608750-03

Photo No.	Date:
5	

Direction Photo Taken:
North-west

Description:

Patchy long grass in the southern extent of the Site, along with temporary fencing.

Photo No.	Date:
6	

Direction Photo Taken:
North-west

Description:

Patchy long grass in the southern extent of the Site.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.:
John Holland Rail / Transport for NSW	Bungendore Station	0608750-03

Photo No.	Date:
7	

Direction Photo Taken:
South

Description:

The drainage channel running the length of the western Site boundary.

Photo No.	Date:
8	

Direction Photo Taken:
North

Description:

The drainage channel running the length of the western Site boundary.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.:
John Holland Rail / Transport for NSW	Bungendore Station	0608750-03

Photo No.	Date:
9	

Direction Photo Taken:
East

Description:

Pooling water in an area with low groundcover north of the southern access on Majara St.

Photo No.	Date:
10	

Direction Photo Taken:
North-west

Description:

Bare patches amongst gumtrees east of the walking bridge in the mid-west of Site.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.:
John Holland Rail / Transport for NSW	Bungendore Station	0608750-03

Photo No.	Date:
11	

Direction Photo Taken:
North-east

Description:

Grassed area through the middle of the site, looking towards the station building in the Sites east.

Photo No.	Date:
12	

Direction Photo Taken:
North

Description:

Bare patches amongst large gum trees in east of the drainage channel in the northwest of Site.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.:
John Holland Rail / Transport for NSW	Bungendore Station	0608750-03

Photo No.	Date:
13	

Direction Photo Taken:
South

Description:

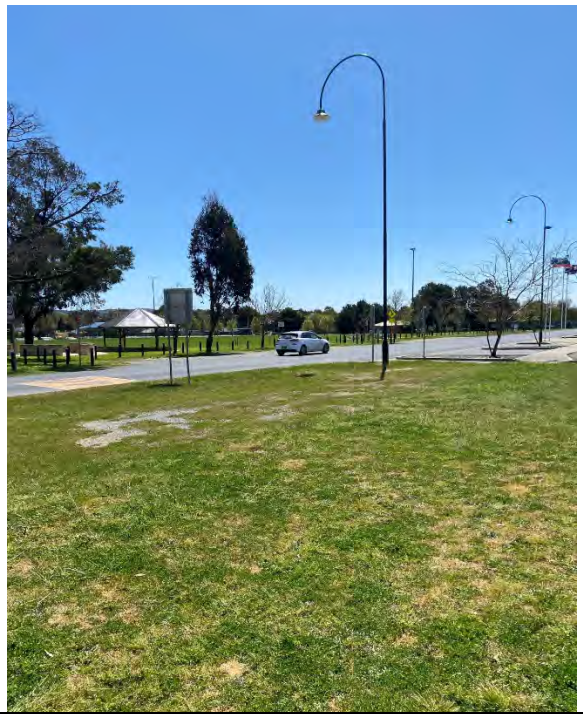
Bare patches and a trail east of the drainage channel in the northwest of Site.

Photo No.	Date:
14	

Direction Photo Taken:
North-west

Description:

Grassed area in the northernmost portion of the Site.



PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.:
John Holland Rail / Transport for NSW	Bungendore Station	0608750-03

Photo No.	Date:
15	

Direction Photo Taken:
North

Description:

Bare gravelly patches in the northernmost portion of Site.

Photo No.	Date:
16	

Direction Photo Taken:
North-west

Description:

Grassed area west of the Stationmasters residence.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.:
John Holland Rail / Transport for NSW	Bungendore Station	0608750-03

Photo No.	Date:
17	

Direction Photo Taken:
South

Description:

The station building and access road.

Photo No.	Date:
18	

Direction Photo Taken:
South

Description:

The station building and current car parking area, near to SS-STN-11.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.:
John Holland Rail / Transport for NSW	Bungendore Station	0608750-03

Photo No.	Date:
19	

Direction Photo Taken:
South-east

Description:

The station building, near to SS-STN-07.

Photo No.	Date:
20	

Direction Photo Taken:
North-west

Description:

SS-STL-01, duplicate and triplicate. Fill layers were noted atop of natural clays.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.:
John Holland Rail / Transport for NSW	Bungendore Station	0608750-03

Photo No.	Date:
21	

Direction Photo Taken:

Description:

SS-STL-02

Photo No.	Date:
22	

Direction Photo Taken:

Description:

SS-STL-03

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.:
John Holland Rail / Transport for NSW	Bungendore Station	0608750-03

Photo No.	Date:
23	

Direction Photo Taken:

Description:

SS-STL-05

Photo No.	Date:
24	

Direction Photo Taken:

Description:

SS-STL-04

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.:
John Holland Rail / Transport for NSW	Bungendore Station	0608750-03

Photo No.	Date:
25	

Direction Photo Taken:

Description:

SS-STL-06

Photo No.	Date:
26	

Direction Photo Taken:
East

Description:

SS-STL-07

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.:
John Holland Rail / Transport for NSW	Bungendore Station	0608750-03

Photo No.	Date:
27	

Direction Photo Taken:

Description:

SS-STL-09

Dry, compacted silts and gravels.

Photo No.	Date:
28	

Direction Photo Taken:
North-west

Description:

SS-STL-08

Dry silts.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.:
John Holland Rail / Transport for NSW	Bungendore Station	0608750-03

Photo No.	Date:
29	

Direction Photo Taken:
North-east

Description:

SS-STL-12

Clayey layers.

Photo No.	Date:
30	

Direction Photo Taken:

Description:

SS-STL-11

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.:
John Holland Rail / Transport for NSW	Bungendore Station	0608750-03

Photo No.	Date:
31	

Direction Photo Taken:
North-east

Description:

SS-STL-13

Moist soil with a higher organic content.

Photo No.	Date:
32	

Direction Photo Taken:

Description:

SS-STL-14

Unusual orange/brown clayey layers.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.:
John Holland Rail / Transport for NSW	Bungendore Station	0608750-03

Photo No.	Date:
33	

Direction Photo Taken:
South

Description:

SS-STL-15

Blue/grey fill, uncharacteristic of the rest of the site.

APPENDIX G LABORATORY DOCUMENTATION

CHAIN OF CUSTODY

ALS Laboratory: please tick →

CLIENT: ERM	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):	FOR LABORATORY USE ONLY (Circle) Custody Seal Intact? Yes No N/A
OFFICE: Newcastle			Free ice / frozen ice bricks present upon receipt? Yes No N/A
PROJECT: 0608750/03 - Bungendore Lead Investigation	ALS QUOTE NO.:	National Price Discount	Random Sample Temperature on Receipt: °C
ORDER NUMBER:		COC SEQUENCE NUMBER (Circle) COC: (1) 2 3 4 5 6 7 OF: (1) 2 3 4 5 6 7	Other comment
PROJECT MANAGER: Matthew Crow	CONTACT PH: 0402652889		
SAMPLER: Max Galbraith	SAMPLER MOBILE:0468384969	RELINQUISHED BY: Max Galbraith DATE/TIME: 11:00 8/10/21	RECEIVED BY: SG2 DATE/TIME: 8/10/21 @ 11pm.
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):	RELINQUISHED BY: DATE/TIME:	RECEIVED BY: DATE/TIME:
Email Reports to (will default to PM if no other addresses are listed):			
Email Invoice to (will default to PM if no other addresses are listed):			

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE: LAB ID	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W): SAMPLE ID	DATE / TIME	MATRIX	CONTAINER INFORMATION: TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required): W-3 (15 Metals)	Additional Information: Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	SS-STN-01	7/10/2021	soil			x	
2	SS-STN-02	7/10/2021	soil			x	
3	SS-STN-03	7/10/2021	soil			x	
4	SS-STN-04	7/10/2021	soil			x	
5	SS-STN-05	7/10/2021	soil			x	
6	SS-STN-06	7/10/2021	soil			x	
7	SS-STN-07	7/10/2021	soil			x	
8	SS-STN-08	7/10/2021	soil			x	
9	SS-STN-09	7/10/2021	soil			x	
10	SS-STN-10	7/10/2021	soil			x	
11	SS-STN-11	7/10/2021	soil			x	
12	SS-STN-12	7/10/2021	soil			x	
13	SS-STN-13	7/10/2021	soil			x	
14	SS-STN-14	7/10/2021	soil			x	
15	SS-STN-15	7/10/2021	soil			x	
16	R01_211007	7/10/2021	Water			x	
17	D01_211007	7/10/2021	soil			x	
18	T01_211007	7/10/2021	soil			x	Interlab sample, forward to Eurofins

Sample ID's as per COC – client

Environmental Division
Sydney
Work Order Reference
ES2136205

Telephone : + 61-2-8784 8555

Eurofins
T01

SM DOLL
11/10 @ 4:40 pm

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

832261

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

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NATA # 1261 Site # 20794

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NATA # 2377 Site # 2370

Eurofins Environment Testing NZ Limited
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Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Sample Receipt Advice

Company name:	ERM Sydney
Contact name:	Matthew Crow
Project name:	BUNGENDORE LEAD INVESTIGATION
Project ID:	0608750/03
Turnaround time:	5 Day
Date/Time received	Oct 11, 2021 4:40 PM
Eurofins reference	832261

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✓	All samples have been received as described on the above COC.
✓	COC has been completed correctly.
✓	Attempt to chill was evident.
✓	Appropriately preserved sample containers have been used.
✓	All samples were received in good condition.
✓	Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
✓	Appropriate sample containers have been used.
✓	Sample containers for volatile analysis received with zero headspace.
X	Split sample sent to requested external lab.
X	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

Contact

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

John Nguyen on phone : or by email: JohnNguyen@eurofins.com

Results will be delivered electronically via email to Matthew Crow - matthew.crow@erm.com.

Note: A copy of these results will also be delivered to the general ERM Sydney email address.

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

Eurofins Environment Testing Australia Pty Ltd
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NATA # 1261 Site # 18217

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NZBN: 9429046024954

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Penrose, Auckland 1061
Phone : +64 9 526 45 51
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Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: ERM Sydney
Address: Level 15, 309 Kent St
Sydney
NSW 2000

Project Name: BUNGENDORE LEAD INVESTIGATION
Project ID: 0608750/03

Order No.:
Report #: 832261
Phone: 02 8584 8888
Fax: 02 8584 8800

Received: Oct 11, 2021 4:40 PM
Due: Oct 18, 2021
Priority: 5 Day
Contact Name: Matthew Crow

Eurofins Analytical Services Manager : John Nguyen

Sample Detail						NEPM 1999 Metals : Metals M15	Moisture Set
Melbourne Laboratory - NATA # 1261 Site # 1254							
Sydney Laboratory - NATA # 1261 Site # 18217						X	X
Brisbane Laboratory - NATA # 1261 Site # 20794							
Mayfield Laboratory - NATA # 1261 Site # 25079							
Perth Laboratory - NATA # 2377 Site # 2370							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	T01_211007	Oct 07, 2021		Soil	S21-Oc30482	X	X
Test Counts						1	1

ERM Sydney
Level 15, 309 Kent St
Sydney
NSW 2000

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **Matthew Crow**

Report **832261-S**
Project name BUNGENDORE LEAD INVESTIGATION
Project ID 0608750/03
Received Date Oct 11, 2021

Client Sample ID			**T01_211007**
Sample Matrix			**Soil**
Eurofins Sample No.			**S21-Oc30482**
Date Sampled			**Oct 07, 2021**
Test/Reference	LOR	Unit	
Chromium (hexavalent)	1	mg/kg	< 1
Chromium (trivalent)	5	mg/kg	32
% Moisture	1	%	9.5
Heavy Metals			
Arsenic	2	mg/kg	17
Barium	10	mg/kg	67
Beryllium	2	mg/kg	< 2
Boron	10	mg/kg	< 10
Cadmium	0.4	mg/kg	1.2
Chromium	5	mg/kg	32
Cobalt	5	mg/kg	11
Copper	5	mg/kg	78
Lead	5	mg/kg	770
Manganese	5	mg/kg	240
Mercury	0.1	mg/kg	0.2
Nickel	5	mg/kg	12
Vanadium	10	mg/kg	81
Zinc	5	mg/kg	650

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Chromium (hexavalent)	Sydney	Oct 18, 2021	28 Days
- Method: In-house method E057.2			
Chromium (trivalent)	Sydney	Oct 14, 2021	28 Days
- Method: E043 /E057 Total Speciated Chromium			
Heavy Metals	Sydney	Oct 18, 2021	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Oct 14, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			

eurofins | Environment Testing

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

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NSW 2000

Project Name: BUNGENDORE LEAD INVESTIGATION
Project ID: 0608750/03

Order No.:
Report #: 832261
Phone: 02 8584 8888
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Received: Oct 11, 2021 4:40 PM
Due: Oct 18, 2021
Priority: 5 Day
Contact Name: Matthew Crow

Eurofins Analytical Services Manager : John Nguyen

Sample Detail						NEPM 1999 Metals : Metals M15	Moisture Set
Melbourne Laboratory - NATA # 1261 Site # 1254							
Sydney Laboratory - NATA # 1261 Site # 18217						X	X
Brisbane Laboratory - NATA # 1261 Site # 20794							
Mayfield Laboratory - NATA # 1261 Site # 25079							
Perth Laboratory - NATA # 2377 Site # 2370							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	T01_211007	Oct 07, 2021		Soil	S21-Oc30482	X	X
Test Counts						1	1

Internal Quality Control Review and Glossary

General

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

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
ug/L: micrograms per litre
ppm: Parts per million
ppb: Parts per billion
%: Percentage
org/100mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

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

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

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

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs..

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM where no positive PFAS results have been reported have been reviewed and no data was affected.

.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Chromium (hexavalent)	mg/kg	< 1			1	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Barium	mg/kg	< 10			10	Pass	
Beryllium	mg/kg	< 2			2	Pass	
Boron	mg/kg	< 10			10	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Cobalt	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Manganese	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Vanadium	mg/kg	< 10			10	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Chromium (hexavalent)	%	104			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	105			80-120	Pass	
Barium	%	86			80-120	Pass	
Beryllium	%	91			80-120	Pass	
Boron	%	106			80-120	Pass	
Cadmium	%	98			80-120	Pass	
Chromium	%	115			80-120	Pass	
Cobalt	%	119			80-120	Pass	
Copper	%	105			80-120	Pass	
Lead	%	115			80-120	Pass	
Manganese	%	107			80-120	Pass	
Mercury	%	107			80-120	Pass	
Nickel	%	106			80-120	Pass	
Vanadium	%	112			80-120	Pass	
Zinc	%	113			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S21-Oc08533	NCP	%	89			75-125	Pass	
Barium	S21-Oc25541	NCP	%	106			75-125	Pass	
Beryllium	S21-Oc08533	NCP	%	76			75-125	Pass	
Boron	S21-Oc08533	NCP	%	82			75-125	Pass	
Cadmium	S21-Oc08533	NCP	%	84			75-125	Pass	
Chromium	S21-Oc08533	NCP	%	93			75-125	Pass	
Cobalt	S21-Oc08533	NCP	%	101			75-125	Pass	
Copper	S21-Oc08533	NCP	%	87			75-125	Pass	
Lead	S21-Oc08533	NCP	%	97			75-125	Pass	
Manganese	S21-Oc24959	NCP	%	120			75-125	Pass	
Mercury	S21-Oc08533	NCP	%	97			75-125	Pass	
Nickel	S21-Oc08533	NCP	%	89			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Vanadium	S21-Oc08533	NCP	%	95			75-125	Pass	
Zinc	S21-Oc08533	NCP	%	97			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
Chromium (hexavalent)	S21-Oc30482	CP	mg/kg	< 1	< 1	<1	30%	Pass	
% Moisture	S21-Oc30372	NCP	%	17	16	4.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S21-Oc08534	NCP	mg/kg	3.0	2.5	21	30%	Pass	
Barium	S21-Oc08534	NCP	mg/kg	35	37	4.0	30%	Pass	
Beryllium	S21-Oc08534	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Boron	S21-Oc08534	NCP	mg/kg	< 10	< 10	<1	30%	Pass	
Cadmium	S21-Oc08534	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S21-Oc08534	NCP	mg/kg	13	13	5.0	30%	Pass	
Cobalt	S21-Oc08534	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Copper	S21-Oc08534	NCP	mg/kg	15	14	10	30%	Pass	
Lead	S21-Oc08534	NCP	mg/kg	72	71	1.0	30%	Pass	
Manganese	S21-Oc08534	NCP	mg/kg	82	82	1.0	30%	Pass	
Mercury	S21-Oc08534	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S21-Oc08534	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Vanadium	S21-Oc08534	NCP	mg/kg	28	26	5.0	30%	Pass	
Zinc	S21-Oc08534	NCP	mg/kg	88	83	5.0	30%	Pass	

Comments

Sample Integrity

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

Authorised by:

John Nguyen	Analytical Services Manager
Charl Du Preez	Senior Analyst-Inorganic (NSW)
John Nguyen	Senior Analyst-Metal (NSW)

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2136205**	Page	: 1 of 7
Client	: **ENVIRONMENTAL RESOURCES MANAGEMENT (ERM)**	Laboratory	: Environmental Division Sydney
Contact	: MR MATTHEW CROW	Contact	: Monica Wright
Address	: LEVEL 1 45 WATT STREET NEWCASTLE NSW 2300	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 4964 2150	Telephone	: +61-2-8784 8555
Project	: 0608750/03-BUNGENDORE LEAD INVESTIGATION	Date Samples Received	: 08-Oct-2021 11:00
Order number	: ----	Date Analysis Commenced	: 12-Oct-2021
C-O-C number	: ----	Issue Date	: 15-Oct-2021 17:31
Sampler	: MAX GALBRAITH		
Site	: ----		
Quote number	: EN/114/20		
No. of samples received	: 17		
No. of samples analysed	: 17		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

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

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

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

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

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

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

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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS-STN-01	SS-STN-02	SS-STN-03	SS-STN-04	SS-STN-05
			Sampling date / time	07-Oct-2021 00:00	07-Oct-2021 00:00	07-Oct-2021 00:00	07-Oct-2021 00:00	07-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	ES2136205-001	ES2136205-002	ES2136205-003	ES2136205-004	ES2136205-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**15.9**	**19.9**	**13.9**	**17.6**	**16.4**
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	**19**	**15**	<5	**6**	<5
Barium	7440-39-3	10	mg/kg	**60**	**90**	**30**	**60**	**50**
Beryllium	7440-41-7	1	mg/kg	<1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg	<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg	**1**	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**16**	**28**	**6**	**13**	**15**
Cobalt	7440-48-4	2	mg/kg	**3**	**6**	<2	**3**	**2**
Copper	7440-50-8	5	mg/kg	**70**	**58**	**10**	**38**	**10**
Lead	7439-92-1	5	mg/kg	**978**	**680**	**42**	**142**	**42**
Manganese	7439-96-5	5	mg/kg	**146**	**267**	**67**	**224**	**134**
Nickel	7440-02-0	2	mg/kg	**5**	**11**	**3**	**5**	**4**
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg	**25**	**40**	**10**	**27**	**20**
Zinc	7440-66-6	5	mg/kg	**419**	**234**	**47**	**122**	**50**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	**0.2**	**0.1**	<0.1	<0.1	<0.1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS-STN-06	SS-STN-07	SS-STN-08	SS-STN-09	SS-STN-10
			Sampling date / time	07-Oct-2021 00:00	07-Oct-2021 00:00	07-Oct-2021 00:00	07-Oct-2021 00:00	07-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	ES2136205-006	ES2136205-007	ES2136205-008	ES2136205-009	ES2136205-010
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**9.8**	**17.3**	**9.9**	**4.5**	**12.9**
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	**15**	<5	**12**
Barium	7440-39-3	10	mg/kg	**30**	**40**	**70**	**100**	**60**
Beryllium	7440-41-7	1	mg/kg	<1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg	<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**10**	**7**	**25**	**5**	**19**
Cobalt	7440-48-4	2	mg/kg	**2**	**2**	**5**	**3**	**4**
Copper	7440-50-8	5	mg/kg	**13**	**6**	**25**	<5	**41**
Lead	7439-92-1	5	mg/kg	**54**	**27**	**35**	**12**	**183**
Manganese	7439-96-5	5	mg/kg	**88**	**164**	**185**	**79**	**290**
Nickel	7440-02-0	2	mg/kg	**5**	**3**	**10**	**3**	**7**
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg	**17**	**11**	**30**	**12**	**33**
Zinc	7440-66-6	5	mg/kg	**40**	**28**	**55**	**14**	**220**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS-STN-11	SS-STN-12	SS-STN-13	SS-STN-14	SS-STN-15
			Sampling date / time	07-Oct-2021 00:00	07-Oct-2021 00:00	07-Oct-2021 00:00	07-Oct-2021 00:00	07-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	ES2136205-011	ES2136205-012	ES2136205-013	ES2136205-014	ES2136205-015
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**20.0**	**15.7**	**21.3**	**20.5**	**6.7**
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	**17**	**8**	**26**	**8**	<5
Barium	7440-39-3	10	mg/kg	**50**	**70**	**80**	**120**	**20**
Beryllium	7440-41-7	1	mg/kg	<1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg	<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**29**	**21**	**16**	**29**	**23**
Cobalt	7440-48-4	2	mg/kg	**2**	**5**	**4**	**4**	**9**
Copper	7440-50-8	5	mg/kg	**35**	**14**	**35**	**28**	**12**
Lead	7439-92-1	5	mg/kg	**282**	**35**	**515**	**17**	**14**
Manganese	7439-96-5	5	mg/kg	**189**	**676**	**243**	**197**	**235**
Nickel	7440-02-0	2	mg/kg	**7**	**7**	**5**	**12**	**9**
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg	**26**	**26**	**23**	**32**	**46**
Zinc	7440-66-6	5	mg/kg	**237**	**64**	**244**	**33**	**32**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	**0.1**	<0.1	<0.1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	D01_211007	----	----	----	----
			Sampling date / time	07-Oct-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2136205-017	--------	--------	--------	--------
				Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**15.1**	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	**12**	----	----	----	----
Barium	7440-39-3	10	mg/kg	**40**	----	----	----	----
Beryllium	7440-41-7	1	mg/kg	<1	----	----	----	----
Boron	7440-42-8	50	mg/kg	<50	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	**12**	----	----	----	----
Cobalt	7440-48-4	2	mg/kg	**3**	----	----	----	----
Copper	7440-50-8	5	mg/kg	**49**	----	----	----	----
Lead	7439-92-1	5	mg/kg	**555**	----	----	----	----
Manganese	7439-96-5	5	mg/kg	**111**	----	----	----	----
Nickel	7440-02-0	2	mg/kg	**4**	----	----	----	----
Selenium	7782-49-2	5	mg/kg	<5	----	----	----	----
Vanadium	7440-62-2	5	mg/kg	**22**	----	----	----	----
Zinc	7440-66-6	5	mg/kg	**335**	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	**0.1**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	R01_211007	----	----	----	----
			Sampling date / time	07-Oct-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2136205-016	--------	--------	--------	--------
				Result	----	----	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	----	----	----	----
Barium	7440-39-3	0.001	mg/L	<0.001	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES2136205**	Page	: 1 of 7
Client	: **ENVIRONMENTAL RESOURCES MANAGEMENT (ERM)**	Laboratory	: Environmental Division Sydney
Contact	: MR MATTHEW CROW	Contact	: Monica Wright
Address	: LEVEL 1 45 WATT STREET NEWCASTLE NSW 2300	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 4964 2150	Telephone	: +61-2-8784 8555
Project	: 0608750/03-BUNGENDORE LEAD INVESTIGATION	Date Samples Received	: 08-Oct-2021
Order number	: ----	Date Analysis Commenced	: 12-Oct-2021
C-O-C number	: ----	Issue Date	: 15-Oct-2021
Sampler	: MAX GALBRAITH		
Site	: ----		
Quote number	: EN/114/20		
No. of samples received	: 17		
No. of samples analysed	: 17		

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Accreditation No. 825
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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

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

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

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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3950303)									
ES2136205-001	SS-STN-01	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	1	1	0.0	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	60	80	25.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	16	14	16.8	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	3	4	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	5	5	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	19	21	7.5	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	70	78	11.9	0% - 50%
		EG005T: Lead	7439-92-1	5	mg/kg	978	1180	18.6	0% - 20%
		EG005T: Manganese	7439-96-5	5	mg/kg	146	172	16.6	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	25	26	5.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	419	496	16.9	0% - 20%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.0	No Limit
ES2135992-001	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	20	20	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	3	<2	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	68	46	38.0	0% - 50%
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	362	296	20.0	0% - 20%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3950303) - continued									
ES2135992-001	Anonymous	EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	238	201	16.5	0% - 20%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.0	No Limit
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3950305)									
ES2136205-012	SS-STN-12	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	70	110	41.4	0% - 50%
		EG005T: Chromium	7440-47-3	2	mg/kg	21	26	20.9	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	5	8	51.4	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	7	9	21.1	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	8	9	13.1	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	14	21	34.5	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	35	31	12.1	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	676	717	6.0	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	26	34	28.1	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	64	60	6.4	0% - 50%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.0	No Limit
ES2136222-004	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	130	160	17.9	0% - 50%
		EG005T: Chromium	7440-47-3	2	mg/kg	20	27	29.0	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	13	15	10.6	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	17	24	33.5	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	6	6	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	20	22	11.8	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	67	65	2.2	0% - 50%
		EG005T: Manganese	7439-96-5	5	mg/kg	315	385	20.0	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	34	40	16.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	64	65	1.6	0% - 50%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.0	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3950309)									
ES2136181-001	Anonymous	EA055: Moisture Content	----	0.1	%	60.0	60.7	1.1	0% - 20%
ES2136205-005	SS-STN-05	EA055: Moisture Content	----	0.1	%	16.4	16.1	2.0	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3950310)									
ES2136205-014	SS-STN-14	EA055: Moisture Content	----	0.1	%	20.5	19.3	5.8	0% - 20%
ES2136222-008	Anonymous	EA055: Moisture Content	----	0.1	%	6.8	7.0	4.0	0% - 20%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3950304)									
ES2136205-001	SS-STN-01	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.2	0.2	0.0	No Limit
ES2136205-011	SS-STN-11	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020T: Total Metals by ICP-MS (QC Lot: 3952183)									
ES2136251-013	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
ES2135838-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.057	0.058	0.0	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.060	0.059	0.0	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.006	0.0	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	0.20	0.20	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3952254)									
ES2135633-005	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
ES2136277-002	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3950303)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	121.1 mg/kg	101	88.0	113
EG005T: Barium	7440-39-3	10	mg/kg	<10	90.5 mg/kg	120	65.0	136
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	0.5 mg/kg	125	70.0	130
EG005T: Boron	7440-42-8	50	mg/kg	<50	----	----	----	----
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	0.74 mg/kg	88.8	70.0	130
EG005T: Chromium	7440-47-3	2	mg/kg	<2	19.6 mg/kg	118	68.0	132
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	10.4 mg/kg	97.0	83.0	117
EG005T: Copper	7440-50-8	5	mg/kg	<5	52.9 mg/kg	107	89.0	111
EG005T: Lead	7439-92-1	5	mg/kg	<5	60.8 mg/kg	90.8	82.0	119
EG005T: Manganese	7439-96-5	5	mg/kg	<5	534 mg/kg	109	83.0	117
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.3 mg/kg	103	80.0	120
EG005T: Selenium	7782-49-2	5	mg/kg	<5	----	----	----	----
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	58.6 mg/kg	124	75.0	125
EG005T: Zinc	7440-66-6	5	mg/kg	<5	139.3 mg/kg	92.2	66.0	133
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3950305)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	121.1 mg/kg	92.5	88.0	113
EG005T: Barium	7440-39-3	10	mg/kg	<10	90.5 mg/kg	110	65.0	136
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	0.5 mg/kg	116	70.0	130
EG005T: Boron	7440-42-8	50	mg/kg	<50	----	----	----	----
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	0.74 mg/kg	85.7	70.0	130
EG005T: Chromium	7440-47-3	2	mg/kg	<2	19.6 mg/kg	111	68.0	132
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	10.4 mg/kg	91.9	83.0	117
EG005T: Copper	7440-50-8	5	mg/kg	<5	52.9 mg/kg	105	89.0	111
EG005T: Lead	7439-92-1	5	mg/kg	<5	60.8 mg/kg	94.4	82.0	119
EG005T: Manganese	7439-96-5	5	mg/kg	<5	534 mg/kg	103	83.0	117
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.3 mg/kg	97.2	80.0	120
EG005T: Selenium	7782-49-2	5	mg/kg	<5	----	----	----	----
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	58.6 mg/kg	111	75.0	125
EG005T: Zinc	7440-66-6	5	mg/kg	<5	139.3 mg/kg	88.5	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3950304)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.087 mg/kg	92.0	70.0	125

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 3952183)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	82.0	114
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	92.7	79.0	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	98.1	84.0	116
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.2	84.0	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.1	86.0	116
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	96.4	84.0	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.4	83.0	118
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	94.3	85.0	115
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	95.7	85.0	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.2	84.0	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	93.5	68.0	126
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	95.2	85.0	113
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	104	79.0	117
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	102	75.0	129
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3952254)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	95.7	77.0	111

Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3950303)							
ES2135992-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	99.7	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	85.8	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	90.5	68.0	132
		EG005T: Copper	7440-50-8	250 mg/kg	102	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	86.9	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	85.3	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	97.3	66.0	133
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3950305)							
ES2136205-012	SS-STN-12	EG005T: Arsenic	7440-38-2	50 mg/kg	103	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	101	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	108	68.0	132
		EG005T: Copper	7440-50-8	250 mg/kg	105	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	99.8	70.0	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3950305) - continued							
ES2136205-012	SS-STN-12	EG005T: Nickel	7440-02-0	50 mg/kg	102	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	97.5	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3950304)							
ES2136205-001	SS-STN-01	EG035T: Mercury	7439-97-6	5 mg/kg	94.2	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 3952183)							
ES2135654-056	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	94.8	70.0	130
		EG020A-T: Beryllium	7440-41-7	1 mg/L	92.8	70.0	130
		EG020A-T: Barium	7440-39-3	1 mg/L	95.7	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	93.8	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	97.1	70.0	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	98.9	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	94.6	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	97.2	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	99.3	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	96.3	70.0	130
		EG020A-T: Vanadium	7440-62-2	1 mg/L	97.9	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	93.8	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3952254)							
ES2135633-016	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	94.9	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2136205**	Page	: 1 of 5
Client	: **ENVIRONMENTAL RESOURCES MANAGEMENT (ERM)**	Laboratory	: Environmental Division Sydney
Contact	: MR MATTHEW CROW	Telephone	: +61-2-8784 8555
Project	: 0608750/03-BUNGENDORE LEAD INVESTIGATION	Date Samples Received	: 08-Oct-2021
Site	: ----	Issue Date	: 15-Oct-2021
Sampler	: MAX GALBRAITH	No. of samples received	: 17
Order number	: ----	No. of samples analysed	: 17

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

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

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

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

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

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

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
SS-STN-01,	SS-STN-02,	**07-Oct-2021**	**----**	----	----	**12-Oct-2021**	21-Oct-2021	✓
SS-STN-03,	SS-STN-04,							
SS-STN-05,	SS-STN-06,							
SS-STN-07,	SS-STN-08,							
SS-STN-09,	SS-STN-10,							
SS-STN-11,	SS-STN-12,							
SS-STN-13,	SS-STN-14,							
SS-STN-15,	D01_211007							
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
SS-STN-01,	SS-STN-02,	**07-Oct-2021**	**13-Oct-2021**	05-Apr-2022	✓	**14-Oct-2021**	05-Apr-2022	✓
SS-STN-03,	SS-STN-04,							
SS-STN-05,	SS-STN-06,							
SS-STN-07,	SS-STN-08,							
SS-STN-09,	SS-STN-10,							
SS-STN-11,	SS-STN-12,							
SS-STN-13,	SS-STN-14,							
SS-STN-15,	D01_211007							
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
SS-STN-01,	SS-STN-02,	**07-Oct-2021**	**13-Oct-2021**	04-Nov-2021	✓	**15-Oct-2021**	04-Nov-2021	✓
SS-STN-03,	SS-STN-04,							
SS-STN-05,	SS-STN-06,							
SS-STN-07,	SS-STN-08,							
SS-STN-09,	SS-STN-10,							
SS-STN-11,	SS-STN-12,							
SS-STN-13,	SS-STN-14,							
SS-STN-15,	D01_211007							

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

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)							
R01_211007	**07-Oct-2021**	**13-Oct-2021**	05-Apr-2022	✓	**13-Oct-2021**	05-Apr-2022	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T)							
R01_211007	**07-Oct-2021**	**----**	----	----	**13-Oct-2021**	04-Nov-2021	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	4	34	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Total Mercury by FIMS	EG035T	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Mercury by FIMS	EG035T	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Total Mercury by FIMS	EG035T	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Total Mercury by FIMS	EG035T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **ES2136205**		
Client	: **ENVIRONMENTAL RESOURCES MANAGEMENT (ERM)**	Laboratory	: Environmental Division Sydney
Contact	: MR MATTHEW CROW	Contact	: Monica Wright
Address	: LEVEL 1 45 WATT STREET NEWCASTLE NSW 2300	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: matthew.crow@erm.com	E-mail	: monica.wright@alsglobal.com
Telephone	: +61 02 4964 2150	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 4962 2152	Facsimile	: +61-2-8784 8500
Project	: 0608750/03-BUNGENDORE LEAD INVESTIGATION	Page	: 1 of 3
Order number	: ----	Quote number	: EP2020ENVRES0018 (EN/114/20)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: MAX GALBRAITH		

Dates

Date Samples Received	: 08-Oct-2021 11:00	Issue Date	: 09-Oct-2021
Client Requested Due Date	: 15-Oct-2021	Scheduled Reporting Date	: **15-Oct-2021**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 0.3'C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 17 / 17

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Sample T01 forwarded to EUROFINS.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

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

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - S-03 15 Metals (NEPM 2013 Suite - incl. Digestion)
ES2136205-001	07-Oct-2021 00:00	SS-STN-01	✓	✓
ES2136205-002	07-Oct-2021 00:00	SS-STN-02	✓	✓
ES2136205-003	07-Oct-2021 00:00	SS-STN-03	✓	✓
ES2136205-004	07-Oct-2021 00:00	SS-STN-04	✓	✓
ES2136205-005	07-Oct-2021 00:00	SS-STN-05	✓	✓
ES2136205-006	07-Oct-2021 00:00	SS-STN-06	✓	✓
ES2136205-007	07-Oct-2021 00:00	SS-STN-07	✓	✓
ES2136205-008	07-Oct-2021 00:00	SS-STN-08	✓	✓
ES2136205-009	07-Oct-2021 00:00	SS-STN-09	✓	✓
ES2136205-010	07-Oct-2021 00:00	SS-STN-10	✓	✓
ES2136205-011	07-Oct-2021 00:00	SS-STN-11	✓	✓
ES2136205-012	07-Oct-2021 00:00	SS-STN-12	✓	✓
ES2136205-013	07-Oct-2021 00:00	SS-STN-13	✓	✓
ES2136205-014	07-Oct-2021 00:00	SS-STN-14	✓	✓
ES2136205-015	07-Oct-2021 00:00	SS-STN-15	✓	✓
ES2136205-017	07-Oct-2021 00:00	D01_211007	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - W-03T 15 Metals (Total) (NEPM)
ES2136205-016	07-Oct-2021 00:00	R01_211007	✓

Proactive Holding Time Report

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

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	au.accounts@erm.com

MATTHEW CROW

- *AU Certificate of Analysis - NATA (COA)	Email	matthew.crow@erm.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	matthew.crow@erm.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	matthew.crow@erm.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	matthew.crow@erm.com
- A4 - AU Tax Invoice (INV)	Email	matthew.crow@erm.com
- Chain of Custody (CoC) (COC)	Email	matthew.crow@erm.com
- EDI Format - ENMRG (ENMRG)	Email	matthew.crow@erm.com
- EDI Format - EQUIS V5 ERM (EQUIS_V5_ERM)	Email	matthew.crow@erm.com
- EDI Format - ESDAT (ESDAT)	Email	matthew.crow@erm.com

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):	FOR LABORATORY USE ONLY (Circle)	
ALS QUOTE NO.: National Price Discount	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7	Custody Seal Intact? Yes No N/A	
		Free ice / frozen ice bricks present upon receipt? Yes No N/A	
		Random Sample Temperature on Receipt: °C	
		Other comment:	
CONTACT PH: 0402852889			
SAMPLER MOBILE:0488384968	RELINQUISHED BY: Max Galbraith	RECEIVED BY: SGZ	RELINQUISHED BY:
EDD FORMAT (or default):	DATE/TIME: 11:00 8/10/21	DATE/TIME: 8/10/21 @ 11pm.	DATE/TIME:

(W)	CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).	Additional Information
[redacted]	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	W-3 (15 Metals)	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
[redacted]	soil		x	
7/10/2021	soil		x	
7/10/2021	soil		x	
7/10/2021	soil		x	
7/10/2021	soil		x	
7/10/2021	soil		x	
7/10/2021	soil		x	
7/10/2021	soil		x	
7/10/2021	soil		x	
7/10/2021	soil		x	
7/10/2021	soil		x	
7/10/2021	soil		x	
7/10/2021	soil		x	
7/10/2021	soil		x	
7/10/2021	soil		x	
7/10/2021	soil		x	
7/10/2021	soil		x	
7/10/2021	Water		x	
7/10/2021	soil		x	
7/10/2021	soil		x	Interlab sample, Forward to Eurofins

per COC
- client

Environmental Division
Sydney
Work Order Reference
ES2136205

Telephone : + 61-2-8784 8555

Eurofins

F01

d Plastic: ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
ed; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
tic/le Bottle; ASS = Plastic Bag for Acid Sulphate Soils, B = Unpreserved Bag.

APPENDIX H RAMBOLL RPT

Intended for
John Holland Rail Pty Ltd

Document type
Report

Date
October 2021

BUNGENDORE TRAIN STATION
ENVIRONMENTAL SITE ASSESSMENT

RAMBOLL

BUNGENDORE TRAIN STATION
ENVIRONMENTAL SITE ASSESSMENT

Project name	Bungendore Train Station
Project no.	318001025-T11-01
Recipient	Michael Hooper
Document type	Report
Description	This report provides the results of the Environmental Site Assessment (ESA) targeting the Bungendore Train Station and surrounding rail corridor at Bungendore, NSW.

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Revision	Date	Prepared by	Checked by	Approved by	Description
Rev 0	15/10/2020	N McGuire	S Maxwell	F Robinson	For client review

F Robinson
CEnvP Certification No. SC400100

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

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ABBREVIATIONS

Measures	Description
%	per cent
µg/m^2	Micrograms per square metre
km	Kilometres
m	Metre
mbgl	Metres below ground level
mg/kg	Milligrams per Kilogram
mm	Millimetre
AHD	Australian Height Datum
CLM Act	NSW Contaminated Land Management Act 1997
COA	Certificate of Analysis
COC	Chain of Custody
Council	Queanbeyan–Palerang Regional Council
DP	Deposited Plan
DQI	Data Quality Indicator
DQO	Data Quality Objective
EIL	Ecological Investigation Level
EPA	Environment Protection Authority (NSW)
ESA	Environmental Site Assessment
ESL	Ecological Screening Level
HIL	Health Investigation Level
HSL	Health Screening Level
LCS	Laboratory Control Sample
LOR	Limit of Reporting
Mercury	Inorganic mercury unless noted otherwise
MS	Matrix Spike
NATA	National Association of Testing Authorities
ND	Not Detected

Measures	Description
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
NL	Non-Limiting
pH	A measure of acidity, hydrogen ion activity
PQL	Practical Quantitation Limit
FPXRF	Portable X-ray Fluorescence
QA/QC	Quality Assurance/Quality Control
RAP	Remediation Action Plan
RPD	Relative Percent Difference
SWL	Standing Water Level
TCLP	Toxicity Characteristic Leaching Procedure
TfNSW	Transport for NSW
UCL	Upper Confidence Limit
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

Ramboll Australia Pty Ltd (Ramboll) was engaged by John Holland Rail Pty Limited (JHR) on behalf of Transport for NSW (TfNSW) to complete an environmental site assessment at the operational Bungendore Train Station and surrounding rail corridor which forms part of the Country Regional Network (CRN) located at Bungendore, New South Wales (NSW) (the site).

The objectives were:

- To assess the potential presence of contamination on site relating to historic transport of ore through the site and
- To determine the need for further assessment in accordance with the Consultants Reporting on Contaminated Land – Contaminated Land Guidelines (NSW EPA 2020)

The scope of work comprised:

- Systematic site inspection
- A total of 49 in field measurement of metals concentrations using field portable x-ray fluorescence (FPXRF). This included 44 surface measurements and five measurements collected to depths of up to 0.1 meter below ground level from three locations where elevated lead concentrations were observed at surface
- Collection of quality control samples for laboratory analysis
- Comparison of results against tier 1 assessment criteria
- Preparation of this report.

A site inspection was completed by Ramboll environmental scientists experienced in assessment of contaminated sites on 13 February 2021. The following items were noted:

- Site topography was relatively flat with a hill to the north of the site where the rail corridor cuts into the hillside.
- The site comprised the Bungendore Station and rail corridor, unsealed car park and roads and adjacent grassland.
- Evidence of some potential ore and mine waste was present in the southern portion of the site in an area which may have historically joined the existing unsealed road for access off of Malbon Street.
- A drainage swale ran along the western site boundary however no water was observed in the swale during the inspection.

Several exceedances of the health-based criteria for lead were observed in the southern portion of the site near a suspected former access road and in the north along the operational railway line. All exceedances to the health-based criteria were reported at less than 0.1 m depth and it's considered the impacts may be limited to shallow soils.

Key recommendations are:

- Land south of the southern driveway entrance to Bungendore Station be isolated from public access
- A Preliminary Site Investigation should be completed in accordance with the National Environment Protection Measure (NEPC 2013) and the Consultants Reporting on Contaminated Land – Contaminated Land Guidelines (NSW EPA 2020) to consolidate background information relevant to assessment of the nature and extent of contamination at the site

- A Detailed Site Investigation should then be completed to characterise the degree and extent of site contamination, associated risks to human health and the environment and drivers for remediation
- Further assessments should inform the potential Duty to Report contamination under the Contaminated Land Management Act.

1. INTRODUCTION

1.1 Preamble

Ramboll Australia Pty Ltd (Ramboll) was engaged by John Holland Rail Pty Limited (JHR) on behalf of Transport for NSW (TfNSW) to complete an environmental site assessment at the operational Bungendore Train Station and surrounding rail corridor which forms part of the Country Regional Network (CRN) located at Bungendore, New South Wales (NSW) (the site).

This report provides the findings of an Environmental Site Assessment (ESA) undertaken at Bungendore Train Station to assess potential sources of heavy metal contamination at the site and potential risks to human and ecological receptors. The ESA was completed as a preliminary investigation of the potential for contamination at the site and the need for further investigations following guidance relevant to contaminated land.

1.2 Background

Review of the NSW Department of Resources and Geoscience website[1] provides the following background:

'The Lake George Mine is situated at Captains Flat, approximately 50km south east of Canberra. The mine operated from 1892 until 1962, producing lead, zinc, copper, pyrite, silver and gold.'

The Lake George Mine now forms part of the NSW Government Legacy Mines Program (former Derelict Mines Program).

During mining operations an ore loadout complex was used to load ore from the mine to train for transport off site. Investigations of contamination at Captains Flat in 2020[2] and 2021[3] revealed that the historic loadout of ore from the Captains Flat Rail Line has resulted in heavy metal contamination along the Captains Flat to Bungendore line extending north of the Captains Flat Train Station. On this basis it was identified that the Bungendore Train Station may be impacted from this historic ore transport activity.

1.3 Objectives

The objectives were:

- To assess the potential presence of contamination on site relating to historic transport of ore through the site and
- To determine the need for further assessment

1.4 Scope of Work

At the direction of JHR the scope was limited to assessment of metals concentrations in surface soils and does not include other potential contaminants of concern or a Preliminary Site Investigation (PSI) as described in the National Environment Protection Measure (NEPC 2013).

The scope of work comprised:

- Systematic site inspection and walk over
- In field measurement of metals concentrations using field portable x-ray fluorescence (FPXRF) with excavation to 0.1 mgl at locations where elevated lead concentrations were observed

[1] https://www.resourcesandgeoscience.nsw.gov.au/landholders-and-community/minerals-and-coal/legacy-mines-program/case-studies/captains-flat-lake-george-mine accessed 23 September 2021

[2] Ramboll 2020, Captains Flat Rail Corridor Environmental Site Assessment

[3] Ramboll 2021, Captains Flat Rail Corridor Preliminary Site Investigation

- Collection of quality control samples for laboratory analysis
- Comparison of results against tier 1 assessment criteria and
- Preparation of this report.

The operational rail line was excluded from assessment.

2. SITE IDENTIFICATION

2.1 Site Identification

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

Table 2-1: Site Identification

Information	Description
Street Address:	20 Majara Street, Bungendore, NSW
Identifier:	Part Lot 2 Deposited Plan (DP) 814518 and Part Lot 4 DP830878 and the rail corridor at Bungendore Station.
Site Area:	Approximately 1.3 hectares (Ha)
Local Government:	Queanbeyan–Palerang Regional Council
Owner:	Managed by JHR as part of the CRN
Current Site Use:	Operational rail corridor

2.2 Site Details

The site comprises the western portion of the Bungendore Train Station and surrounding areas within the CRN. The Bungendore train station services the operational Goulburn-Bombala line however also historically serviced the Captains Flat to Bungendore line between 1940 and 1969 where trains carried ore from the former Lake George Mine.

2.3 Zoning

Review of Palerang Local Environmental Plan 2014 identifies the site is zoned SP2 Rail Infrastructure Facility.

2.4 Surrounding Land Use

The site is located off Majara Street in an area surrounded by land predominately zoned R1 General Residential, R2 Low Density Residential and RE1 Public Recreation.

Surrounding land use includes:

- North: Rail corridor and sports fields.
- East: Rail corridor and residential properties.
- South: Rail corridor and evidence of a former railway yard or siding.
- West: Primary School, sports oval, and mixed residential and commercial properties.

2.5 Environmental Protection Licence

Based on a search of the NSW Environment Protection Authority (EPA) public register (http://www.epa.nsw.gov.au/prpoeoapp/ 23/09/2020) the site forms part of a licensed premises regulated under EPL 13421. The licensed premise includes Country Regional Network operational and non-operational track.

2.6 NSW EPA Records

A search of the 'List of NSW contaminated sites notified to EPA' and the 'Contaminated Land: Record of Notices' current at 23 September 2021 indicates that contamination on or within

1,000 m of the site has not been notified to the EPA and is not regulated by the EPA under the CLM Act 1997.

3. SITE CONDITION AND SURROUNDING ENVIRONMENT

3.1 Topography

Based on information sourced from NSW base maps the site topography appears to be flat with a gentle slope down to the south west. Topographical contours are presented on Figure 1, Appendix 1.

3.2 Geology

According to the NSW Geological Survey (2018) 1:500,000 geology map the site is underlain by Ordovician sedimentary rocks.

3.3 Hydrogeology

A review of the Bureau of Meteorology's National Groundwater Information System (BOM, 2019) indicated that four registered groundwater bores are located within 500 m of the site and a summary of the details contained within the summary reports is presented below:

- Three of the bores were used for domestic purposes and one for monitoring purposes.
- The total drilled depth ranged between 5.1 m - 50 m.
- Standing water level ranged between 4.3 m – 28 m.
- Lithology comprised mainly clay, sand and gravel with water bearing zones reported in gravel.

The Hydrogeology Map of Australia (Geoscience Australia, 2000) indicates the site is within an area of fractured or fissured aquifers of low to moderate productivity.

3.4 Site Inspection

A site inspection was completed by Ramboll environmental scientists experienced in assessment of contaminated sites on 13 February 2021. The following items were noted:

- Site topography was relatively flat with a hill to the north of the site where the rail corridor cuts into the hillside.
- The site comprised the Bungendore Station and rail corridor, unsealed car park and roads and adjacent grassland.
- Evidence of some potential ore and mine waste was present in the southern portion of the site in an area which may have historically joined the existing unsealed road for access off of Malbon Street.
- A drainage swale ran along the western site boundary however no water was observed in the swale during the inspection.

Site photos are presented in Appendix 2.

4. ASSESSMENT CRITERIA

4.1 Soil

The NEPM (2013) provides health-based soil investigation levels (HILs) and ecological investigation levels (EILs) for various land uses. Based on the current land use as a railway station, the assessment criteria adopted for the site are as follows:

- HIL D – HIL for commercial / industrial such as shops, offices, factories and industrial sites. The HILs are applicable for assessing human health risk via all relevant pathways of exposure. The HILs are generic to all soil types and apply generally to a depth of 3 mbgl for industrial use.
- EIL for commercial / industrial. No site specific soil parameters were collected so generic EILs were used.

The soil assessment criteria are summarised in Table 4-1.

Table 4-1: Soil Assessment Criteria (mg/kg)

Contaminant	HIL D	Generic EIL
Arsenic	3,000	160
Chromium	3,600[a]	-
Copper	240,000	-
Iron	-	-
Lead	1,500	1,800
Nickel	6,000	-
Zinc	400,000	-

- Indicates no criteria available

[a]HIL for chromium (VI)

5. SAMPLING AND ANALYSIS QUALITY PLAN

5.1 Data Quality Objectives

To achieve the objectives and purpose of the investigation, both the field and laboratory programs must result in data that is representative of the conditions at the site. As such, specific Data Quality Objectives (DQOs) have been developed for the tasks to be completed. The DQO process is a systematic, seven step process that defines the criteria that the validation sampling should satisfy in accordance with the *Guidelines for the NSW Site Auditor Scheme (3rd Edition)* (NSW EPA 2017).

The seven step DQOs process comprises:

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

The seven step DQO process has been completed for sampling at the site and is outlined in Table 5-1.

Table 5-1: Data Quality Objectives

DQO	Outcome
Step1: State the Problem	Historic rail transport of ore concentrates may have contaminated the site.
Step 2: Identify the Decision	To assess the potential presence of contaminant exposure risks at or originating from the site related to the historic transport of ore concentrates by rail.
Step 3: Identify the Information Inputs	• QA/QC as described in Table 5-2 to assess whether the data collected is of sufficient quality to meet the project objectives. • Preliminary assessment of contaminant migration and exposure pathways and receptors on site and within the surrounding environment to inform assessment of whether potential risks to human health or the environment exist. • Contaminant concentrations on site boundaries to inform assessment of the fate and transport of contaminants off site.
Step 4: Define the Study Boundaries	Spatial boundaries: The site comprised Part Lot 2 Deposited Plan (DP) 814518, Part Lot 4 DP830878 and the rail corridor at Bungendore Station, as defined in Figure 1, Appendix 1. Vertical boundaries: The vertical boundary of the site was limited to shallow site soils. Temporal boundaries: The temporal boundary was limited to the time at which the ESA was completed.
Step 5: Develop a Decision Rule	The decision rules for this assessment are as follows: • If it is determined that the data generated through this investigation is reliable, complete, comparable, accurate and representative then this information will be used to address the project objectives. • If it is determined that the data generated through this investigation is not suitable, comprehensive or reliable, for use in achieving the project objectives, then further investigations may be recommended to reduce uncertainties. • If it is determined that insufficient information is available to make conclusions, then further information may be required. • If concentrations are above guidelines then consider if further investigation, remediation or management is required.
Step 6: Specify Limits of Decision Errors	The acceptable limits on decision error are as follows: • A 5% probability of a false negative (i.e. assessing that the average concentrations of identified CoPC are less than the assessment criteria when they are actually not). • A 5% probability of a false positive (i.e. assessing that the average concentrations of identified CoPC are more than the assessment criteria when they actually are not).
Step 7: Optimise the Design for Obtaining Data	Refer to Section 5.2

5.2 Sampling Plan

The sampling plan for the soil investigation completed under this ESA comprised:

- Systematic FPXRF sampling in-situ at surface at 44 locations on an approximate 18 m grid across the site
- Targeted FPXRF sampling in-situ at surface at three locations where elevated lead was observed at surface
- Sampling and laboratory analyses from 5% of the FPXRF locations for arsenic, chromium, copper, iron, lead and zinc.

The sampling was designed in accordance with the minimum sampling density presented in the NSW Sampling Design Guidelines (NSW EPA, 1998). For a site area of 1.3 hectares a minimum of approximately 23 sampling locations are required.

5.3 Data Quality Indicators

Data Quality Indicators (DQIs) have been established to set acceptance limits on field and laboratory data collected as part of the soil investigation. The DQIs are outlined in Table 5-2.

Table 5-2: Data Quality Indicators

DQI	Field	Laboratory
Completeness – a measure of the amount of usable data from a data collection activity	All critical locations sampled. Experienced sampler. Documentation complete and correct, including field logs, chain of custody documentation recording of FPXRF data.	All critical samples analysed. All analysis completed according to standard operating procedures. Appropriate methods. Appropriate Practical Quantitation Limits (PQLs)
Comparability – the confidence that data may be considered to be equivalent for each sampling and analytical event	Experienced sampler. Same types of samples collected using approved sampling methods. Correlation co-efficient (R^2) for FPXRF and laboratory results for lead of $\geq$ 0.7 (US EPA 2007).	Same analytical methods used. Same sample PQLs. Same NATA accredited laboratory used. Same units.
Representativeness – the confidence that data are representative of each medium present onsite	Appropriate media sampled.	All sampled analysed according to standard operating procedures.
Precision - a quantitative measure of the variability of the data	Collection of laboratory QC samples at a rate of one in 20 FPXRF samples.	Laboratory duplicates analysed, RPDs to be within ≤30 %.
Accuracy – a quantitative measure of the closeness of the reported data to the 'true' value	Sampling methodologies appropriate and complied with. Daily system checks. Measurement of blanks and certified reference materials.	Analysis of replicate samples, method blanks, surrogate spikes and laboratory quality control samples.

6. QUALITY ASSURANCE AND QUALITY CONTROL

6.1 QA/QC Data Evaluation

An assessment was made of data completeness, comparability, representativeness, precision and accuracy based on field and laboratory considerations, as outlined in NEPM 1999 Amendment (2013) guidelines. Assessment of the DQIs of completeness, comparability, representativeness, precision and accuracy is made in Table 6-1.

Table 6-1: QA/QC – Assessment of DQIs

DQI	Ramboll Assessment
Completeness	Sampling was conducted in accordance with frequencies proposed within the NSW Sampling Design Guidelines (1995) for a site of area 1.3 hectares a minimum of 23 sampling locations are required. The sampling completed was considered sufficient to develop a preliminary CSM and to identify remediation or management of contamination required at the site. Within this context the sampling program that was implemented is considered sufficiently complete to address project objectives.
Comparability	The field investigation was completed by experienced personnel in general accordance with sampling methodology guidance described in Section 5.2. FPXRF measurements were completed with a calibrated instrument (calibration certificate provided in Appendix 3) and response regularly checked using certified reference material. The laboratory analysis was undertaken by a NATA registered laboratory using accredited analytical methods. FPXRF measurements reported in parts per million (ppm) were corrected for the % moisture content reported in laboratory check samples to inform assessment of dry weight (mg/kg) contaminant concentrations. The moisture correction which was applied to FPXRF measurements is described by the following formula: Moisture corrected FPXRF = Uncorrected FPXRF/(100 − moisture content)*100 The average moisture content was generally applied to uncorrected FPXRF measurements however where laboratory check samples were collected, the specific moisture content reported in these samples was applied to the corresponding FPXRF data. Correlation co-efficients (R^2) between moisture corrected FPXRF and laboratory samples were then calculated for COPC. Data sets, scatter plots and R^2 values are presented in Appendix 5. For lead the R^2 between moisture corrected FPXRF and laboratory samples was calculated at 0.94.
Representativeness	In the field, representativeness was achieved by completing the sampling described under Completeness above. It is noted however that the operational rail formation was excluded from the site and that contamination may exist in this area and other surrounding areas of the CRN.
Precision	The precision of the FPXRF results can be improved by extending the dwell time of the measurement. A dwell of 60 seconds was adopted during sampling and was considered to provide sufficient precision for the sampling program. In order to further ensure precision in the field FPXRF the following controls were implemented: • FPXRF measurements were collected by an experienced environmental scientist holding a NSW EPA license required for field based XRF testing • FPXRF measurements were collected from soil in-situ and measurements were taken by placing the FPXRF directly on the ground surface • The soil surface was cleared of debris and grass prior to taking the measurement to ensure that there was no obstruction, that the analyser window is protected and that contact with the sample surface was maintained during measurements • As moisture is known to affect measured concentrations, visually dry surfaces were chosen for measurement wherever feasible Soil sampling for confirmatory laboratory analyses occurred at a rate of one every five FPXRF samples. This included:

DQI	Ramboll Assessment
Accuracy	• Collection of samples by a suitably experienced environmental scientist • Disposable nitrile rubber gloves were worn during sample collection and changed between sampling locations • Soil samples were placed directly into laboratory supplied sampling containers and stored on ice in insulated coolers in the field and during transportation to the laboratory • Sample identification, date and analytical requirements were recorded on chain of custody documents. • Samples were transported under chain of custody conditions to a laboratory with NATA accreditation for COPCs. Internal laboratory analytical precision was assessed by sub-sampling primary samples to create laboratory duplicates. Internal precision was assessed through relative percentage difference (RPD) between laboratory duplicates and primary samples. Recovery limits are defined in accordance with the laboratory's NATA certified methods though is based on 70%-130% RPD. At the laboratory, precision was achieved using laboratory control samples, method blanks and laboratory spikes. Accuracy was achieved in the field by ensuring appropriate sampling methodologies were utilised and complied with. Works were completed in accordance with Method 6200, Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment (US EPA 2007). Accuracy of FPXRF data was measured through: • Daily system checks and internal calibration as recommended by the instrument manual. • Measurement of blank reference material (silicon dioxide, SiO2) – this was done at the start of the day and repeated every 10 samples. This was completed to mitigate potential inaccuracies associated with cross-contamination of samples. The analyzer window was also cleaned regularly to prevent cross-contamination. • Certified reference materials were measured to check instrument response and calibration. This was conducted every 25 samples. At the laboratory, accuracy was assessed by analysing blind field replicate samples (and then assessing relative percentage differences with primary samples) and laboratory duplicates.

The sampling methods implemented are described in Section 7 and demonstrate general accordance with relevant guidance documents. Based on this, field quality QA is considered adequate. An assessment of field QC and laboratory QA/QC is presented in Table 6-2.

Table 6-2: QA/QC – Field and Laboratory Quality Assurance and Quality Control

Field and Lab QA/QC	Ramboll Comments
Field quality control samples	Duplicate and triplicate FPXRF measurements were conducted on select soil samples. Daily system checks and internal calibration was also conducted as recommended by the instrument manual. Certified reference material (CRM) and reference blank samples were analysed in the field at a rate of 1 in 10. Laboratory QA samples were analysed at a rate of 20.4% of total FPXRF samples. This exceeds recommendation for a minimum 5% as presented in the USEPA (NEPC 2013). Results of the above QC samples are shown in Appendix 6.
Field quality control results	The following field duplicate (between XRF measurement and primary lab measurement) sample pairs reported relative percentage difference (RPD) exceedances (≤30%): • Arsenic – 118% for BSX24/QA39. • Chromium – 85% for BSX10/QA35. • Copper – 40% for BSX37/QA43. • Lead – 53% for BSX10/QA35. • Zinc – 61% and 52% for BSX24/QA39 and BSX37/QA43.

Field and Lab QA/QC	Ramboll Comments
	The following interlab duplicate sample pairs reported relative percentage difference (RPD) exceedances (≤30%): • Arsenic – 46%, 188% and 198% for QA35/QA36, QA39/QA40 and QA43/QA44 respectively. • Chromium – 51% and 32% for QA39/QA40 and QA43/QA44 respectively. • Copper – 79% and 159% for QA39/QA40 and QA43/QA44 respectively. • Lead– 40%, 46% and 192% for QA35/QA36, QA39/QA40 and QA43/QA44 respectively. • Nickel – 75% and 114% for QA39/QA40 and QA43/QA44 respectively. • Zinc – 54%, 114% and 175% for QA35/QA36, QA39/QA40 and QA43/QA44 respectively. The higher values in each instance were adopted as a conservative approach. The RPD exceedances are likely due to heterogeneous distribution of contamination and difficulty in replication between laboratories with high concentrations of heavy metals. Lower RPDs were reported in the XRF and lab duplicate pairs and indicates the replicability errors are likely due to lab method errors. The soil surface though may also have resulted from high moisture content (average 1.1 %, maximum 22%). All FPXRF systems checks were passed. The FPXRF analysis of SiO2 blank had less than limit-of-detection (LOD) for all CoPCs. The FPXRF analysis of certified reference material reported no RPD exceedances for arsenic and lead. FPXRF calibration certificates, blank and CRM certificates are provided in Appendix 3.
NATA registered laboratory and NATA endorsed methods	Eurofins MGT was used as the primary laboratory. Envirolab was used as the secondary laboratory. The laboratory certificates are NATA stamped.
Analytical methods	Summary analytical methods were included in the laboratory test certificates as shown in Appendix 5.
Holding times	Review of the COCs and laboratory certificates indicated that holding times were met
Practical Quantitation Limits (PQLs)	PQLs for all analyses were below the site screening criteria.
Laboratory quality control samples	Laboratory quality control samples including duplicates, laboratory control samples, matrix spikes, and method blanks were undertaken by the laboratories at appropriate frequencies for soil samples. Results passed acceptance criteria and support reliance on collected data.

Laboratory reports are presented as Appendix 5.

Overall, it is considered that the completed investigation works, and the data obtained adequately complied with the requirements of NEPM 1999 Amendment (2013) guidelines. Concentrations measured by FPXRF are also considered to be of acceptable quality and appropriate for assessment of onsite risks.

6.2 Uncertainties

The FPXRF analysis, like analytical techniques, can suffer from several interferences and factors that can introduce uncertainties in the results. This can affect the accuracy and precision of the instrument. Some of the important factors that were considered were:

- Moisture – sample moisture can cause results of the analysis to be under reported. This can be accounted for by measuring the sample moisture content and applying moisture correction to the results. During field measurements the surface soil was found to be

    - damp and wet in some locations due to previous rainfall. The laboratory soil sample
    - analysis showed that soil moisture was variable and > 20% at sample location BSX37/QA43/QA44. The soil sample was taken from fill within the rail corridor and may have been influenced by recent rain.

  To account for the higher moisture in some of the samples and to reliably assess site related risks, the FPXRF concentrations for the COPC were corrected with average moisture (9.8%).
- Sample heterogeneity can also be a source of uncertainty. The FPXRF results indicate contaminant concentrations in soil were heterogeneous. FPXRF takes measurements on a relatively small sample area of a few millimetres in size. The effective analysis depth (depth from which 99% of the XRF signal originates) can also vary based on organic carbon content, soil moisture and other soil variables. The effect of this is that the volume of soil measured by FPXRF is relatively small compared with the soil volume sampled for laboratory analysis. Therefore, small scale heterogeneity is averaged (diluted) to lower concentrations in a homogenised laboratory sample of larger volume (as a deeper and wider soil area is sampled for laboratory measurement).
- Inconsistent positioning of the XRF analyser can cause deviations in signal path distances, which can introduce errors. To eliminate this source of error, it was ensured that the FPXRF positioning was consistent between samples and always in contact with the surface.
- XRF can also suffer from spectra interferences where spectral lines from different elements can overlap. The Niton analyser uses a 50kV x-ray source to provide sufficient resolution to accurately quantify lead spectral lines.

7. FIELDWORK

Fieldwork was completed on 13 February 2021 by an environmental engineer suitably experienced and qualified in assessment of site contamination integrating FPXRF measurement of metals in soil and collection of various laboratory samples. Further description of specific elements of the fieldwork is presented below.

7.1.1 Portable XRF Measurements

A ThermoFisher Scientific Niton™ XL3t XRF analyser was used for undertaking soil measurements. The instrument was used in soil mode and data was collected using 60 second dwell. The analyser uses a 50kV x-ray tube which provides sufficient flux to enable separation of spectra lines for highly accurate quantification of elements of interest.

FPXRF readings were completed by a suitably experienced scientist holding an NSW EPA license required for field based XRF testing. Testing was completed in accordance with relevant provisions described in US EPA method 6200 (USEPA 2007).

The FPXRF was used in-situ and measurements were taken by placing the FPXRF directly on surface soil. The soil surface to be measured was cleared of debris and grass prior to taking the measurement. This was to ensure that there was no obstruction, the analyser window was protected and maintained the required contact with the sample surface during measurements. As moisture is known to affect measured concentrations (see uncertainty section), visually dry surfaces were chosen for measurement.

Readings were recorded digitally on the FPXRF unit and are reported as a wet weight and are not directly comparable with the dry weight guideline concentration. As the laboratory measurements showed that soil moisture was relatively high, all FPXRF readings were moisture corrected to convert concentrations to dry weight basis.

The sampling program was adjusted based on review of FPXRF lead readings in the field to assess contamination at sources, along pathways and adjacent receptors. The sampling completed was sufficient to develop a preliminary CSM and to identify remediation or management required and therefore meets the project objectives.

7.1.2 Soil Sampling

Soil samples for laboratory analysis were collected by hand per frequency nominated in the SAQP section and in general accordance with *AS 4482.1-2005* (Standards Australia 2005). Three shallow hand augers were advanced using a hand trowel in soil in the southern portion of the site to assess the depth of impacts. Fresh disposable nitrile rubber gloves were used to collect each sample. The hand trowel was rinsed with Decon90 solution and rinsed with potable water between location. Samples were stored in laboratory supplied glass sample jars, labelled with unique identifiers which were cross-referenced with on-site plans and submitted to the laboratory under chain of custody. A rinsate sample was completed on the hand trowel upon the completion of fieldwork.

8. FIELD AND ANALYTICAL RESULTS

8.1 Soil Observations

The highest contaminant concentrations observed through FPXRF measurement were generally associated with the portion of the site nearby the rail formation and the southern portion of the site where fill was present.

8.2 Soil Results

The raw FPXRF data for all metals is provided in Appendix 5. Measured contaminant concentrations were assessed against Tier 1 assessment criteria for commercial/industrial use as presented in Appendix 6. Exceedances are also shown on Figure 1, Appendix 1. FPXRF results are summarised in Table 8-1.

Table 8-1: Summary of Soil Metals Results[4]

	Number of Samples	Detections	Minimum	Maximum	Mean	No > HIL D	No > EIL Commercial / Industrial
Metals							
Arsenic	49	17	<LOD	2,983	426	0	10
Chromium	49	21	<LOD	82	41	0	-
Copper	49	17	<LOD	1008	300	0	-
Iron	49	49	4,500	62,911	19684	-	-
Lead	49	41	<LOD	10,770	1274	14	11
Nickel	49	1	<LOD	66	66	0	-
Zinc	49	33	<LOD	7,286	660	0	-

Elevated lead concentrations exceeded the human health criteria for commercial industrial land use at 13 locations (in 14 samples) as follows:

- Five locations in the southern portion of the site.
- Eight locations along the rail formation to the north of the site.

The highest lead concentration was identified at BSX25 (10,770 ppm) which exceeded the site criteria for human health by more than 7-times. BSX25 is located in the southern portion of the site where the suspected old access road to Bungendore Station is.

Arsenic, chromium, copper, nickel and zinc did not exceed the respective HIL values for commercial/industrial land use.

EIL exceedances were reported for arsenic and lead and were identified at locations similar to health exceedances across the site.

[4] Analytical results are not included in this table as these were completed for the purpose of validating FPXRF results only. As the FPXRF results have been demonstrated to be accurate these results are included in the table.

9. DISCUSSION OF RESULTS

Elevated lead concentrations were observed in two areas of the site and appear to be associated with a southern portion of the site and the operational rail formation. The source of contamination is thought to be from historic transport of ore by rail through the site and potential for ore spills or dust deposition around the site as represented by elevated lead concentrations presented on Figure 2, Appendix 1.

There were no health-based exceedances to the lead criteria in three samples from 0.1 m depth and this indicates the contamination may be limited to shallow depth. Further investigations would be required to confirm.

The extent of investigation completed at the site was limited however based on the sampling completed and the use of the site as a railway station, there are potential risks to human and ecological receptors.

10. CONCLUSIONS AND RECOMMENDATIONS

Ramboll was engaged by JHR on behalf of TfNSW to assess at the operational Bungendore Train Station and surrounding rail corridor which forms part of the CRN located at Bungendore, NSW.

Several exceedances of the HIL for lead were observed in the southern portion of the site near a suspected former access road and in the north along the operational railway line. All exceedances to the HIL were reported at less than 0.1 m depth and it's considered the impacts may be limited to shallow soils.

Key recommendations are:

- Land south of the southern driveway entrance to Bungendore Station be isolated from public access as shown in Figure 2.
- A Preliminary Site Investigation should be completed in accordance with the National Environment Protection Measure (NEPC 2013) and the Consultants Reporting on Contaminated Land – Contaminated Land Guidelines (NSW EPA 2020) to consolidate background information relevant to assessment of the nature and extent of contamination at the site.
- A Detailed Site Investigation should then be completed to characterise the degree and extent of site contamination, associated risks to human health and the environment and drivers for remediation.
- Further assessments should inform the potential Duty to Report contamination under the Contaminated Land Management Act

11. LIMITATIONS

Ramboll Australia Pty Ltd (Ramboll) prepared this report in accordance with the scope of work as outlined in our proposal to JHR dated 11 August 2020 and in accordance with our understanding and interpretation of current regulatory standards.

A representative program of sampling and laboratory analyses was undertaken as part of this investigation, based on past and present known uses of the site (the site and 26 Goulburn St. site). While every care has been taken, concentrations of contaminants measured may not be representative of conditions between the locations sampled and investigated. We cannot therefore preclude the presence of materials that may be hazardous. Site conditions may change over time. This report is based on conditions encountered at the Site at the time of the report and Ramboll disclaims responsibility for any changes that may have occurred after this time.

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

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

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

11.1 User Reliance

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

12. REFERENCES

Bureau of Meteorology (2019), Australian Groundwater Explorer − National Groundwater information System.

NSW EPA (1997), *Contaminated Land Management Act 1997, Public Record,* Accessed on 23 September 2021 at:
https://apps.epa.nsw.gov.au/prclmapp/searchregister.aspx

Geoscience Australia (2000), *Hydrogeology Map of Australia*, 2000

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

NSW EPA. (1995). *Sampling Design Guidelines.*

NSW EPA. (2017). *Guidelines for the Site Auditor Scheme (3rd Edition).*

NSW EPA (2020) *Consultants Reporting on Contaminated Land - Contaminated Land Guidelines*

NSW Geological Survey (2018), 1:500,000 NSW Seamless Geology Map.

NSW Government Resources and Geoscience, Captains Flat (Lake George) Mine accessed on 7 September 2020 available at: NSW Government Resources and Geoscience, Captains Flat (Lake George) Mine accessed on 23 September 2021 available at: https://www.resourcesandgeoscience.nsw.gov.au/landholders-and-community/minerals-and-coal/legacy-mines-program/case-studies/captains-flat-lake-george-mine

POEO (1997), NSW EPA, *Protection of the Environment Operations Act* 1997, Section 308, *Public Registers. Accessed on 23 September 2021 at:*

https://www.epa.nsw.gov.au/licensing-and-regulation/public-registers/about-prpoeo

Ramboll (2020), *Captains Flat Rail Corridor Environmental Site Assessment*

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

Standards Australia (2005) *AS 4482.1—2005 Guide to the investigation and sampling of sites with potentially contaminated soil*

US EPA (2007), *Method 6200, Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment*

APPENDIX 1
FIGURES

Aerial photography by Metromap, flown 19/08/2021

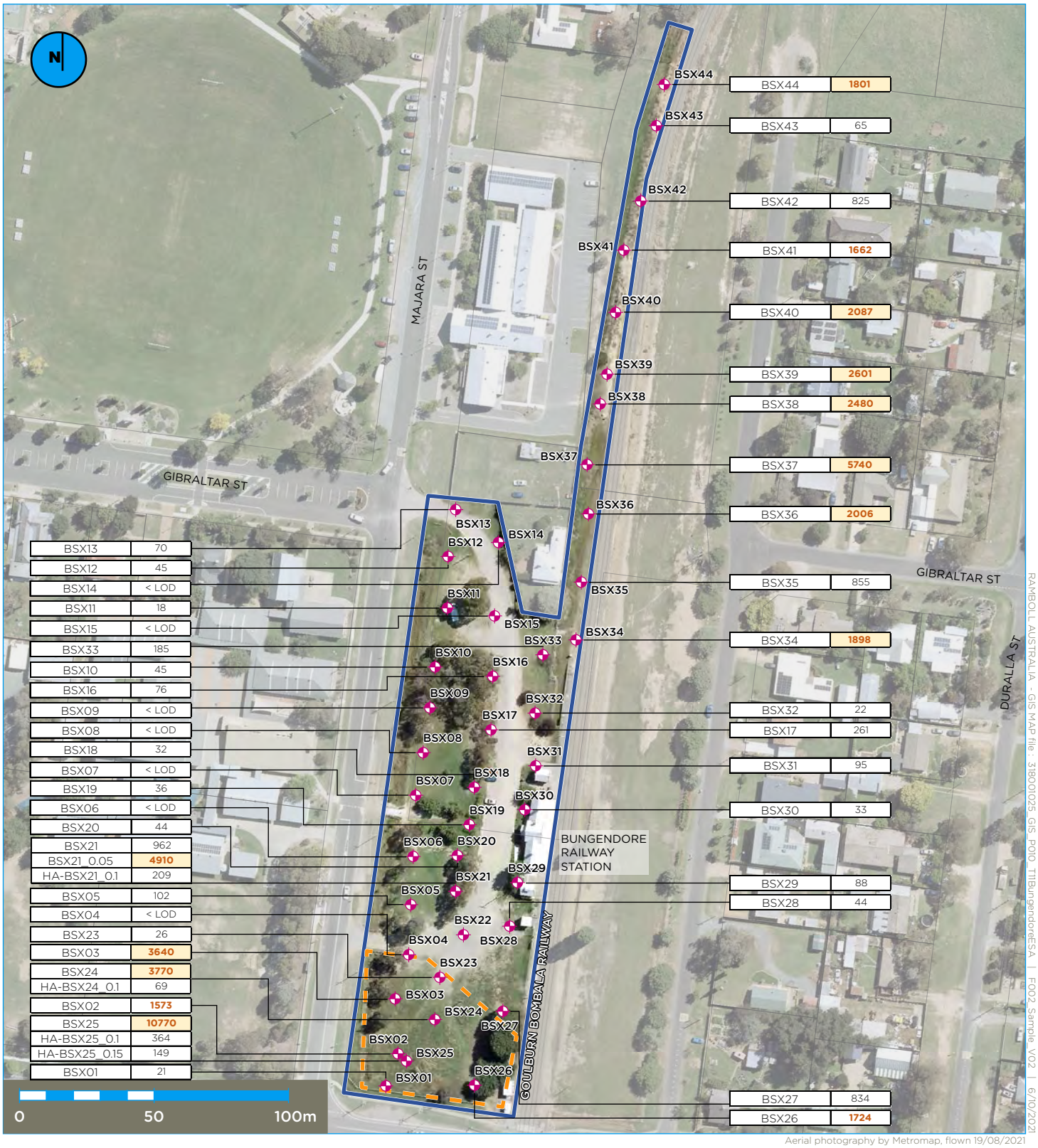
RAMBOLL AUSTRALIA - GIS MAP file: 318001025_GIS_P010_TIIBungendoreESA | F001 Sitelayout_V02 | 6/10/2021

Legend

- Site boundary
- Cadastral boundary (NSW Spatial Service, 2021)
- Contour 1m AHD

A4
1:2,000

Figure 1 : Bungendore Train Station ESA - Site Locality Plan



Aerial photography by Metromap, flown 19/08/2021

RAMBOLL AUSTRALIA - GIS MAP file - 318001025_GIS_P010_TIIBungendoreESA | F002 Sample_V02 | 6/10/2021

Legend

- Sample locations
- Site boundary
- Area to be fenced off
- Cadastral boundary (NSW Spatial Service, 2021)

Exceedance Criteria

Sample ID and Depth (m)	Analyte	HIL D	EIL D
	Lead (mg/kg)	1500	1800

A4
1:2,000

Figure 2 : Bungendore Train Station ESA – Site Features and Sampling Plan

APPENDIX 2
PHOTOGRAPHIC LOG

Photo 1: Bungendore Station and car park looking east.

Photo 2: Bungendore Station entry with raised garden beds.

Photo 3: Vegetated swale on the western boundary of the site.

Photo 4: Rail corridor looking north from Bungendore Station.

Photo 5: Rail corridor looking south from Bungendore Station.

APPENDIX 3
QC AND FPXRF CERTIFICATES

Soil QC Sheet

Revision Date: September 2014

Certificate of Calibration

Serial Number: 58027 | Model: XL3t 500 | Software: 8.4J.14 | Date of Q.C.: 22-January-2021

Resolution: Shaping 20 178.1 | Escale: Shaping 20 7.31 | Source: Tube | Inspector: Dave S

Calibration type: Empirical

60 second analysis time per filter, all switched on

Elements that are in BLUE BOLD should be detected Elements not in BLUE BOLD need not be detected but record if present

NIST HIGH 2710	Certified	Low	High	Measured	Err	Pass	<LOD?
Ba	**707**	**507**	**978**	**750.79**	44.7	OK	
Cs	107	0	400	**66.34**	9.93	OK	
Te	NR	-300	300	**103.85**	35.58	OK	
Sb	38.4	-100	110	**50.1**	11.87	OK	
Sn	NR	-100	100	**68.46**	15.1	OK	
Cd	21.8	-10	50	**28.25**	6.75	OK	
Ag	35.3	0	60	**36.47**	5.46	OK	
Pd	NR	-70	70	**4.99**	7.46	OK	< LOD
Mo	19	0	30	**18.83**	5.37	OK	
Zr	NR			**119.4**	7.66		
Sr	**330**	**280**	**380**	**315.18**	9.81	OK	
U	25	10	40	**26.78**	12.06	OK	
Rb	***120***	**80**	**160**	**122.88**	7.91	OK	
Th	13	-80	80	**47.98**	20.9	OK	
Pb	**5532**	**5400**	**5832**	**5535.76**	80.74	OK	
Se	NR	-30	30	**-13.39**	6.75	OK	< LOD
As	**626**	**510**	**750**	**713.0**	66.1	OK	
Hg	32.6	0	50	**35.6**	13.7	OK	
Au		-20	25	**-4.9**	12.1	OK	< LOD
Zn	**6952**	**6700**	**7250**	**6897.2**	113.5	OK	
W	**93**	**0**	**400**	**107.4**	91.5	OK	< LOD
Cu	**2950**	**2700**	**3250**	**2892.0**	85.2	OK	
Ni	14.3	0	105	**57.80**	38.44	OK	
Co	10	-270	270	**-114.31**	129.99	OK	< LOD
Fe	**33800**	**30420**	**37180**	**36881.7**	493.11	OK	
Mn	**10100**	**9500**	**12000**	**9869.4**	304.3	OK	
Cr	39	-100	120	**48.39**	23.61	OK	
V	76.6	-200	300	**94.94**	47.44	OK	
Ti	2830	2260	3500	**2738.68**	148.73	OK	
Sc	8.7	-160	160	**41.05**	29.23	OK	< LOD
Ca	**12500**	**8000**	**17000**	**10337.2**	310.70	OK	
K	**21100**	**16100**	**26100**	**20173.3**	584.76	OK	
S	2400	-140000	140000	**4470.86**	1170.01	OK	

SiO2 (Blank)	Expected**	Low	High	Measured	Err	Pass	<LOD?
Ba	**0**	-200	200	**-51.62**	29.91	OK	< LOD
Cs	**0**	-260	260	**-11.24**	7.15	OK	< LOD
Te	**0**	-220	220	**-2.05**	26.08	OK	< LOD
Sb	**0**	-120	80	**-2.29**	8.51	OK	< LOD
Sn	**0**	-120	70	**-0.63**	-0.63	OK	
Cd	**0**	-50	50	**-5.49**	4.59	OK	< LOD
Ag	**0**	-30	30	**-0.65**	3.42	OK	< LOD
Pd	**0**	-50	50	**-7.38**	5.28	OK	< LOD
Mo	**0**	-10	10	**1.79**	3.44	OK	< LOD
Zr	**0**	-10	10	**1.04**	2.03	OK	< LOD
Sr	**0**	-10	10	**-2.02**	1.27	OK	< LOD
U	**0**	-10	10	**1.44**	3.71	OK	< LOD
Rb	**<210**	-10	210	**0.3**	1.5	OK	< LOD
Th	**0**	-10	10	**-1.49**	2.65	OK	< LOD
Pb	**0**	-10	10	**-2.69**	4.75	OK	< LOD
Se	**0**	-20	20	**-7.97**	2.08	OK	< LOD
As	**0**	-10	10	**0.16**	3.48	OK	< LOD
Hg	**0**	-10	10	**1.13**	4.22	OK	< LOD
Au	**0**	-10	10	**-0.85**	3.04	OK	< LOD
Zn	**0**	-10	10	**-17.24**	5.79	OK	< LOD
W	**0**	-60	60	**-7.16**	25.51	OK	< LOD
Cu	**0**	-20	20	**-0.74**	11.47	OK	< LOD
Ni	**0**	-70	70	**-3.66**	18.81	OK	< LOD
Co	**0**	-50	50	**10.52**	11.75	OK	< LOD
Fe	**0**	-50	50	**24.42**	24.31	OK	< LOD
Mn	**0**	-100	300	**-4.34**	26.65	OK	< LOD
Cr	**0**	-120	120	**-1.18**	10.03	OK	< LOD
V	**0**	-160	160	**-1.44**	8.2	OK	< LOD
Ti	**0**	-700	700	**20.26**	19.81	OK	< LOD
Sc	**0**	-100	100	**-0.67**	2.84	OK	< LOD
Ca	**0**	-2000	2000	**8.49**	18.84	OK	< LOD
K	**0**	-3000	3000	**22.65**	59.66	OK	< LOD
S	**0**	-140000	140000	**54.49**	252.46	OK	< LOD

NIST LOW 2709	Certified	Low	High	Measured	Err	Pass	<LOD?
Ba	**968**	**638**	**1238**	**773.93**	39.45	OK	
Cs	5.3	-300	300	**24.32**	8.54	OK	
Te	NR	-300	300	**11.22**	30.74	OK	< LOD
Sb	7.9	-90	100	**-2.63**	9.98	OK	< LOD
Sn	NR	-100	100	**24.37**	12.91	OK	
Cd	0.38	-60	60	**-6.16**	5.37	OK	< LOD
Ag	0.41	-40	40	**-4.23**	3.92	OK	< LOD
Pd	NR	-60	60	**-0.87**	6.41	OK	< LOD
Mo	2	-10	10	**2.25**	4.38	OK	< LOD
Zr	**160**	**120**	**200**	**161.74**	6.56	OK	
Sr	**231**	**180**	**300**	**216.95**	7.08	OK	
U	3	-80	80	**2.81**	7.76	OK	< LOD
Rb	***96***	**76**	**115**	**80.10**	5.28	OK	
Th	11	-80	80	**14.58**	4.90	OK	
Pb	18.9	0	35	**6.85**	6.71	OK	< LOD
Se	1.57	-30	30	**-8.11**	3.08	OK	< LOD
As	17.7	0	35	**7.87**	5.31	OK	< LOD
Hg	1.4	-10	10	**6.8**	6.2	OK	< LOD
Au		-15	15	**-3.9**	3.8	OK	< LOD
Zn	**106**	**50**	**160**	**51.34**	13.07	OK	
W	2	-80	80	**26.52**	37.16	OK	< LOD
Cu	34.6	0	60	**46.23**	17.86	OK	
Ni	88	0	125	**61.48**	30.06	OK	
Co	13.4	-250	280	**63.2**	103.68	OK	< LOD
Fe	**35000**	**25000**	**35000**	**29367.32**	379.49	OK	
Mn	538	0	700	**394.9**	69.8	OK	
Cr	130	30	200	**134.7**	23.2	OK	
V	112	-300	400	**147.6**	47.4	OK	
Ti	**3420**	**2700**	**4400**	**3532.2**	149.7	OK	
Sc	NR	-250	250	**0.5**	33.6	OK	< LOD
Ca	**18900**	**13900**	**27000**	**19249.0**	369.8	OK	
K	**20300**	**15300**	**25300**	**18618.7**	514.8	OK	
S	890	-150000	150000	**1359.3**	848.8	OK	

RCRA	Expected**	Low	High	Measured	Err	Pass	<LOD?
Ba				**617.83**	43.17		
Cs				**64.1**	9.73		
Te				**93.04**	34.99		
Sb	**0**	**0**	**0**	**27.56**	12.3		
Sn	0	0	0	**71.83**	15.91		
Cd	**500**	**400**	**600**	**513.41**	13.01	OK	
Ag	**500**	**400**	**600**	**515.93**	12.21	OK	
Pd				**22.32**	8.89		
Mo				**-0.98**	4.92		
Zr				**237.69**	8.29		
Sr	NA			**189.08**	7.31		
U				**4.56**	8.72		
Rb	NA			**81.67**	5.94		
Th				**15.37**	7.86		
Pb	**500**	**400**	**600**	**486.81**	27.88	OK	
Se	**500**	**400**	**600**	**508.08**	20.02	OK	
As	**500**	**400**	**600**	**442.62**	26.36	OK	
Hg	NA			**5.37**	8.26		
Au				-4.51	15.21		
Zn	NA			**36.41**	14.1		
W				**57.53**	45.16		
Cu	NA			**38.47**	20.27		
Ni	NA			**54.52**	36.45		
Co	NA			**210.39**	148.51		
Fe	NA			**49329.11**	539.57		
Mn	NA			**827.95**	102.53		
Cr (variable)	**500**			**400.56**	32.19		
V				**132.82**	52.18		
Ti				**3854.77**	167.53		
Sc				**28.81**	47.17		
Ca				**31567.24**	513.3		
K				**19100.98**	578.1		
S				**1934.88**	1053.81		

GBW 07411	Certified	Low	High	Measured	Err	Pass	<LOD?
Ba	**550**	**320**	**800**	**608.31**	42.91	OK	
Cs	9	-457	457	**41.69**	9.59	OK	
Te	NR	-300	300	**69.67**	34.56	OK	
Sb	9	-80	100	**21.32**	11.36	OK	
Sn	NR	-120	120	**106.1**	15.06	OK	
Cd	28	0	47	**32.57**	6.72	OK	
Ag	5	-35	47	**7.17**	4.65	OK	
Pd	NR	-60	60	**-6.54**	6.89	OK	< LOD
Mo	2	-9	9	**3.41**	5.06	OK	< LOD
Zr	**192**	**25**	**359**	**197.95**	7.99	OK	
Sr	**130**	**95**	**159**	**133.49**	6.47	OK	
U	3	-19	19	**3.08**	9.45	OK	< LOD
Rb	**111**	**61**	**120**	**104.29**	6.86	OK	
Th	**13**	**-18**	**45**	**31.63**	15.04	OK	
Pb	**2700**	**2324**	**2900**	**2733.48**	56.23	OK	
Se	1	-10	15	**-14.91**	5.17	OK	< LOD
As	205	127	283	**173.88**	44.57	OK	
Hg	0	-10	50	**-1.50**	9.71	OK	< LOD
Au		-10	15	**-3.55**	8.47	OK	< LOD
Zn	**3800**	**2711**	**4880**	**3725.91**	82.24	OK	
W	7	-184	184	**56.35**	70.80	OK	< LOD
Cu	**65**	**42**	**80**	**63.08**	23.00	OK	
Ni	24	-35	117	**47.64**	37.50	OK	< LOD
Co	12	-232	232	**26.86**	13.74	OK	
Fe		**0**	**60000**	**59369.55**	612.49	OK	
Mn	9700	4561	10643	**9657.5**	298.6	OK	
Cr	60	-317	380	**48.0**	27.9	OK	
V	89	-325	380	**157.4**	60.9	OK	
Ti	**4100**	**3283**	**4917**	**4469.4**	195.0	OK	
Sc	11	-300	300	**14.3**	51.6	OK	< LOD
Ca		**0**	**365000**	**30755.6**	562.5	OK	
K		**0**	**25000**	**17988.9**	625.9	OK	
S		-16000	16000	**1902.4**	1214.5	OK	

DL1a	Certified	Low	High	Measured	Err	Pass	<LOD?
Ba	ND			**214.82**	33.44		
Cs	ND			**-1.08**	7.71		
Te	ND			**-10.6**	27.91		
Sb	ND			**-7.93**	**9.07**		
Sn	ND			**4.64**	11.55		
Cd	ND			**-4.42**	4.93		
Ag	ND			**-4.45**	3.57		
Pd	ND			**-4.09**	5.75		
Mo	ND			**4.99**	4.17		
Zr	ND			**90.97**	4.63		
Sr	ND			**13.83**	2.27		
U	**116**	**93**	**140**	**113.78**	10.99	OK	
Rb	ND			**94.05**	5.97		
Th	**76**	**60**	**92**	**66.57**	7.24	OK	
Pb	ND			**58.15**	9.12		
Se	ND			**-11.50**	2.71		
As	ND			**-2.38**	6.61		
Hg	ND			**5.2**	5.4		
Au	ND			**0.8**	4.1		
Zn	ND			**23.25**	10.13		
W	ND			**15.20**	31.72		
Cu	ND			**9.45**	13.95		
Ni	ND			**19.13**	23.59		
Co	ND			**70.48**	44.85		
Fe	**9000**			**5524.24**	154.44		
Mn	ND			**49.0**	37.2		
Cr	ND			**47.3**	12.6		
V	ND			**28.4**	20.6		
Ti	900			**949.3**	63.4		
Sc	ND			**7.0**	9.7		
Ca	3000			**2401.7**	120.0		
K	2000			**23718.5**	403.9		
S	4000			**1374.4**	502.2		

Certificate of Calibration

Serial Number: 58027 | Model: XL3t 500 | Software: 8.4J.14 | Date of Q.C.: 22-January-2021
Resolution: Shaping 20 **178.1** | Escale: Shaping 20 **7.31** | Source: Tube | Inspector: Dave S
Calibration type: **Empirical**

60 second analysis time per filter, all switched on

Elements that are in BLUE BOLD should be detected Elements not in BLUE BOLD need not be detected but record if present

TILL4	Certified	Low	High	Measured	Err	Pass	<LOD?
Ba	**395**	**195**	**610**	**448.11**	39.28	OK	
Cs	12	-300	300	**37.27**	8.94	OK	
Te	NR	-300	300	**48.51**	32.21	OK	
Sb	1	-100	100	**16.94**	10.56	OK	
Sn	NR	-100	100	**55.54**	13.64	OK	
Cd	NR	-70	70	**1.7**	5.73	OK	< LOD
Ag	NR	-50	50	**0.15**	4.18	OK	< LOD
Pd	NR	-60	60	**-5.62**	6.48	OK	< LOD
Mo	16	0	30	**11.88**	5.09	OK	
Zr	385	185	585	**402.11**	9.5	OK	
Sr	**109**	**50**	**150**	**115.98**	5.48	OK	
U	5	**-20**	**20**	**-2.79**	9.39	OK	< LOD
Rb	**161**	**100**	**210**	**161.85**	7.40	OK	
Th	17.4	-40	70	**50.73**	7.38	OK	
Pb	50	28	70	**31.37**	8.81	OK	
Se	NR	-15	15	**-9.89**	3.98	OK	< LOD
As	111	80	140	**114.35**	10.49	OK	
Hg	NR	-15	15	**2.5**	8.2	OK	< LOD
Au		-10	10	**4.7**	5.6	OK	< LOD
Zn	70	45	95	**45.14**	13.63	OK	
W	**204**	**130**	**270**	**222.50**	50.02	OK	
Cu	**237**	**200**	**280**	**236.48**	26.83	OK	
Ni	17	-50	90	**31.02**	30.51	OK	< LOD
Co	8	-300	300	**41.28**	117.09	OK	< LOD
Fe	**39700**	**29700**	**49700**	**35744.54**	430.61	OK	
Mn	490	300	600	**384.3**	72.6	OK	
Cr	53	-50	150	**52.9**	21.6	OK	
V	67	-150	250	**77.7**	48.1	OK	
Ti	**4840**	**3870**	**5808**	**4669.3**	162.0	OK	
Sc	10	-150	150	**12.4**	23.6	OK	< LOD
Ca	NR			**7323.6**	260.9		
K	NR			**25681.0**	618.5		
S	800	-130000	130000	**1292.8**	867.4	OK	< LOD

NIST2780	Certified	Low	High	Measured	Err	Pass	<LOD?
Ba	**993**	**844**	**1142**	**1056.68**	44.82	OK	
Cs	13	-10	100	**70.44**	9.64	OK	
Te		0	150	**141.75**	34.8	OK	
Sb	160	100	250	**173.39**	12.61	OK	
Sn		-20	100	**80.01**	14.78	OK	
Cd	12.1	5	30	**15.28**	6.29	OK	
Ag	27	0	120	**31.88**	5.19	OK	
Pd		-15	15	**-0.14**	7.04	OK	< LOD
Mo	11	0	20	**9.02**	5.04	OK	
Zr	176	131	220	**183.95**	7.98	OK	
Sr	**217**	**195**	**239**	**229.58**	8.09	OK	
U	4	-20	20	**11.25**	11.27	OK	< LOD
Rb	175	140	210	**162.39**	8.29	OK	
Th	12	0	55	**48.17**	19.46	OK	
Pb	**5770**	**4904**	**6635**	**5148.08**	74.58	OK	
Se	5	-10	10	**-14.68**	5.98	OK	< LOD
As	48.8	0	90	**1.74**	57.24	OK	< LOD
Hg		-15	15	**1.6**	9.4	OK	< LOD
Au		-20	20	**2.1**	10.5	OK	< LOD
Zn	**2570**	**1800**	**3340**	**2100.81**	60.42	OK	
W		-100	100	**56.17**	59.16	OK	< LOD
Cu	**215.5**	**151**	**280**	**179.58**	27.06	OK	
Ni		-100	100	**13.87**	33.10	OK	< LOD
Co		-200	200	**81.65**	105.37	OK	< LOD
Fe	**27840**	**22272**	**33408**	**25021.21**	382.99	OK	
Mn	**462**	**415**	**508**	**420.4**	77.5	OK	
Cr		0	70	**57.6**	19.7	OK	
V	268	150	350	**264.7**	53.9	OK	
Ti	**6990**	**6291**	**7689**	**6707.9**	175.2	OK	
Sc	23	3	33	**6.1**	13.3	OK	< LOD
Ca	1950	1000	3000	**1705.4**	162.3	OK	
K	**33800**	**30420**	**37180**	**34015.2**	631.6	OK	
S	**12630**	**5000**	**15000**	**11083.6**	1312.2	OK	

This certificate is issued in accordance with Thermo Fisher Scientific factory specifications.
The measurements were found to be within specification limits at the time of calibration.
This certificate is valid for 2 years from the date of calibration.

Standards are traceable to National Institute of Standards & Technology (NIST) standards.
**** - Not Certified**

Signed:

Dave Scattergood
Service Manager

APPENDIX 4
LABORATORY REPORTS (COA)

(1)

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

[ ] Sydney Laboratory
Unit F3 Bld.F, 16 Mars Rd, Lane Cove West, NSW 2066
02 9900 8400 EnviroSampleNSW@eurofins.com

Brisbane Laboratory
Unit 1, 21 Smallwood Pl., Murarrie, QLD 4172
07 3902 4600 EnviroSampleQLD@eurofins.com

Perth Laboratory
Unit 2, 91 Leach Highway, Kewdale WA 6105
08 9251 9600 EnviroSampleWA@eurofins.com

[ ] Melbourne Laboratory
2 Kingston Town Close, Oakleigh, VIC 3166
03 8564 5000 EnviroSampleVic@eurofins.com

Company	Ramboll	Project №	318001025 _4	Project Manager	Stephen Maxwell
Address	50 Glebe Road the Junction	Project Name		EDD Format (ESdat, EQuIS,	Excel and PDF
Contact Name	Stephen Maxwell				
Phone №					
Special Directions					
Purchase Order					
Quote ID №	180813RAMN_1				

Sampler(s)	NM
Handed over by	TF
Email for Invoice	smaxwell@ramboll.com asiapac-accounts@ramboll.com
Email for Results	smaxwell@ramboll.com

Turnaround Time (TAT) Requirements (Default will be 3 days if not ticked)

[ ] Overnight (9am)*
[ ] 1 Day* [ ] 2 Day*
[ ] 3 Day* [✓] 5 Day
[ ] Other ( )
* Surcharges apply

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

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	8 Heavy Metals	1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964 WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	QA34	13/2/21	S	X									
2	QA35			X									
3	QA36			X									Please send to envirolab
4	QA37			X									
5	QA38			X									
8	QA39			X									
9	QA40			X									Please send to envirolab
10	QA41			X									
	Total Counts												

Method of Shipment	[ ] Courier (#) [ ] Hand Delivered	[ ] Postal	Name		Signature		Date	__/__/__	Time	__:__
Eurofins | mgt Laboratory Use Only	Received By	UR	SYD | BNE | MEL | PER | ADL | NTL | DRW		Signature	UR	Date	11/2/21	Time	3:30 pm	Temperature	6.5°C
	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW		Signature		Date	__/__/__	Time	__:__	Report №	

Eurofins Environment Testing Australia Pty Ltd trading as Eurofins | mgt

#774715

(2)

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

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

Brisbane Laboratory
Unit 1, 21 Smallwood Pl., Murarrie, QLD 4172
07 3902 4600 EnviroSampleQLD@eurofins.com

Perth Laboratory
Unit 2, 91 Leach Highway, Kewdale WA 6105
08 9251 9600 EnviroSampleWA@eurofins.com

☐ **Melbourne Laboratory**
2 Kingston Town Close, Oakleigh, VIC 3166
03 8564 5000 EnviroSampleVic@eurofins.com

Company	Ramboll	Project №	318001025 _4	Project Manager	Stephen Maxwell
Address	50 Glebe Road the Junction	Project Name		EDD Format (ESdat, EQuIS,	Excel and PDF
Contact Name	Stephen Maxwell				
Phone №					
Special Directions					
Purchase Order					
Quote ID №	180813RAMN_1				

Sampler(s)	NM	
Handed over by	TF	
Email for Invoice	smaxwell@ramboll.com asiapac-accounts@ramboll.com	
Email for Results	smaxwell@ramboll.com	

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

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

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

8 Heavy Metals

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	8 Heavy Metals	1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964: WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	QA42	3/2/21	S	X									
2	QA43			X									
3	QA44			X									Please send to Envirolab
4	QA45			X									
5	QA46			X									
8													
9													
10													
	Total Counts												

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

Eurofins Environment Testing Australia Pty Ltd trading as Eurofins | mgt

eurofins | Environment Testing

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

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
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NATA # 1261 Site # 18217

Brisbane
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NATA # 1261 Site # 20794

Perth
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NATA # 1261
Site # 23736

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New Zealand

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Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Sample Receipt Advice

Company name:	Ramboll Australia Pty Ltd
Contact name:	Stephen Maxwell
Project name:	Not provided
Project ID:	318001025_4
Turnaround time:	5 Day
Date/Time received	Feb 17, 2021 3:20 PM
Eurofins reference	774715

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✓	All samples have been received as described on the above COC.
✓	COC has been completed correctly.
✓	Attempt to chill was evident.
✓	Appropriately preserved sample containers have been used.
✓	All samples were received in good condition.
✓	Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
✓	Appropriate sample containers have been used.
✓	Sample containers for volatile analysis received with zero headspace.
✓	Split sample sent to requested external lab.
✗	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

QA36, QA40 & QA44 forwarded to Envirolab for analysis.

Contact

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

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

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

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

eurofins | Environment Testing

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

Australia

Melbourne
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NATA # 1261 Site # 18217

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NATA # 1261 Site # 20794

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Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

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Phone : +61 2 4968 8448

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43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

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

Project Name:
Project ID: 318001025_4

Order No.:
Report #: 774715
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Feb 17, 2021 3:20 PM
Due: Feb 24, 2021
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Metals M8	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217						X	X
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	QA34	Feb 13, 2021		Soil	S21-Fe35206	X	X
2	QA35	Feb 13, 2021		Soil	S21-Fe35207	X	X
3	QA37	Feb 13, 2021		Soil	S21-Fe35208	X	X
4	QA38	Feb 13, 2021		Soil	S21-Fe35209	X	X
5	QA39	Feb 13, 2021		Soil	S21-Fe35210	X	X
6	QA41	Feb 13, 2021		Soil	S21-Fe35211	X	X
7	QA42	Feb 13, 2021		Soil	S21-Fe35212	X	X
8	QA43	Feb 13, 2021		Soil	S21-Fe35213	X	X
9	QA45	Feb 13, 2021		Soil	S21-Fe35214	X	X

eurofins | Environment Testing

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

Australia

Melbourne
6 Monterey Road
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Site # 1254 & 14271

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NATA # 1261 Site # 20794

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NATA # 1261
Site # 23736

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Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

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

Project Name:
Project ID: 318001025_4

Order No.:
Report #: 774715
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Feb 17, 2021 3:20 PM
Due: Feb 24, 2021
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Metals M8	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217						X	X
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory							
External Laboratory							
10	QA46	Feb 13, 2021		Soil	S21-Fe35215	X	X
Test Counts						10	10

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

Attention: **Stephen Maxwell**

Report **774715-S**
Project name
Project ID 318001025_4
Received Date Feb 17, 2021

Client Sample ID			**QA34**	**QA35**	**QA37**	**QA38**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S21-Fe35206**	**S21-Fe35207**	**S21-Fe35208**	**S21-Fe35209**
Date Sampled			**Feb 13, 2021**	**Feb 13, 2021**	**Feb 13, 2021**	**Feb 13, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	5.9	8.0	5.6	9.0
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	19	19	7.6	23
Copper	5	mg/kg	30	16	15	17
Lead	5	mg/kg	26	52	84	63
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	8.8	6.1	< 5	7.8
Zinc	5	mg/kg	26	64	69	47
% Moisture	1	%	9.9	9.4	5.1	9.6

Client Sample ID			**QA39**	**QA41**	**QA42**	**QA43**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S21-Fe35210**	**S21-Fe35211**	**S21-Fe35212**	**S21-Fe35213**
Date Sampled			**Feb 13, 2021**	**Feb 13, 2021**	**Feb 13, 2021**	**Feb 13, 2021**
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	48	11	2.5	3000
Cadmium	0.4	mg/kg	2.1	< 0.4	< 0.4	10.0
Chromium	5	mg/kg	22	24	< 5	31
Copper	5	mg/kg	200	35	7.9	670
Lead	5	mg/kg	3500	430	62	4300
Mercury	0.1	mg/kg	0.5	< 0.1	< 0.1	0.2
Nickel	5	mg/kg	7.9	6.0	< 5	22
Zinc	5	mg/kg	710	120	53	4300
% Moisture	1	%	12	13	13	22

Client Sample ID			QA45	QA46
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**S21-Fe35214**	**S21-Fe35215**
Date Sampled			**Feb 13, 2021**	**Feb 13, 2021**
Test/Reference	LOR	Unit		
Heavy Metals				
Arsenic	2	mg/kg	110	100
Cadmium	0.4	mg/kg	2.3	1.6
Chromium	5	mg/kg	14	19
Copper	5	mg/kg	170	97
Lead	5	mg/kg	1100	530
Mercury	0.1	mg/kg	0.3	0.2
Nickel	5	mg/kg	7.5	7.3
Zinc	5	mg/kg	970	350
% Moisture	1	%	3.7	1.1

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Metals M8	Sydney	Feb 22, 2021	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Feb 18, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			

eurofins | Environment Testing

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Site # 1254 & 14271

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NATA # 1261 Site # 18217

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

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NATA # 1261
Site # 23736

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Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

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

Project Name:
Project ID: 318001025_4

Order No.:
Report #: 774715
Phone: 02 9954 8118
Fax: 02 9954 8150

Received: Feb 17, 2021 3:20 PM
Due: Feb 24, 2021
Priority: 5 Day
Contact Name: Stephen Maxwell

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Metals M8	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217						X	X
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	QA34	Feb 13, 2021		Soil	S21-Fe35206	X	X
2	QA35	Feb 13, 2021		Soil	S21-Fe35207	X	X
3	QA37	Feb 13, 2021		Soil	S21-Fe35208	X	X
4	QA38	Feb 13, 2021		Soil	S21-Fe35209	X	X
5	QA39	Feb 13, 2021		Soil	S21-Fe35210	X	X
6	QA41	Feb 13, 2021		Soil	S21-Fe35211	X	X
7	QA42	Feb 13, 2021		Soil	S21-Fe35212	X	X
8	QA43	Feb 13, 2021		Soil	S21-Fe35213	X	X
9	QA45	Feb 13, 2021		Soil	S21-Fe35214	X	X

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Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory							
External Laboratory							
10	QA46	Feb 13, 2021		Soil	S21-Fe35215	X	X
Test Counts						10	10

Internal Quality Control Review and Glossary

General

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

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	101			80-120	Pass	
Cadmium	%	96			80-120	Pass	
Chromium	%	90			80-120	Pass	
Copper	%	92			80-120	Pass	
Lead	%	99			80-120	Pass	
Mercury	%	96			80-120	Pass	
Nickel	%	92			80-120	Pass	
Zinc	%	89			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S21-Fe35321	NCP	%	104			75-125	Pass	
Cadmium	S21-Fe35321	NCP	%	105			75-125	Pass	
Chromium	S21-Fe35321	NCP	%	102			75-125	Pass	
Copper	S21-Fe36864	NCP	%	84			75-125	Pass	
Lead	S21-Fe36864	NCP	%	87			75-125	Pass	
Mercury	S21-Fe35321	NCP	%	92			75-125	Pass	
Nickel	S21-Fe35321	NCP	%	98			75-125	Pass	
Zinc	S21-Fe35321	NCP	%	96			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S21-Fe35214	CP	mg/kg	110	94	14	30%	Pass	
Cadmium	S21-Fe35214	CP	mg/kg	2.3	2.7	16	30%	Pass	
Chromium	S21-Fe35214	CP	mg/kg	14	5.5	88	30%	Fail	Q15
Copper	S21-Fe35214	CP	mg/kg	170	190	11	30%	Pass	
Lead	S21-Fe35214	CP	mg/kg	1100	1000	13	30%	Pass	
Mercury	S21-Fe35214	CP	mg/kg	0.3	0.2	21	30%	Pass	
Nickel	S21-Fe35214	CP	mg/kg	7.5	5.2	37	30%	Fail	Q15
Zinc	S21-Fe35214	CP	mg/kg	970	770	23	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S21-Fe35214	CP	%	3.7	3.2	13	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S21-Fe35215	CP	mg/kg	100	94	10	30%	Pass	
Cadmium	S21-Fe35215	CP	mg/kg	1.6	1.5	9.0	30%	Pass	
Chromium	S21-Fe35215	CP	mg/kg	19	16	17	30%	Pass	
Copper	S21-Fe35215	CP	mg/kg	97	97	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S21-Fe35215	CP	mg/kg	530	510	4.0	30%	Pass	
Mercury	S21-Fe35215	CP	mg/kg	0.2	0.2	32	30%	Fail	Q15
Nickel	S21-Fe35215	CP	mg/kg	7.3	7.2	<1	30%	Pass	
Zinc	S21-Fe35215	CP	mg/kg	350	360	1.0	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

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

Authorised by:

Andrew Black	Analytical Services Manager
John Nguyen	Senior Analyst-Metal (NSW)

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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CERTIFICATE OF ANALYSIS 262265

Client Details

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

Sample Details

Your Reference	**318001025_4**
Number of Samples	3 Soil
Date samples received	19/02/2021
Date completed instructions received	19/02/2021

Analysis Details

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

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

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

Report Details

Date results requested by	26/02/2021
Date of Issue	26/02/2021

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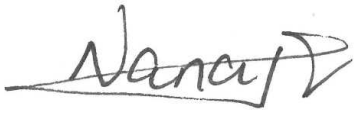
Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Jaimie Loa-Kum-Cheung, Metals Supervisor
Steven Luong, Organics Supervisor

Authorised By



Nancy Zhang, Laboratory Manager

Acid Extractable metals in soil				
Our Reference		262265-1	262265-2	262265-3
Your Reference	UNITS	QA36	QA40	QA44
Date Sampled		13/02/2021	13/02/2021	13/02/2021
Type of sample		Soil	Soil	Soil
Date prepared	-	26/02/2021	26/02/2021	26/02/2021
Date analysed	-	26/02/2021	26/02/2021	26/02/2021
Arsenic	mg/kg	5	1,600	14
Cadmium	mg/kg	<0.4	4.1	1
Chromium	mg/kg	15	13	43
Copper	mg/kg	15	460	77
Lead	mg/kg	39	2,200	90
Mercury	mg/kg	<0.1	0.3	0.2
Nickel	mg/kg	4	10	6
Zinc	mg/kg	45	2,600	290

Moisture				
Our Reference		262265-1	262265-2	262265-3
Your Reference	UNITS	QA36	QA40	QA44
Date Sampled		13/02/2021	13/02/2021	13/02/2021
Type of sample		Soil	Soil	Soil
Date prepared	-	22/02/2021	22/02/2021	22/02/2021
Date analysed	-	23/02/2021	23/02/2021	23/02/2021
Moisture	%	10	11	20

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date prepared	-			26/02/2021	1	26/02/2021	26/02/2021		26/02/2021	[NT]
Date analysed	-			26/02/2021	1	26/02/2021	26/02/2021		26/02/2021	[NT]
Arsenic	mg/kg	4	Metals-020	<4	1	5	5	0	102	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	93	[NT]
Chromium	mg/kg	1	Metals-020	<1	1	15	14	7	97	[NT]
Copper	mg/kg	1	Metals-020	<1	1	15	15	0	105	[NT]
Lead	mg/kg	1	Metals-020	<1	1	39	39	0	95	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	115	[NT]
Nickel	mg/kg	1	Metals-020	<1	1	4	4	0	100	[NT]
Zinc	mg/kg	1	Metals-020	<1	1	45	43	5	93	[NT]

Result Definitions

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

Quality Control Definitions

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

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

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

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

Brisbane Laboratory
Unit 1, 21 Smallwood Pl., Murarrie, QLD 4172
07 3902 4600 EnviroSampleQLD@eurofins.com

Perth Laboratory
Unit 2, 91 Leach Highway, Kewdale WA 6105
08 9251 9600 EnviroSampleWA@eurofins.com

☐ Melbourne Laboratory
2 Kingston Town Close, Oakleigh, VIC 3166
03 8564 5000 EnviroSampleVic@eurofins.com

Company	Ramboll	Project No.	318001025 _4	Project Manager	Stephen Maxwell
Address	50 Glebe Road the Junction	Project Name		EDD Format (ESdat, EQuIS, ...)	Excel and PDF
Contact Name	Stephen Maxwell				
Phone No.					
Special Directions					
Purchase Order					
Quote ID No.	180813RAMN_1				

Sampler(s): NM
Handed over by: TF
'Email' for Invoice: smaxwell@ramboll.com asiapac-accounts@ramboll.com
Email for Results: smaxwell@ramboll.com

Analyses (Note: Where metals are required, please specify "total" or "filtered". SUITE codes must be used to ensure SUITE pricing): 8 Heavy metals

Turnaround Time (TAT) Requirements (Default will be 5 days if not ticked)
☐ Overnight (9am)*
☐ 1 Day* ☐ 2 Day*
☐ 3 Day* ☑ 5 Day
* Surcharges apply
☐ Other ( )

No.	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	8 Heavy metals	1L Plastic	250mL Plastic	125mL Plastic*	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	QA34	13/2/21	S	X									
2	QA35			X									
3	QA36 (1)			X									Please send to envirolab
4	QA37			X									
5	QA38			X									
8	QA39			X									
9	QA40 (2)			X									Please send to envirolab
10	QA41	V	V	X									
	Total Counts												

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 262655
Date Received: 19/02/21
Time Received: 1330
Received By: RL
Temp: Cool/Ambient 14°C
Cooling: Ice/icepack
Security: Intact/Broken/None

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

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

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

Eurofins Environment Testing Australia Pty Ltd trading as Eurofins | mgt

19/02/21. #774715

② 262265

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

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

Brisbane Laboratory
Unit 1, 21 Smallwood Pl., Murarrie, QLD 4172
07 3902 4600 EnviroSampleQLD@eurofins.com

Perth Laboratory
Unit 2, 91 Leach Highway, Kewdale WA 6105
08 9251 9600 EnviroSampleWA@eurofins.com

Melbourne Laboratory
2 Kingston Town Close, Oakleigh, VIC 3166
03 8564 5000 EnviroSampleVic@eurofins.com

Company	Ramboll	Project №	318001025 -4	Project Manager	Stephen Maxwell
Address	50 Glebe Road the Junction	Project Name		EDD Format (ESdat, EQuIS)	Excel and PDF
Contact Name	Stephen Maxwell			Sampler(s)	NM
Phone №				Handed over by	TF
Special Directions				Email for Invoice	smaxwell@ramboll.com asiapac-accounts@ramboll.com
Purchase Order				Email for Results	smaxwell@ramboll.com
Quote ID №	180813RAMN_1				

Analyses (Note: where metals are requested, please specify "Total" or "Filtered"; SUITE code must be used to attract SUITE pricing): 8 Heavy metals

Containers: 1L Plastic, 250mL Plastic, 125mL Plastic, 200mL Amber Glass, 40mL VOA vial, 500mL PFAS Bottle, Jar (Glass or HDPE), Other (Asbestos AS4964, WA Guidelines)

Turnaround Time (TAT) Requirements (Default will be 5 days if not ticked)
- [ ] Overnight (9am)*
- [ ] 1 Day*
- [ ] 2 Day*
- [ ] 3 Day*
- [x] 5 Day
- [ ] Other ( )

* Surcharges apply

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	8 Heavy metals	Sample Comments / Dangerous Goods Hazard Warning
1	QA442	3/2/21	S	X	
2	QA443	↓	↓	X	
3	QA444 ③	↓	↓	X	Please send to envirolab.
4	QA445	↓	↓	X	
5	QA446	↓	↓	X	
8					
9					
10					
	Total Counts				

Method of Shipment	Courier (#)	Hand Delivered	Postal	Name		Signature		Date	__/__/__	Time	__:__
Eurofins | mgt Laboratory Use Only	Received By	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	__/__/__	Time	__:__	Temperature
	Received By	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	__/__/__	Time	__:__	Report №

APPENDIX 5
FPXRF RAW AND MOISTURE CORRECTED DATA

Client: John Holland Rail
Job No:318001025
Project Name: Bungendore Train Station ESA
5/10/2021

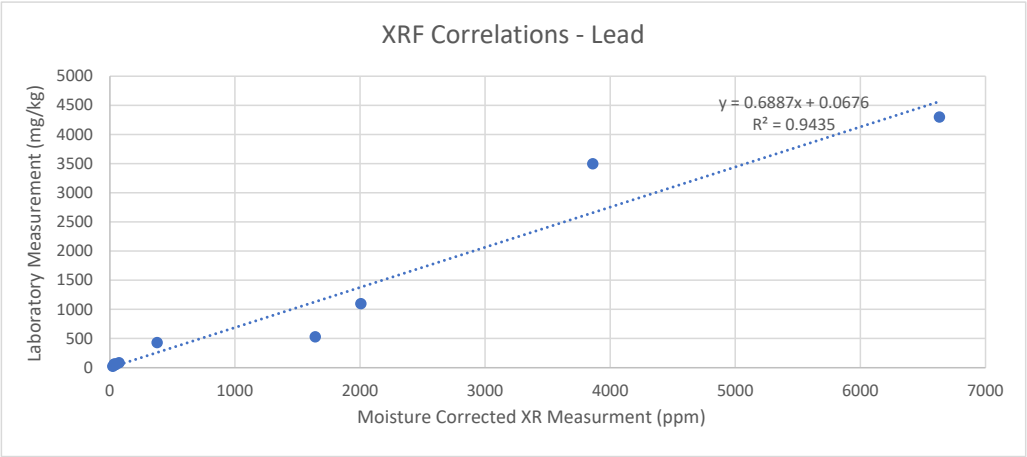
Moisture Correction and FPXRF Correlation

uncorrected

Primary	Secondary	Pb -primary (from logs)	Pb - lab	moisture
BSX06	QA34	20.5	26	9.9
BSX10	QA35	40.49	52	9.4
BSX16	QA37	68.33	84	5.1
BSX20	QA38	39.72	63	9.6
BSX24	QA39	3397.13	3500	12
BSX25_0.1	QA41	327.84	430	13
BSX30	QA42	30.13	62	13
BSX37	QA43	5172.44	4300	22
BSX41	QA45	1931.49	1100	3.7
BSX44	QA46	1622.92	530	1.1

corrected

Primary	Secondary	Pb -primary (from logs)	Pb - lab
BSX06	QA34	22.75249723	26
BSX10	QA35	44.69094923	52
BSX16	QA37	72.00210748	84
BSX20	QA38	43.9380531	63
BSX24	QA39	3860.375	3500
BSX25_0.1	QA41	376.8275862	430
BSX30	QA42	34.63218391	62
BSX37	QA43	6631.333333	4300
BSX41	QA45	2005.700935	1100
BSX44	QA46	1640.970677	530



Client: John Holland Rail
Job No:318001025
Project Name: Bungendore Train Station ESA
5/10/2021

FPXRF Raw Data

Date	Type	Duration	Units	Sequence	Sample ID	Pb	Pb Error	K	K Error	Ca	Ca Error	Sc	Sc Error	Ti	Ti Error	V	V Error	Cr	Cr Error	Mn	Mn Error	Fe	Fe Error	Co	Co Error	Ni	Ni Error	Cu	Cu Error	Zn	Zn Error	As	As Error	Se	Se Error	Rb	Rb Error	Sr	Sr Error	Zr	Zr Error	Mo	Mo Error	W	W Error	Au	Au Error	Hg	Hg Error	S	S Error	Th	Th Error	U	U Error
13/02/2021	Soil	60	ppm	Final	BSX01	18.67	9.96	2934.13	207.16	1894.46	118.31	< LOD	17.08	766.52	68.89	< LOD	33.01	21.34	12.83	193.9	71.84	10230.04	305.65	< LOD	126.29	< LOD	51.17	< LOD	28.67	41.61	16.23	< LOD	11.54	< LOD	5.59	50.63	5.82	53.18	5.17	230.91	9.63	< LOD	9.25	< LOD	64.13	< LOD	7.86	< LOD	11.41	< LOD	608.85	< LOD	8.96	< LOD	12.97
13/02/2021	Soil	60	ppm	Final	BSX02	1417.34	59.02	4812.66	340.5	3118.55	196.83	< LOD	28.56	1914.16	134.57	127.48	44.79	42.46	22.78	508.21	127.83	45102.72	765.69	< LOD	307.67	< LOD	76.41	89.32	34.58	492.31	46.45	< LOD	69.15	< LOD	9.09	38.38	6.46	122.87	8.96	209.5	11.57	< LOD	11.02	< LOD	104.79	< LOD	15.1	< LOD	17.16	2529.78	992.07	< LOD	24.34	< LOD	14.91
13/02/2021	Soil	60	ppm	Final	BSX03	3280.81	96.22	7795.23	380.57	3012.36	179.51	< LOD	24.74	2531.95	130.79	< LOD	58.38	< LOD	28.45	292.07	112.26	23172.35	594.52	< LOD	248.37	< LOD	85.55	269.47	50.49	730.16	60.24	< LOD	112.35	< LOD	12.28	51.49	8.21	81.04	8.23	191.63	12.15	< LOD	11.82	< LOD	117.92	< LOD	21.01	< LOD	20.37	3866.03	1010.84	< LOD	36.93	< LOD	18.61
13/02/2021	Soil	60	ppm	Final	BSX04	< LOD	21.05	2183.15	142.84	708.69	62.44	< LOD	9.36	473.87	43.34	26.07	14.17	36.4	9	200.24	104.66	14362.24	501.79	< LOD	216.46	< LOD	93.88	< LOD	49.99	< LOD	35.99	< LOD	17.62	< LOD	10.27	60.54	8.85	54.78	7.27	188.58	12.38	< LOD	12.91	< LOD	123.39	< LOD	12.15	< LOD	18.73	498.8	302	18.92	9.72	< LOD	20.09
13/02/2021	Soil	60	ppm	Final	BSX05	91.71	15.54	3371.27	206.78	2303.3	121.24	18.91	12.19	749.04	66.41	35.87	21.68	22.31	12.57	232.56	78.39	12231.21	349.38	< LOD	148.46	< LOD	55.05	< LOD	31.16	49.65	18.18	< LOD	17.93	< LOD	5.8	51.63	6.11	40.98	4.88	157.51	8.58	< LOD	9.46	< LOD	72.84	< LOD	8.27	< LOD	12.1	< LOD	620.61	< LOD	10.26	< LOD	13.36
13/02/2021	Soil	60	ppm	Final	BSX06	< LOD	20.49	15148.58	452.68	303.5	103.3	13.94	9.17	2070.95	106.13	75.19	32.95	64.4	16.31	< LOD	144.33	21782.78	601.34	< LOD	255.95	< LOD	93.47	< LOD	56.68	< LOD	32.84	< LOD	15.62	< LOD	8.75	169.1	13.53	32.5	5.84	140.34	10.66	< LOD	12.03	< LOD	113.48	< LOD	11.59	< LOD	17.9	< LOD	782.19	19.84	10.15	< LOD	26.05
13/02/2021	Soil	60	ppm	Final	BSX07	< LOD	13.61	7418.18	324.81	631.18	94.6	< LOD	13.15	1756.62	94.08	55.73	28.94	26.28	15.49	< LOD	107.35	10160.39	344.97	< LOD	140.1	< LOD	65.31	< LOD	36.54	< LOD	21.17	< LOD	10.32	< LOD	7.08	24.83	5.11	7.2	3.22	112.85	8	< LOD	9.85	< LOD	78.11	< LOD	8.4	< LOD	12.82	862.61	563.11	< LOD	9.26	< LOD	13.4
13/02/2021	Soil	60	ppm	Final	BSX08	< LOD	16.44	3500.72	204.03	1436.14	96.92	< LOD	14.79	1670.14	80.88	< LOD	35.87	37.62	13.08	259.43	85.44	5289.09	250.09	< LOD	105.64	< LOD	61.33	< LOD	36.63	42.41	19.77	< LOD	12.46	< LOD	6.4	31.54	5.55	24.49	4.39	246.44	11.07	< LOD	10.59	< LOD	79.73	< LOD	7.98	< LOD	12.89	653.72	433.44	< LOD	9.35	< LOD	14.05
13/02/2021	Soil	60	ppm	Final	BSX09	< LOD	20.21	2425.86	151.71	451.79	54.68	13.73	6.17	601.15	46.42	< LOD	21.81	22.96	8.9	149.06	91.35	9980.88	400.79	< LOD	171.9	< LOD	81.62	< LOD	48.97	< LOD	34.58	< LOD	15.53	< LOD	7.6	53.4	7.97	24.96	5.22	207.25	12.13	< LOD	12	< LOD	104.92	< LOD	11.92	< LOD	17.02	519.09	315.43	< LOD	12.36	< LOD	17.99
13/02/2021	Soil	60	ppm	Final	BSX10	40.49	13.85	7005.99	307.17	1184.71	107.93	< LOD	15.48	1975.43	98.14	79.33	30.5	42.55	15.11	280.68	95.3	16026.36	444.19	< LOD	185.74	< LOD	67.84	< LOD	38.92	< LOD	28.2	< LOD	16.16	< LOD	6.27	67.15	7.69	27.93	4.77	255.98	11.67	< LOD	10.69	< LOD	81.91	< LOD	10.35	< LOD	15.32	< LOD	705.54	16.32	8.1	< LOD	16.73
13/02/2021	Soil	60	ppm	Final	BSX11	16.37	10.68	10533.6	391.25	782.19	109.93	< LOD	15.72	2563.43	118.23	< LOD	52.87	< LOD	24.34	202.63	78.8	11640.39	350.47	< LOD	144.88	< LOD	59.35	< LOD	34.24	< LOD	20.32	< LOD	12.17	< LOD	6.2	65.23	7.12	20.55	3.97	339.49	12.19	< LOD	10.18	< LOD	75.83	< LOD	9.08	< LOD	11.74	< LOD	765.67	14.53	7.14	< LOD	16.03
13/02/2021	Soil	60	ppm	Final	BSX12	40.71	19.03	3046.57	167.73	547.25	59.73	9.95	6.18	581.39	47.84	23.36	15.23	34.95	9.31	< LOD	142.42	8921.24	439.21	< LOD	190.21	< LOD	107.76	< LOD	66.08	< LOD	39.15	< LOD	21.11	< LOD	10.19	55.8	9.49	29.94	6.43	166.72	12.91	< LOD	14.33	< LOD	138.86	< LOD	13.78	< LOD	20.49	637.58	332.99	< LOD	15.93	< LOD	21.83
13/02/2021	Soil	60	ppm	Final	BSX13	62.64	12.72	8258.91	396.03	5516.14	231.57	< LOD	33.17	1779.57	115.16	< LOD	53.43	< LOD	27.6	266.57	75.46	10769.5	305.63	< LOD	126.33	< LOD	52.17	< LOD	27.1	35.95	15.24	< LOD	14.63	< LOD	5.5	44.97	5.41	45.11	4.7	147.96	7.8	< LOD	8.56	< LOD	65.88	< LOD	6.71	< LOD	10.03	< LOD	963.62	< LOD	9.05	< LOD	12.32
13/02/2021	Soil	60	ppm	Final	BSX14	< LOD	12.55	7684.68	376.29	7317.34	256.4	< LOD	36.93	994.61	91.41	< LOD	44.59	< LOD	26.7	89.43	57.57	6384.96	237.04	< LOD	99.38	< LOD	48.79	< LOD	29.38	< LOD	18.81	< LOD	10.03	< LOD	4.68	35.14	4.87	37.95	4.42	81.42	6.24	< LOD	8.24	< LOD	59.06	< LOD	7.15	12.29	7.49	< LOD	1036.87	< LOD	8.12	< LOD	11.42
13/02/2021	Soil	60	ppm	Final	BSX15	< LOD	13.73	8218.92	383.34	24476.71	439.8	< LOD	59.76	1475.45	103.34	< LOD	48.07	< LOD	25.77	182.03	71.37	8192.42	277.82	< LOD	114.12	59.83	37.96	< LOD	27.8	< LOD	19.26	< LOD	10.69	< LOD	6.09	44.96	5.59	60.21	5.5	107.09	7.22	< LOD	8.58	< LOD	63.26	< LOD	7.62	< LOD	11.04	< LOD	999.78	< LOD	8.27	< LOD	12.57
13/02/2021	Soil	60	ppm	Final	BSX16	68.33	14.88	6219.23	281.25	3474.58	152.98	< LOD	21.41	1157.48	81.09	< LOD	38.22	25.13	14.16	393.88	97.24	9267.44	321.59	< LOD	134.26	< LOD	61.38	< LOD	36.94	37.47	19	< LOD	17.63	< LOD	7.03	40.78	5.95	42.35	5.2	93.28	7.42	< LOD	9.68	< LOD	85.24	< LOD	10.13	< LOD	13.44	< LOD	699.29	< LOD	9.9	< LOD	14.08
13/02/2021	Soil	60	ppm	Final	BSX17	235.32	21.17	11246.49	479.69	3692.98	211.91	< LOD	30.03	3469.26	155.71	70.77	46.12	< LOD	32.43	129.55	65.78	12547.56	334.86	< LOD	137.12	< LOD	53.13	< LOD	31.63	110.58	20.84	< LOD	24.63	< LOD	5.85	48.91	5.78	63.93	5.53	239.51	9.74	< LOD	8.95	< LOD	68.5	< LOD	8.22	< LOD	11.36	< LOD	1066.83	< LOD	10.74	< LOD	13.42
13/02/2021	Soil	60	ppm	Final	BSX18	28.85	10.66	9779.85	441.3	2998.88	189.74	< LOD	27.55	3458.88	154.85	78.51	46.25	< LOD	32.23	216.19	73.05	11827.41	325.02	< LOD	137.93	< LOD	51.1	< LOD	30.43	232.6	27.15	< LOD	12.62	< LOD	6.29	60.47	6.22	37.55	4.48	262.68	10.03	< LOD	9.17	< LOD	65.96	< LOD	8.1	< LOD	11.25	< LOD	1082.6	< LOD	8.9	< LOD	13.53
13/02/2021	Soil	60	ppm	Final	BSX19	32.4	8.98	8763.67	498.41	9798.44	359.54	< LOD	51.57	1600.32	141.14	95.14	47.22	< LOD	39.94	151.51	54.21	7839.45	223.33	< LOD	94.06	< LOD	38.69	< LOD	23.63	218.53	21.82	< LOD	10.64	< LOD	4.24	33.54	4.11	37.97	3.75	42.87	4.37	14.2	4.9	< LOD	53.33	< LOD	6.18	< LOD	9	< LOD	1580.65	< LOD	7.06	< LOD	9.82
13/02/2021	Soil	60	ppm	Final	BSX20	39.72	14.72	4646.29	236.22	826.49	84.58	< LOD	12.83	1788.4	86.1	< LOD	38.27	37.22	13.03	166.42	89.44	13720.59	437.83	< LOD	181.08	< LOD	76.29	< LOD	41.18	< LOD	27.19	< LOD	17.27	< LOD	7.34	55.03	7.46	28.75	5.11	315.19	13.61	< LOD	11.62	< LOD	99.24	< LOD	10.61	< LOD	15.13	1191.08	512.81	< LOD	12.06	< LOD	16.19
13/02/2021	Soil	60	ppm	Final	BSX21	866.75	37.25	11327.7	553.72	7605.21	326.05	< LOD	45.49	2568.2	168.82	96.26	53.53	< LOD	41.24	364.04	85.06	17303.87	381.23	< LOD	158.74	< LOD	48.38	66.05	23.43	309.62	29.68	59.71	29.54	< LOD	6.16	59.26	6.13	56.37	5.12	137.74	7.62	< LOD	8.4	< LOD	68.28	< LOD	10.28	< LOD	11.22	1864.54	1104.53	< LOD	15.81	< LOD	13.65
13/02/2021	Soil	60	ppm	Final	BSX21_0.05	4424.68	125.34	5249.3	286.65	2685.99	151.34	27.7	15.52	1288.02	91.22	< LOD	42.36	30.87	15.02	225.97	124.13	33606.09	802.57	< LOD	320.17	< LOD	106.81	387.35	65.89	530.13	60.31	379.05	100.48	< LOD	17.32	59.2	9.82	73.11	8.96	124.9	12.04	< LOD	13.1	< LOD	147.14	< LOD	30.35	< LOD	25.22	4151.75	903.05	49.72	32.93	< LOD	20.67
13/02/2021	Soil	60	ppm	Final	HA-BSX21_0.1	188.3	44.72	1004.03	93.22	133.73	30.35	11.41	4.18	179.04	27.4	18.73	9.61	30.46	7.02	< LOD	198.24	5102.2	475.73	< LOD	210.67	< LOD	198.95	< LOD	122.27	< LOD	70.48	< LOD	48.32	< LOD	17.54	36.36	12.27	39.93	10.28	212.27	20.37	< LOD	20.62	< LOD	248.59	< LOD	26.95	< LOD	40.67	545.48	255.82	< LOD	23.82	< LOD	34.82
13/02/2021	Soil	60	ppm	Final	BSX22	< LOD	13.57	8396.1	415.35	28088.9	501.47	< LOD	69.82	3606.4	155.93	103.17	46.44	31.63	20.36	184.08	73.96	10544.89	322.79	< LOD	135.24	< LOD	55.12	< LOD	31.82	< LOD	18.73	< LOD	10.09	< LOD	5.26	30.55	5.09	87.9	6.62	96.69	7.28	< LOD	8.92	< LOD	76.6	< LOD	8.93	< LOD	12.63	< LOD	1304.13	< LOD	8.25	< LOD	13.14
13/02/2021	Soil	60	ppm	Final	BSX23	23.74	11.22	7520.06	344.04	3763.73	179.02	< LOD	24.52	2846.96	123.27	57.13	36.32	< LOD	25.01	138.87	71.04	9485.53	314.88	< LOD	132.82	< LOD	57.91	< LOD	32.14	< LOD	22.53	< LOD	12.9	< LOD	6.67	43.64	5.92	39.83	4.95	348.43	12.3	< LOD	10.1	< LOD	76.37	< LOD	8.49	< LOD	12.75	< LOD	838.95	10.99	6.69	< LOD	13.84
13/02/2021	Soil	60	ppm	Final	BSX24	3397.13	85.21	6341.01	347.81	3775.87	194.21	31.58	19.52	2189.7	121.47	65.95	37.16	< LOD	28.2	274.46	92.11	16150.12	432.74	< LOD	180.04	< LOD	68.27	196.36	38.34	1199.66	64.83	168.26	67.08	< LOD	11.28	42.85	6.72	72.15	6.84	168.43	10.08	< LOD	10	< LOD	96.87	< LOD	19.92	< LOD	17.22	2419.8	863.7	< LOD	33.29	< LOD	15.47
13/02/2021	Soil	60	ppm	Final	HA-BSX24_0.1	61.84	38.64	850.41	83.71	62.16	23.45	8.29	3.34	109.77	21.78	< LOD	11.13	36.93	6.7	< LOD	242.57	4055.08	496.32	< LOD	225.29	< LOD	270.01	< LOD	151.35	< LOD	72.3	< LOD	44.47	< LOD	25.61	44.06	14.62	22.1	9.83	249.08	25.18	< LOD	25.63	< LOD	369.95	< LOD	34	< LOD	50.5	567.3	243.74	< LOD	27.47	< LOD	37.43
13/02/2021	Soil	60	ppm	Final	BSX25	9705.81	155.69	7082.91	416.17	2582.96	192.08	< LOD	27.7	3064.89	168.85	106.54	52.53	< LOD	35.67	290.7	110.31	32449.15	664.14	< LOD	267.33	< LOD	80.54	483.8	57.56	754.39	57.49	297.01	121.47	< LOD	17.7	53.24	8.99	102.7	8.96	250.57	13.48	< LOD	11.21	< LOD	116.86	< LOD	30.19	< LOD	22.34	10413.73	1688.16	< LOD	58.07	< LOD	21.52
13/02/2021	Soil	60	ppm	Final	HA-BSX25_0.1	327.84	29.13	4232.13	229.58	844.61	85.04	< LOD	12.83	1672.1	83.68	< LOD	36.44	26.19	12.99	272.93	92.37	10513.36	364.09	< LOD	153.83	< LOD	62.97	< LOD	42.51	49.13	21.85	< LOD	33.93	< LOD	7.17	38.63	6.4	34.19	5.18	338.65	13.36	12.64	7.77	< LOD	89.48	< LOD	11.17	< LOD	15.35	< LOD	639.11	< LOD	14.72	< LOD	16.08
13/02/2021	Soil	60	ppm	Final	HA-BSX25_0.15	134.42	16.05	9576.27	464.94	2309.59	183.82	< LOD	27.65	4580.35	185.59	92.92	54.62	< LOD	36.2	197.75	68.46	11466.15	304.82	< LOD	128.28	< LOD	46.6	< LOD	25.31	60.7	16.1	< LOD	17.94	< LOD	5.19	48.83	5.46	30.05	3.95	427.78	11.89	< LOD	8.99	< LOD	59.47	< LOD	7.82	< LOD	9.94	< LOD	1168.46	12.04	6.75	< LOD	12.33
13/02/2021	Soil	60	ppm	Final	BSX26	1553.54	55.13	8473.42	443.67	7611.31	296.09	< LOD	41.08	2863.43	161.37	99.28	50.24	< LOD	33.53	242.1	85.7	20682.07	464.41	< LOD	192.79	< LOD	60.31	106.62	30.25	486.71	40.6	75.57	43.35	< LOD	7.02	47.09	6.35	139.32	8.47	199.67	10.21	< LOD	9.74	< LOD	76.85	< LOD	12.82	< LOD	13.08	2346.33	1015.08	< LOD	22.73	< LOD	14.79
13/02/2021	Soil	60	ppm	Final	BSX27	751.19	38.6	6506.62	420.73	6698.53	296.1	< LOD	43.26	3299.34	177.71	111.04	54.81	< LOD	36.89	453.1	104.36	28862.8	543.99	< LOD	220.99	< LOD	60.81	< LOD	36.19	458.9	39.18	48.56	30.52	< LOD	7.59	28.4	5.22	105.15	7.38	260.85	11.07	< LOD	9.75	< LOD	80	< LOD	11.67	< LOD	12.74	1647.82	1009.15	22.81	11.78	< LOD	13.52
13/02/2021	Soil	60	ppm	Final	BSX28	39.22	11.32	12040.19	484.59	23309.85	459.84	< LOD	60.92	1793.18	120.85	< LOD	56.06	< LOD	28.73	115.71	63.36	10134.28	299.83	< LOD	123.77	< LOD	46.41	< LOD	27.8	35.4	15.42	< LOD	12.8	< LOD	5.24	50.94	5.8	87.35	6.26	120.14	7.44	< LOD	8.4	< LOD	63.01	< LOD	8.4	< LOD	11.01	< LOD	1137.42	< LOD	8.91	< LOD	13.2
13/02/2021	Soil	60	ppm	Final	BSX29	79.38	13.9	8544.42	373.04	4757.37	202.12	< LOD	27.61	2404.2	116.05	61.23	35.08	32.31	19.02	184.87	68.52	7576.26	260.16	< LOD	107.86	< LOD	49.2	< LOD	26.38	< LOD	19.47	< LOD	16.49	< LOD	5.6	39.43	5.23	30.64	4.13	144.83	7.77	< LOD	8.55	< LOD	58.03	< LOD	7.07	< LOD	9.74	< LOD	955.2	< LOD	9.21	< LOD	12.32
13/02/2021	Soil	60	ppm	Final	BSX30	30.13	20.05	1401.08	109.31	345	42.97	< LOD	6.56	220.27	29.59	< LOD	14.56	28.39	7.19	< LOD	164.39	4657.42	354.43	< LOD	143.79	< LOD	125.6	< LOD	71.9	< LOD	39.91	< LOD	23.66	< LOD	11.96	27.21	7.97	24.13	6.62	118.74	12.44	< LOD	15.76	< LOD	165.63	< LOD	16.85	< LOD	24.78	398.36	241.5	< LOD	15	< LOD	20.8
13/02/2021	Soil	60	ppm	Final	BSX31	86	14.6	9509.31	400.1	3524.41	184.78	< LOD	25.95	2143.01	131.3	119.61	42.58	< LOD	27.81	< LOD	90.83	9687.67	299.25	< LOD	128.51	< LOD	50.55	< LOD	29.92	26.33	15.09	< LOD	16.77	< LOD	5.47	56.9	6.3	45.54	4.9	260.46	10.2	< LOD	9.45	< LOD	65.27	< LOD	9.09	< LOD	11.17	< LOD	980.95	< LOD	9.95	< LOD	14.57
13/02/2021	Soil	60	ppm	Final	BSX32	19.84	8.37	9278.58	446.11	8673.03	299.55	< LOD	40.77	1274.98	113.3	< LOD	54.82	< LOD	31.01	155.76	54.56	5276.11	186.7	< LOD	77.33	< LOD	39.71	< LOD	20.58	47.99	13.11	< LOD	9.51	< LOD	4.96	36.52	4.25	56.49	4.46	108.02	6.02	< LOD	7.23	< LOD	49.85	< LOD	6.19	< LOD	8.96	< LOD	1087.64	< LOD	7.19	< LOD	9.76
13/02/2021	Soil	60	ppm	Final	BSX33	166.72	18.16	4367.58	257.12	7926.95	229.47	< LOD	31.88	716.1	70.76	< LOD	33.68	< LOD	22.47	244.97	73.62	5553.25	222.7	< LOD	94.49	< LOD	48.92	< LOD	29.1	336.94	31.41	< LOD	20.42	< LOD	5.98	28.44	4.57	47.05	4.81	91.5	6.58	< LOD	8.63	< LOD	67.29	< LOD	7.51	< LOD	10.3	1123.32	610.12	< LOD	9.95	< LOD	11.18
13/02/2021	Soil	60	ppm	Final	BSX34	1710.27	59	17294.5	715.88	7804.25	360.66	< LOD	52.1	2861	188.69	98.39	59.38	< LOD	42.63	372.02	105.06	39008.65	649.43	< LOD	270.22	< LOD	61.71	244.97	38.85	503.37	42.32	123.63	46.92	< LOD	8.23	78.98	7.99	231.78	10.92	179.73	10.42	< LOD	9.67	< LOD	86.92	< LOD	14.72	< LOD	14.01	3226.17	1375.82	41.52	16.98	< LOD	17.3
13/02/2021	Soil	60	ppm	Final	BSX35	770.1	38.79	10358.88	498.6	3036.19	211.28	< LOD	31.52	1999.02	144.56	< LOD	67.09	< LOD	36.22	191.36	82.42	25906.1	512.2	< LOD	215.49	< LOD	59.76	82.1	28.04	478.69	39.76	135.1	32.28	< LOD	7.2	81.14	7.54	95.48	7.04	188.85	9.61	< LOD	9.51	< LOD	78.41	< LOD	10.85	< LOD	13.99	< LOD	1242.92	< LOD	16.62	< LOD	15.19
13/02/2021	Soil	60	ppm	Final	BSX36	1808.2	57.64	5804.78	436.27	4182.74	261.59	< LOD	38.74	1593.55	143.18	< LOD	70.21	< LOD	42.66	410.19	102.04	37476.32	605.86	< LOD	250.27	< LOD	60.08	112.95	29.44	971.16	53.84	248.95	47.31	< LOD	8.52	32.53	5.5	71.52	6.17	107.64	7.77	< LOD	9.21	< LOD	83.56	< LOD	14.54	< LOD	13.48	3734.32	1359.71	< LOD	23.05	< LOD	13.73
13/02/2021	Soil	60	ppm	Final	BSX37	5172.44	104.96	7001.92	525.03	9622.67	418.69	< LOD	60.48	1542.41	179.42	115.96	61.38	< LOD	47.51	388.88	117.9	56695.16	807.49	< LOD	333.17	< LOD	78.03	908.78	67.67	6566.58	148.09	2688.62	100.45	< LOD	14.3	32.68	6.42	233.98	11.45	103.53	9.59	< LOD	9.86	< LOD	167.39	< LOD	28.02	< LOD	23.6	5392.44	1721.53	< LOD	40.26	< LOD	15.42
13/02/2021	Soil	60	ppm	Final	BSX38	2234.65	71.06	8895.09	457.18	1366.69	158.29	< LOD	24.65	2287.43	143.83	85.98	45.34	45.5	23.6	< LOD	137.13	38905.59	685.16	< LOD	283.69	< LOD	70.66	447.53	51.6	694.06	51.89	911.68	65.21	< LOD	10.6	45.16	6.91	106.66	8.17	183.83	10.7	< LOD	10.46	< LOD	91.53	< LOD	18.43	19.24	11.81	3354.87	1112.28	32.37	19.28	< LOD	16.63
13/02/2021	Soil	60	ppm	Final	BSX39	2343.88	64.13	17974.37	751.95	1480.6	218.96	< LOD	32.79	3717.64	232.46	< LOD	106.37	< LOD	48.4	147.56	77.95	27853.27	511.84	< LOD	208.8	< LOD	57.79	293.25	38.04	381.22	34.7	511.22	54.58	< LOD	8.78	84.48	7.71	98.14	6.94	189.47	9.48	< LOD	9.12	< LOD	74.52	< LOD	16.71	< LOD	13.29	5217.61	1609.92	< LOD	25.61	< LOD	16.2
13/02/2021	Soil	60	ppm	Final	BSX40	1880.67	57.86	15351.21	650.44	2312.1	221.91	< LOD	32.22	3380.49	208.39	124.66	65.9	57.45	29.52	215.19	84.91	30153.62	535.08	< LOD	219.79	< LOD	57.8	159.75	31.41	534.4	40.27	251.18	47.4	< LOD	8.64	70.96	7.24	121.17	7.63	256.46	10.72	< LOD	9.19	< LOD	77.06	< LOD	14.39	< LOD	13.4	3056.35	1262.66	< LOD	23.11	< LOD	16.24
13/02/2021	Soil	60	ppm	Final	BSX41	1498.24	95.14	2965.84	165.54	1049.92	75.28	11.87	7.57	462.33	44.74	26.3	14.67	42.34	9.12	< LOD	207.47	17369.4	745.09	< LOD	303.29	< LOD	160.62	< LOD	101.75	539.29	82.13	184.69	77.46	< LOD	18.31	100.71	15.14	184.89	16.9	111.43	15.02	< LOD	16.86	< LOD	215.91	< LOD	29.57	< LOD	36.01	1330.96	412.31	< LOD	38.59	< LOD	32.18
13/02/2021	Soil	60	ppm	Final	BSX42	743.64	35.48	11824.82	550.04	5982.98	288.2	< LOD	41.52	3243.15	180.72	85.39	55.53	< LOD	39.52	965.98	122.41	19261.84	412.53	< LOD	168.17	< LOD	53.33	72.53	24.87	1053.89	52.88	103.12	29.04	< LOD	6.33	64.78	6.46	64.24	5.53	204.62	9.14	< LOD	8.81	< LOD	85.31	< LOD	10.53	< LOD	12.18	2160.88	1102.25	< LOD	15.83	< LOD	13.83
13/02/2021	Soil	60	ppm	Final	BSX43	58.46	12.57	12561.18	518.63	1482.05	164.16	< LOD	23.06	2704.2	155.51	< LOD	71.83	< LOD	32.5	914.77	119.05	18178.98	399.23	< LOD	163.06	< LOD	51.27	< LOD	30.92	497.05	37.1	26.42	10.75	< LOD	5.55	63.72	6.23	19.29	3.54	227.03	9.29	< LOD	8.82	< LOD	68.84	< LOD	8.74	< LOD	10.84	< LOD	1227.55	10.36	6.38	< LOD	12.84
13/02/2021	Soil	60	ppm	Final	BSX44	1622.92	59.8	19554.36	740.28	1520.93	211.83	< LOD	27.46	3531.16	207.51	< LOD	95.63	73.78	29.45	356.98	111.97	45876.3	732.12	< LOD	299.81	< LOD	75.13	409.05	49.18	1132.43	63.82	317.35	50.34	< LOD	9.47	112.33	9.66	48.48	5.82	280.95	12.13	< LOD	10.69	< LOD	103.68	< LOD	14.65	< LOD	16.53	4278.07	1417.48	< LOD	24.43	< LOD	20.09

Client: John Holland Rail
Job No:318001025
Project Name: Bungendore Train Station ESA
5/10/2021

Moisture Corrected FPXRF Data

Date	Sample ID	Pb	Pb Error	K	K Error	Ca	Ca Error	Sc	Sc Error	Ti	Ti Error	V	V Error	Cr	Cr Error	Mn	Mn Error	Fe	Fe Error	Co	Co Error	Ni	Ni Error	Cu	Cu Error	Zn	Zn Error	As	As Error	Se	Se Error	Rb	Rb Error	Sr	Sr Error	Zr	Zr Error	Mo	Mo Error	W	W Error	Au	Au Error	Hg	Hg Error	S	S Error	Th	Th Error	U	U Error
13/02/2021	BSX01	18.67	9.96	2934.13	207.16	1894.46	118.31	< LOD	17.08	766.52	68.89	< LOD	33.01	21.34	12.83	193.9	71.84	10230.04	305.65	< LOD	126.29	< LOD	51.17	< LOD	28.67	41.61	16.23	< LOD	11.54	< LOD	5.59	50.63	5.82	53.18	5.17	230.91	9.63	< LOD	9.35	< LOD	64.13	< LOD	7.86	< LOD	11.41	< LOD	608.85	< LOD	8.96	< LOD	12.97
13/02/2021	BSX02	1417.34	59.02	4812.66	340.5	3118.55	196.83	< LOD	28.56	1914.16	134.57	127.48	44.79	42.46	22.78	508.21	127.83	45102.72	765.69	< LOD	307.67	< LOD	76.41	89.32	34.58	492.31	46.45	< LOD	69.15	< LOD	9.09	38.38	6.46	122.87	8.96	209.5	11.57	< LOD	11.02	< LOD	104.79	< LOD	15.1	< LOD	17.16	2529.78	992.07	< LOD	24.34	14.91
13/02/2021	BSX03	3280.81	96.22	7795.23	380.57	3012.36	179.51	< LOD	24.74	2531.95	130.79	< LOD	58.38	< LOD	28.45	292.07	112.26	23172.35	594.52	< LOD	248.37	< LOD	85.55	269.47	50.49	730.16	60.24	< LOD	112.35	< LOD	12.28	51.49	8.21	81.04	8.23	191.63	12.15	< LOD	11.82	< LOD	117.92	< LOD	21.01	< LOD	20.37	3866.03	1010.84	< LOD	36.93	18.61
13/02/2021	BSX04	< LOD	21.05	2183.15	142.84	708.69	62.44	< LOD	9.36	473.87	43.34	26.07	14.17	36.4	9	200.24	104.66	14362.24	501.79	< LOD	216.46	< LOD	93.88	< LOD	49.99	< LOD	35.99	< LOD	17.62	< LOD	10.27	60.54	8.85	54.78	7.27	188.58	12.38	< LOD	12.91	< LOD	123.39	< LOD	12.15	< LOD	18.73	498.8	302	18.92	9.72	< LOD	20.09
13/02/2021	BSX05	91.71	15.54	3371.27	206.78	2303.3	121.24	18.91	12.19	749.04	66.41	35.87	21.68	22.31	12.57	232.56	78.39	12231.21	349.38	< LOD	148.46	< LOD	55.05	< LOD	31.16	49.65	18.18	< LOD	17.93	< LOD	5.8	51.63	6.11	40.98	4.88	157.51	8.58	< LOD	9.46	< LOD	72.84	< LOD	8.27	< LOD	12.1	< LOD	620.61	< LOD	10.26	< LOD	13.36
13/02/2021	BSX06	< LOD	20.49	15148.58	452.68	303.5	103.3	13.94	9.17	2070.95	106.13	75.19	32.95	64.4	16.31	< LOD	144.33	21782.78	601.34	< LOD	255.95	< LOD	93.47	< LOD	56.68	< LOD	32.84	< LOD	15.62	< LOD	8.75	169.1	13.53	32.5	5.84	140.34	10.66	< LOD	12.03	< LOD	113.48	< LOD	11.59	< LOD	17.9	< LOD	782.19	19.84	10.15	< LOD	26.05
13/02/2021	BSX07	< LOD	13.61	7418.18	324.81	631.18	94.6	< LOD	13.15	1756.62	94.08	55.73	28.94	26.28	15.49	< LOD	107.35	10160.39	344.97	< LOD	140.1	< LOD	65.31	< LOD	36.54	< LOD	21.17	< LOD	10.32	< LOD	7.08	24.83	5.11	7.2	3.22	112.85	8	< LOD	9.85	< LOD	78.11	< LOD	8.4	< LOD	12.82	862.61	563.11	< LOD	9.26	< LOD	13.4
13/02/2021	BSX08	< LOD	16.44	3500.72	204.03	1436.14	96.92	< LOD	14.79	1670.14	80.88	< LOD	35.87	37.62	13.08	259.43	85.44	5289.09	250.09	< LOD	105.64	< LOD	61.33	< LOD	36.63	42.41	19.77	< LOD	12.46	< LOD	6.4	31.54	5.55	24.49	4.39	246.44	11.07	< LOD	10.59	< LOD	79.73	< LOD	7.98	< LOD	12.89	653.72	433.44	< LOD	9.35	< LOD	14.05
13/02/2021	BSX09	< LOD	20.21	2425.86	151.71	451.79	54.68	13.73	6.17	601.15	46.42	< LOD	21.81	22.96	8.9	149.06	91.35	9980.88	400.79	< LOD	171.9	< LOD	81.62	< LOD	48.97	< LOD	34.58	< LOD	15.53	< LOD	7.6	53.4	7.97	24.96	5.22	207.25	12.13	< LOD	12	< LOD	104.92	< LOD	11.92	< LOD	17.02	519.09	315.43	< LOD	12.36	< LOD	17.99
13/02/2021	BSX10	40.49	13.85	7005.99	307.17	1184.71	107.93	< LOD	15.48	1975.43	98.14	79.33	30.5	42.55	15.11	280.68	95.3	16026.36	444.19	< LOD	185.74	< LOD	67.84	< LOD	38.92	< LOD	28.2	< LOD	16.16	< LOD	6.27	67.15	7.69	27.93	4.77	255.98	11.67	< LOD	10.69	< LOD	81.91	< LOD	10.35	< LOD	15.32	< LOD	705.54	16.32	8.1	< LOD	16.73
13/02/2021	BSX11	16.37	10.68	10533.6	391.25	782.19	109.93	< LOD	15.72	2563.43	118.23	< LOD	52.87	< LOD	24.34	202.63	78.8	11640.39	350.47	< LOD	144.88	< LOD	59.35	< LOD	34.24	< LOD	20.32	< LOD	12.17	< LOD	6.2	65.23	7.12	20.55	3.97	339.49	12.19	< LOD	10.18	< LOD	75.83	< LOD	9.08	< LOD	11.74	< LOD	765.67	14.53	7.14	< LOD	16.03
13/02/2021	BSX12	40.71	19.03	3046.57	167.73	547.25	59.73	9.95	6.18	581.39	47.84	23.36	15.23	34.95	9.31	< LOD	142.42	8921.24	439.21	< LOD	190.21	< LOD	107.76	< LOD	66.08	< LOD	39.15	< LOD	21.11	< LOD	10.19	55.8	9.49	29.94	6.43	166.72	12.91	< LOD	14.33	< LOD	138.86	< LOD	13.78	< LOD	20.49	637.58	332.99	< LOD	15.93	< LOD	21.83
13/02/2021	BSX13	62.64	12.72	8258.91	396.03	5516.14	231.57	< LOD	33.17	1779.57	115.16	< LOD	53.43	< LOD	27.6	266.57	75.46	10769.5	305.63	< LOD	126.33	< LOD	52.17	< LOD	27.1	35.95	15.24	< LOD	14.63	< LOD	5.5	44.97	5.41	45.11	4.7	147.96	7.8	< LOD	8.56	< LOD	65.88	< LOD	6.71	< LOD	10.03	< LOD	963.62	< LOD	9.05	< LOD	12.32
13/02/2021	BSX14	< LOD	12.55	7684.68	376.29	7317.34	256.4	< LOD	36.93	994.61	91.41	< LOD	44.59	< LOD	26.7	89.43	57.57	6384.96	237.04	< LOD	99.38	< LOD	48.79	< LOD	29.38	< LOD	18.81	< LOD	10.03	< LOD	4.68	35.14	4.87	37.95	4.42	81.42	6.24	< LOD	8.24	< LOD	59.06	< LOD	7.15	12.29	7.49	< LOD	1036.87	< LOD	8.12	< LOD	11.42
13/02/2021	BSX15	< LOD	13.73	8218.92	383.34	24476.71	439.8	< LOD	59.76	1475.45	103.34	< LOD	48.07	< LOD	25.77	182.03	71.37	8192.42	277.82	< LOD	114.12	59.83	37.96	< LOD	27.8	< LOD	19.26	< LOD	10.69	< LOD	6.09	44.96	5.59	60.21	5.5	107.09	7.22	< LOD	8.58	< LOD	63.26	< LOD	7.62	< LOD	11.04	< LOD	999.78	< LOD	8.27	< LOD	12.57
13/02/2021	BSX16	68.33	14.88	6219.23	281.25	3474.58	152.98	< LOD	21.41	1157.48	81.09	< LOD	38.22	25.13	14.16	393.88	97.24	9267.44	324.59	< LOD	126.33	< LOD	61.38	< LOD	36.94	37.47	19	< LOD	17.63	< LOD	7.03	40.78	5.95	42.35	5.2	93.28	7.42	< LOD	9.68	< LOD	85.24	< LOD	10.13	< LOD	13.44	< LOD	690.29	< LOD	9.9	< LOD	14.08
13/02/2021	BSX17	235.32	21.17	11246.49	479.69	3692.98	211.91	< LOD	30.03	3469.26	155.71	70.77	46.12	< LOD	32.43	129.55	65.78	12547.56	334.86	< LOD	137.12	< LOD	53.13	< LOD	31.63	110.58	20.84	< LOD	24.63	< LOD	5.85	48.91	5.78	63.93	5.53	239.51	9.74	< LOD	8.95	< LOD	68.5	< LOD	8.22	< LOD	11.36	< LOD	1066.83	< LOD	10.74	< LOD	13.42
13/02/2021	BSX18	28.85	10.66	9779.85	441.3	2998.88	189.74	< LOD	27.55	3458.88	154.85	78.51	46.25	< LOD	32.23	216.19	73.05	11827.41	325.02	< LOD	137.93	< LOD	51.1	< LOD	32.43	232.6	27.15	< LOD	12.62	< LOD	6.29	60.47	6.22	37.55	4.48	262.68	10.03	< LOD	9.17	< LOD	65.96	< LOD	8.1	< LOD	11.25	< LOD	1082.6	< LOD	8.9	< LOD	13.53
13/02/2021	BSX19	32.4	8.98	8763.67	498.41	9798.44	359.54	< LOD	51.57	1600.32	141.14	95.14	47.22	< LOD	39.94	151.51	54.21	7839.45	223.33	< LOD	94.06	< LOD	38.69	< LOD	23.63	218.53	21.82	< LOD	10.64	< LOD	4.24	33.54	4.11	37.97	3.75	42.87	4.37	14.2	4.9	< LOD	53.33	< LOD	6.18	< LOD	9	< LOD	1580.65	< LOD	7.06	< LOD	9.82
13/02/2021	BSX20	39.72	14.72	4646.29	226.22	826.49	84.58	< LOD	12.83	1788.4	86.1	< LOD	38.27	37.22	13.03	166.42	89.44	13720.59	437.83	< LOD	181.08	< LOD	76.29	< LOD	41.18	< LOD	27.19	< LOD	17.27	< LOD	7.34	55.03	7.46	28.75	5.11	315.19	13.61	< LOD	11.62	< LOD	99.24	< LOD	10.61	< LOD	15.13	< LOD	1191.08	512.81	< LOD	12.06	7.44	16.19
13/02/2021	BSX21	866.75	37.25	11327.7	553.72	7605.21	326.05	< LOD	45.49	2568.2	168.82	96.26	53.53	< LOD	41.24	364.04	85.06	17303.87	381.23	< LOD	158.74	< LOD	48.38	66.05	23.43	309.62	29.68	59.71	29.54	< LOD	6.16	59.26	6.13	56.37	5.12	137.74	7.62	< LOD	8.4	< LOD	68.28	< LOD	10.28	< LOD	11.22	1864.54	1104.53	< LOD	15.81	< LOD	13.65
13/02/2021	BSX21_0.05	4424.68	125.34	5249.3	286.65	2685.99	151.34	27.7	15.52	1288.02	91.22	< LOD	42.36	30.87	15.02	225.97	124.13	33606.09	802.57	< LOD	320.17	< LOD	106.81	387.35	65.89	530.13	60.31	379.05	100.48	< LOD	17.32	59.2	9.82	73.11	8.96	124.9	12.04	< LOD	13.1	< LOD	147.14	< LOD	30.35	< LOD	25.22	4151.75	903.05	49.72	32.93	< LOD	20.67
13/02/2021	HA-BSX21_0.1	188.3	44.72	1004.03	93.22	133.73	30.35	11.41	4.18	179.04	27.4	18.73	9.61	30.46	7.02	< LOD	198.24	5102.2	475.73	< LOD	210.67	< LOD	198.95	< LOD	122.27	< LOD	70.48	< LOD	48.32	< LOD	17.54	36.36	12.27	39.93	10.28	212.27	20.37	< LOD	20.62	< LOD	248.59	< LOD	26.95	< LOD	40.67	545.48	255.82	< LOD	23.82	< LOD	34.82
13/02/2021	BSX22	< LOD	13.57	8396.1	415.35	28088.9	501.47	< LOD	69.82	3606.4	155.93	103.17	46.44	31.63	20.36	184.08	73.96	10544.89	322.79	< LOD	135.24	< LOD	55.12	< LOD	31.82	< LOD	18.73	< LOD	10.09	< LOD	5.26	30.55	5.09	87.9	6.62	96.69	7.28	< LOD	8.92	< LOD	76.6	< LOD	8.93	< LOD	12.63	< LOD	1304.13	< LOD	8.25	< LOD	13.14
13/02/2021	BSX23	23.74	11.22	7520.06	344.04	3763.73	179.02	< LOD	24.52	2846.96	123.27	57.13	36.32	< LOD	25.01	138.87	71.04	9485.53	314.88	< LOD	132.82	< LOD	57.91	< LOD	32.14	< LOD	22.53	< LOD	12.9	< LOD	6.67	43.64	5.92	39.83	4.95	348.43	12.3	< LOD	10.1	< LOD	76.37	< LOD	8.49	< LOD	12.75	< LOD	838.95	10.99	6.69	< LOD	13.84
13/02/2021	BSX24	3397.13	85.21	6341.01	347.81	3775.87	194.21	31.58	19.52	2189.7	121.47	65.95	37.16	< LOD	28.2	274.46	92.11	16150.12	432.74	< LOD	180.04	< LOD	68.27	196.36	38.34	1199.66	64.83	168.26	67.08	< LOD	11.28	42.85	6.72	72.15	6.84	168.43	10.08	< LOD	10	< LOD	96.87	< LOD	19.92	< LOD	17.22	2419.8	863.7	< LOD	33.29	< LOD	15.47
13/02/2021	HA-BSX24_0.1	61.84	38.64	850.41	83.71	62.16	23.45	8.29	3.34	109.77	21.78	< LOD	11.13	36.93	6.7	< LOD	242.57	4055.08	496.32	< LOD	225.29	< LOD	270.01	< LOD	151.35	< LOD	72.3	< LOD	44.47	< LOD	25.61	44.06	14.62	22.1	9.83	249.08	25.18	< LOD	25.63	< LOD	369.95	< LOD	34	< LOD	50.5	567.3	243.74	< LOD	27.47	< LOD	37.43
13/02/2021	BSX25	9705.81	155.69	7082.91	416.17	2582.96	192.08	< LOD	27.7	3064.89	168.85	106.54	52.53	< LOD	35.67	290.7	110.31	32449.15	664.14	< LOD	267.33	< LOD	80.54	483.8	57.56	754.39	57.49	297.01	121.47	< LOD	17.7	53.24	8.99	102.7	8.96	250.57	13.48	< LOD	11.21	< LOD	116.86	< LOD	30.19	< LOD	22.34	10413.73	1688.16	< LOD	58.07	< LOD	21.52
13/02/2021	HA-BSX25_0.1	327.84	29.13	4232.13	229.58	844.61	85.04	< LOD	12.83	1672.1	83.68	< LOD	36.44	26.19	12.99	272.93	92.37	10513.36	364.09	< LOD	153.83	< LOD	62.97	< LOD	42.51	49.13	21.85	< LOD	13.93	< LOD	7.17	38.63	6.4	34.19	5.18	338.65	13.36	12.64	7.77	< LOD	89.48	< LOD	11.17	< LOD	15.35	< LOD	639.11	< LOD	14.72	< LOD	16.08
13/02/2021	HA-BSX25_0.15	134.42	16.05	9576.27	464.94	2309.59	183.82	< LOD	27.65	4580.35	185.59	92.92	54.62	< LOD	36.2	197.75	68.46	11466.15	304.82	< LOD	128.28	< LOD	46.6	< LOD	25.31	60.7	16.1	< LOD	17.94	< LOD	5.19	48.83	5.46	30.05	3.95	427.78	11.89	< LOD	8.99	< LOD	59.47	< LOD	7.82	< LOD	9.94	< LOD	1168.46	12.04	6.75	< LOD	12.33
13/02/2021	BSX26	1553.54	55.13	8473.42	443.67	7611.31	296.09	< LOD	41.08	2863.43	161.37	99.28	50.24	< LOD	33.53	242.1	85.7	20682.07	464.41	< LOD	192.79	< LOD	60.31	106.62	30.25	486.71	40.6	75.57	43.35	< LOD	7.02	47.09	6.35	139.32	8.47	199.67	10.21	< LOD	9.74	< LOD	76.85	< LOD	12.82	< LOD	13.08	2346.33	1015.08	< LOD	22.73	< LOD	14.79
13/02/2021	BSX27	751.19	38.6	6506.62	420.73	6698.53	296.1	< LOD	43.26	3299.34	177.71	111.04	54.81	< LOD	36.89	453.1	104.36	28862.8	543.99	< LOD	220.99	< LOD	60.81	< LOD	36.19	458.9	39.18	48.56	30.52	< LOD	7.59	28.4	5.22	105.15	7.38	260.85	11.07	< LOD	9.75	< LOD	80	< LOD	11.67	< LOD	12.74	1647.82	1009.15	22.81	11.78	< LOD	13.52
13/02/2021	BSX28	39.22	11.32	12040.19	484.59	23309.85	459.84	< LOD	60.92	1793.18	120.85	< LOD	56.06	< LOD	28.73	115.71	63.36	10134.28	299.83	< LOD	123.77	< LOD	46.41	< LOD	27.8	35.4	15.42	< LOD	12.8	< LOD	5.24	50.94	5.8	87.35	6.26	120.14	7.44	< LOD	8.4	< LOD	63.01	< LOD	8.4	< LOD	11.01	< LOD	1137.42	< LOD	8.91	< LOD	13.2
13/02/2021	BSX29	79.38	13.9	8544.42	373.04	4757.37	202.12	< LOD	27.61	2404.2	116.05	61.23	35.08	32.31	19.02	184.87	68.52	7576.26	260.16	< LOD	107.86	< LOD	49.2	< LOD	26.38	< LOD	19.47	< LOD	16.49	< LOD	5.6	39.43	5.23	30.64	4.13	144.83	7.77	< LOD	8.55	< LOD	58.03	< LOD	7.07	< LOD	9.74	< LOD	955.2	< LOD	9.21	< LOD	12.32
13/02/2021	BSX30	30.13	20.05	1401.08	109.31	345	42.97	< LOD	6.56	220.27	29.59	< LOD	14.56	28.39	7.19	< LOD	164.39	4657.42	354.43	< LOD	143.79	< LOD	125.6	< LOD	71.9	< LOD	39.91	< LOD	23.66	< LOD	11.96	27.21	7.97	24.13	6.62	118.74	12.44	< LOD	15.76	< LOD	165.63	< LOD	16.85	< LOD	24.78	398.36	241.5	< LOD	15	< LOD	20.8
13/02/2021	BSX31	86	14.6	9509.31	400.1	3524.41	184.78	< LOD	25.95	2143.01	131.3	119.61	42.58	< LOD	27.81	< LOD	90.83	9687.67	299.25	< LOD	128.51	< LOD	50.55	< LOD	29.92	26.33	15.09	< LOD	16.77	< LOD	5.47	56.9	6.3	45.54	4.9	260.46	10.2	< LOD	9.45	< LOD	65.27	< LOD	9.09	< LOD	11.17	< LOD	980.95	< LOD	9.95	< LOD	14.57
13/02/2021	BSX32	19.84	8.37	9278.58	446.11	8673.03	299.55	< LOD	40.77	1274.98	113.3	< LOD	54.82	< LOD	31.01	155.76	54.56	5276.11	186.7	< LOD	77.33	< LOD	39.71	< LOD	20.58	47.99	13.11	< LOD	9.51	< LOD	4.96	36.52	4.25	56.49	4.46	108.02	6.02	< LOD	7.23	< LOD	49.85	< LOD	6.19	< LOD	8.96	< LOD	1087.64	< LOD	7.19	< LOD	9.76
13/02/2021	BSX33	166.72	18.16	4367.58	257.12	7926.95	229.47	< LOD	31.88	716.1	70.76	< LOD	33.68	< LOD	22.47	244.97	73.62	5553.25	222.7	< LOD	94.49	< LOD	48.92	< LOD	29.1	336.94	31.41	< LOD	20.42	< LOD	5.98	28.44	4.57	47.05	4.81	91.5	6.58	< LOD	8.63	< LOD	67.29	< LOD	7.51	< LOD	10.3	1123.32	610.12	< LOD	9.95	< LOD	11.18
13/02/2021	BSX34	1710.27	59	17294.5	715.88	7804.25	360.66	< LOD	52.1	2861	188.69	98.39	59.38	< LOD	42.63	372.02	105.06	39008.65	649.43	< LOD	270.22	< LOD	61.71	244.97	38.85	503.37	42.32	123.63	46.92	< LOD	8.23	78.98	7.99	231.78	10.92	179.73	10.42	< LOD	9.67	< LOD	86.92	< LOD	14.72	< LOD	14.01	3226.17	1375.82	41.52	16.98	< LOD	17.3
13/02/2021	BSX35	770.1	38.79	10358.88	498.6	3036.19	211.28	< LOD	31.52	1999.02	144.56	< LOD	67.09	< LOD	36.22	191.36	82.42	25906.1	512.2	< LOD	215.49	< LOD	59.76	82.1	28.04	478.69	39.76	135.1	32.28	< LOD	7.2	81.14	7.54	95.48	7.04	188.85	9.61	< LOD	9.51	< LOD	78.41	< LOD	10.85	< LOD	13.99	< LOD	1242.92	< LOD	16.62	< LOD	15.19
13/02/2021	BSX36	1808.2	57.64	5804.78	436.27	4182.74	261.59	< LOD	38.74	1593.55	143.18	< LOD	70.21	< LOD	42.66	410.19	102.04	37476.32	605.86	< LOD	250.27	< LOD	60.08	112.95	29.44	971.16	53.84	248.95	47.31	< LOD	8.52	32.53	5.5	71.52	6.17	107.64	7.77	< LOD	9.21	< LOD	83.56	< LOD	14.54	< LOD	13.48	3734.32	1359.71	< LOD	23.05	< LOD	13.73
13/02/2021	BSX37	5172.44	104.96	7001.92	525.03	9622.67	418.69	< LOD	60.48	1542.41	179.42	115.96	61.38	< LOD	47.51	388.88	117.9	56695.16	807.49	< LOD	333.17	< LOD	78.03	908.78	67.67	6566.58	148.09	2688.62	100.45	< LOD	14.3	32.68	6.42	233.98	11.45	103.53	9.59	< LOD	9.86	< LOD	167.39	< LOD	28.02	< LOD	23.6	5392.44	1721.53	< LOD	40.26	< LOD	15.42
13/02/2021	BSX38	2234.65	71.06	8895.09	457.18	1366.69	158.29	< LOD	24.65	2287.43	143.83	85.98	45.34	45.5	23.6	< LOD	137.13	38905.59	685.16	< LOD	283.69	< LOD	70.66	447.53	51.6	694.06	51.89	911.68	65.21	< LOD	10.6	45.16	6.91	106.66	8.17	183.83	10.7	< LOD	10.46	< LOD	91.53	< LOD	18.43	19.24	11.81	3354.87	1112.28	32.37	19.28	< LOD	16.63
13/02/2021	BSX39	2343.88	64.13	17974.37	751.95	1480.6	218.96	< LOD	32.79	3717.64	232.46	< LOD	106.37	< LOD	48.4	147.56	77.95	27853.27	511.84	< LOD	208.8	< LOD	57.79	293.25	38.04	381.22	34.7	511.22	54.58	< LOD	8.78	84.48	7.71	98.14	6.94	189.47	9.48	< LOD	9.12	< LOD	74.52	< LOD	16.71	< LOD	13.29	5217.61	1609.92	< LOD	25.61	< LOD	16.2
13/02/2021	BSX40	1880.67	57.86	15351.21	650.44	2312.1	221.91	< LOD	32.22	3380.49	208.39	124.66	65.9	57.45	29.52	215.19	84.91	30153.62	535.08	< LOD	219.79	< LOD	57.8	159.75	31.41	534.4	40.27	251.18	47.4	< LOD	8.64	70.96	7.24	121.17	7.63	256.46	10.72	< LOD	9.19	< LOD	77.06	< LOD	14.39	< LOD	13.4	3056.35	1262.66	< LOD	23.11	< LOD	16.24
13/02/2021	BSX41	1498.24	95.14	2965.84	165.54	1049.92	75.28	11.87	7.57	462.33	44.74	26.3	14.67	42.34	9.12	< LOD	207.47	17369.4	745.09	< LOD	303.29	< LOD	160.62	< LOD	101.75	539.29	82.13	184.69	77.46	< LOD	18.31	100.71	15.14	184.89	16.9	111.43	15.02	< LOD	16.86	< LOD	215.91	< LOD	29.57	< LOD	36.01	1330.96	412.31	< LOD	38.59	< LOD	32.18
13/02/2021	BSX42	743.64	35.48	11824.82	550.04	5982.98	288.2	< LOD	41.52	3243.15	180.72	85.39	55.53	< LOD	39.52	965.98	122.41	19261.84	412.53	< LOD	168.17	< LOD	53.33	72.53	24.87	1053.89	52.88	103.12	29.04	< LOD	6.33	64.78	6.46	64.24	5.53	204.62	9.14	< LOD	8.81	< LOD	85.31	< LOD	10.53	< LOD	12.18	2160.88	1102.25	< LOD	15.83	< LOD	13.83
13/02/2021	BSX43	58.46	12.57	12561.18	518.63	1482.05	164.16	< LOD	23.06	2704.2	155.51	< LOD	71.83	< LOD	32.5	914.77	119.05	18178.98	399.23	< LOD	163.06	< LOD	51.27	< LOD	30.92	497.05	37.1	26.42	10.75	< LOD	5.55	63.72	6.23	19.29	3.54	227.03	9.29	< LOD	8.82	< LOD	68.84	< LOD	8.74	< LOD	10.84	< LOD	1227.55	10.36	6.38	< LOD	12.84
13/02/2021	BSX44	1622.92	59.8	19554.36	740.28	1520.93	211.83	< LOD	27.46	3531.16	207.51	< LOD	95.63	73.78	29.45	356.98	111.97	45876.3	732.12	< LOD	299.81	< LOD	75.13	409.05	49.18	1132.43	63.82	317.35	50.34	< LOD	9.47	112.33	9.66	48.48	5.82	280.95	12.13	< LOD	10.69	< LOD	103.68	< LOD	14.65	< LOD	16.53	4278.07	1417.48	< LOD	24.43	< LOD	20.09

APPENDIX 6
ANALYTICAL SUMMARY TABLES

Client: John Holland Rail
Job No:318001025
Project Name: Bungendore Train Station ESA
5/10/2021

Table 1 - Analytical Summary - FPXRF Moisture Corrected Data

	NEPM 2013 HIL D Commercial / Industrial	Generic EIL Commercial / Industrial	Sample Type:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Sample ID:		BSX01	BSX02	BSX03	BSX04	BSX05	BSX06	BSX07	BSX08	BSX09	BSX10	BSX11	BSX12	BSX13	BSX14	BSX15	BSX16	BSX17	BSX18
			Sample date:		13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021
			Project Name:		Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor
			Sampling Method:		XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF
Analyte grouping/Analyte			Units	LOR																			
Heavy Metals																							
Arsenic	3000	160	mg/kg	5	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
Chromium	3600		mg/kg	2	24	47	< LOD	40	25	71	29	42	25	47	< LOD	39	< LOD	< LOD	< LOD	28	< LOD	< LOD
Copper	240000		mg/kg	5	< LOD	99	299	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
Iron			mg/kg	0.005	11352	50047	25713	15937	13572	24171	11274	5869	11075	17783	12917	9899	11950	7085	9091	10283	13923	13124
Lead	1500	1800	mg/kg	5	21	1571	3640	< LOD	102	< LOD	< LOD	< LOD	< LOD	45	18	45	70	< LOD	< LOD	76	261	32
Nickel	6000		mg/kg	2	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	66	< LOD	< LOD	< LOD
Zinc	400000		mg/kg	5	46	546	810	< LOD	55	< LOD	< LOD	47	< LOD	< LOD	< LOD	< LOD	40	< LOD	< LOD	42	123	258

Blank Cell indicates no criterion available
LOD = Limit of Detection
National Environment Protection Council (2013) National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) (NEPM).
Concentrations in orange box exceed adopted EIL for commercial/industrial use
Concentrations in orange bold font exceed adopted HIL D for commercial/industrial use
*higher field duplicate value adopted
**hgher laboratory duplicate value adopted

Client: John Holland Rail
Job No:318001025
Project Name: Bungendore Train Station ESA
5/10/2021

Table 1 - Analytical Summary - FPXRF Moisture Corrected Data

	NEPM 2013 HIL D Commercial / Industrial	Generic EIL Commercial / Industrial																				
Sample Type:					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Sample ID:					BSX19	BSX20	BSX21	BSX21_0.05	HA-BSX21_0.1	BSX22	BSX23	BSX24	HA-BSX24_0.1	BSX25	HA-BSX25_0.1	HA-BSX25_0.15	BSX26	BSX27	BSX28	BSX29	BSX30	BSX31
Sample date:					13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021
Project Name:					Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor
Sampling Method:					XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF
Analyte grouping/Analyte			Units	LOR																		
Heavy Metals																						
Arsenic	3000	160	mg/kg	5	< LOD	< LOD	66	421	< LOD	< LOD	< LOD	187	< LOD	330	< LOD	< LOD	84	54	< LOD	< LOD	< LOD	< LOD
Chromium	3600		mg/kg	2	< LOD	41	< LOD	34	34	35	< LOD	< LOD	41	< LOD	29	< LOD	< LOD	< LOD	< LOD	36	32	< LOD
Copper	240000		mg/kg	5	< LOD	< LOD	73	430	< LOD	< LOD	< LOD	218	< LOD	537	< LOD	< LOD	118	< LOD	< LOD	< LOD	< LOD	< LOD
Iron			mg/kg	0.005	8699	15225	19201	37290	5662	11701	10525	17921	4500	36007	11666	12723	22949	32027	11245	8407	5168	10750
Lead	1500	1800	mg/kg	5	36	44	962	4910	209	< LOD	26	2770	69	10770	364	149	1724	834	44	88	33	95
Nickel	6000		mg/kg	2	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
Zinc	400000		mg/kg	5	242	< LOD	344	588	< LOD	< LOD	< LOD	1331	< LOD	837	55	67	540	509	39	< LOD	< LOD	29

Blank Cell indicates no criterion available
LOD = Limit of Detection
National Environment Protection Council (2013) National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) (NEPM).
Concentrations in orange box exceed adopted EIL for commercial/industrial use
Concentrations in orange bold font exceed adopted HIL D for commercial/industrial use
*higher field duplicate value adopted
**hgher laboratory duplicate value adopted

Client: John Holland Rail
Job No:318001025
Project Name: Bungendore Train Station ESA
5/10/2021

Table 1 - Analytical Summary - FPXRF Moisture Corrected Data

	NEPM 2013 HIL D Commercial / Industrial	Generic EIL Commercial / Industrial															
Sample Type:					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Sample ID:					BSX32	BSX33	BSX34	BSX35	BSX36	BSX37	BSX38	BSX39	BSX40	BSX41	BSX42	BSX43	BSX44
Sample date:					13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021
Project Name:					Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor	Bungendore Rail Corridor
Sampling Method:					XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF
Analyte grouping/Analyte			Units	LOR													
Heavy Metals																	
Arsenic	3000	160	mg/kg	5	< LOD	< LOD	137	150	276	2983	1012	567	279	205	114	29	352
Chromium	3600		mg/kg	2	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	50	< LOD	64	47	< LOD	< LOD	82
Copper	240000		mg/kg	5	< LOD	< LOD	272	91	125	1008	497	325	177	< LOD	80	< LOD	454
Iron			mg/kg	0.005	5855	6162	43285	28746	41585	62911	43171	30907	33459	19274	21374	20172	50906
Lead	1500	1800	mg/kg	5	22	185	1806	855	2006	9740	2480	2601	2087	1662	825	65	1801
Nickel	6000		mg/kg	2	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
Zinc	400000		mg/kg	5	53	374	559	531	1078	7286	770	423	593	598	1169	552	1257

Blank Cell indicates no criterion available
LOD = Limit of Detection
National Environment Protection Council (2013) National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) (NEPM).
Concentrations in orange box exceed adopted EIL for commercial/industrial use
Concentrations in orange bold font exceed adopted HIL D for commercial/industrial use
*higher field duplicate value adopted
**hgher laboratory duplicate value adopted

Client: John Holland Rail
Job No:318001025
Project Name: Bungendore Train Station ESA
5/10/2021

Table 2 - QA/QC Summary

Table III: Laboratory QA/QC Results

	XRF and Lab Duplicate			XRF and Lab Duplicate			XRF and Lab Duplicate			Inter Lab Duplicate			Inter Lab Duplicate			Inter Lab Duplicate			Field Blank (SiO2)	Field Blank (SiO2)	Field Blank (SiO2)	Reference Material (RCRApp)	Reference Material (RCRApp)	Reference Material (RCRApp)	Reference Material (RCRApp)
Date:	13/02/2021	13/02/2021		13/02/2021	13/02/2021		13/02/2021	13/02/2021		13/02/2021	13/02/2021		13/02/2021	13/02/2021		13/02/2021	13/02/2021		13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021	13/02/2021
Sample ID:	BSX10	QA35	RPD %	BSX24	QA39	RPD %	BSX37	QA43	RPD %	QA35	QA36	RPD %	QA39	QA40	RPD %	QA43	QA44	RPD %	CHECK BLANK	CHECK BLANK	CHECK BLANK	RCRA APP	RCRA APP	RCRA APP	RCRA APP
Calibration Concentration:	N/A	N/A		N/A	N/A		N/A	N/A		N/A	N/A		N/A	N/A		N/A	N/A		< LOD	< LOD	< LOD	500	500	500	500
Laboratory Report:	N/A	N/A		N/A	N/A		N/A	N/A		N/A	N/A		N/A	N/A		N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Analyte grouping/Analyte																									
Heavy Metals																									
Arsenic	< LOD	8	-	187	48	118%	2983	3000	1%	8	5	46%	48	1600	188%	3000	14	198%	<LOD	<LOD	<LOD	474	430	435	472
Chromium	47	19	85%	< LOD	22	-	< LOD	31	-	19	15	24%	22	13	51%	31	43	32%	<LOD	<LOD	<LOD	594	633	651	632
Copper	< LOD	16	-	218	200	9%	1008	670	40%	16	15	6%	200	460	79%	670	77	159%	<LOD	<LOD	<LOD	< LOD	< LOD	< LOD	< LOD
Lead	45	26	53%	3770	3500	7%	5740	4300	29%	26	39	40%	3500	2200	46%	4300	90	192%	<LOD	<LOD	<LOD	440	457	454	445
Nickel	< LOD	9	-	< LOD	8	-	< LOD	22	-	9	4	75%	8	10	23%	22	6	114%	<LOD	<LOD	<LOD	< LOD	< LOD	< LOD	< LOD
Zinc	< LOD	26	-	1331	710	61%	7286	4300	52%	26	45	54%	710	2600	114%	4300	290	175%	<LOD	<LOD	<LOD	< LOD	< LOD	< LOD	< LOD

Note all units in ppm unless stated otherwise
<LOD = Less than Limit of Detection
<LOR = Less than laboratory Limit of Reporting

Reference RPD for Lead	13%	9%	10%	12%

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