EXTRACTIVE MINERAL LEASE PROPOSAL

for

Mineral Claim (MC) 3828

“Deep Well”

Submitted by Kalkaroo Copper Pty Limited

(A.C.N. 111 129 812)

a subsidiary of

HAVILAH RESOURCES LIMITED

Date	7/03/2026.
Version number	2
Name of applicant(s)	Kalkaroo Copper Pty Ltd.
Name of proposed operation	Deep Well.
Mineral claim number	3828
Commodity type	✕ Extractive minerals - Siltstone ☐ Industrial minerals ☐ Industrial minerals (prescribed purpose)
Mineral claim size (ha)	90 Ha
Proposed lease application size (ha) (If applying over a reduced area)	90 Ha.
Contact details for application	Name: Richard Buckley Phone: 0871113627. Email:richard.buckley@havilah-resources.com.au.

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1 Declaration of Accuracy

The following declaration of accuracy is made in accordance with Regulation 65(8) under the Mining Act 1971.

I, Richard Buckley, holding the position of Chief Operating Officer for the tenement holder Kalkaroo Copper Pty Ltd, have taken reasonable steps to review the information to ensure its accuracy and that all statements made and information given in this application is true and correct. The following steps have been undertaken to ensure the accuracy of the document:

- the use of suitably qualified specialists for specialist studies on which this Proposal is based; and
- an internal process for review and sign off by senior management.

Richard Buckley

Chief Operating Officer

Date: 7th March 2026

2 Introduction

This document supports an Extractive Mineral Lease Proposal (EMLP) for Mineral Claim MC3828 (Mineral Claim) for the development of a borrow pit and extraction of rock material from a location of low vertical relief for road sheeting and construction applications associated with the Kalkaroo Copper-Gold Project (ML 6498, ML 6499, ML 6500, MPL 158 and MPL 159).

This EMLP has been prepared in accordance with the "*Extractive mineral quarry lease/licence applications, Determination Terms of Reference 003.", December 2020.*

2.1 PROPONENT

The Proponent of this Mining Proposal is Kalkaroo Copper Pty Limited (Australian Company Number 111 129 812) a wholly owned subsidiary of Havilah Resources Limited (Havilah).

Kalkaroo Copper Pty Limited (Kalkaroo Copper) is registered in South Australia.

The proponents contact details are shown in Table 1 below.

Table 1 Proponent contact details

Name of Operator	**Kalkaroo Copper Pty Ltd**
Address of registered office:	PO Box 3 Fullarton SA 5063
Name of contact person:	Richard Buckley Chief Operating Officer
Telephone:	(08) 7111 3627
Email:	Richard.Buckley@havilah-resources.com.au

2.2 EXISTING LAND TENURE

The Mineral Claim is in the local government area managed by the Outback Communities Authority. There are currently no development plans pertaining to this area, nor are there any other known land use restrictions or interests.

The land use (historical and current) for the application area is Crown Lease Pastoral Land. The surrounding land tenure is also Crown Lease Pastoral Land.

Details of underlying land tenure for the Mineral Claim are shown in Table 2. The Lease application is included in Appendix 3: Lease Application.

Table 2 Land and Tenure holder details

MINERAL CLAIM 3828		
Land tenure	Pastoral	
Certificate of Land Title/Lease Number	Crown Lease	CL 6162/839
Pastoral Number	Pastoral Block 1121	
Pastoral Lease Number	PE002278	
Name of Leaseholder	Kalkaroo Pastoral Company Pty Ltd	
Address of Leaseholder	PO Box 3 Fullarton SA 5063	

The Mineral Claim covers an area of 90 Hectares.

MC 3828 lies within the overlapping Exploration License EL6659, held by Havilah Resources in accordance with the South Australian Mining Act 1972.

MC 3828 is situated within an overlapping Petroleum Exploration Licence Area (PELA) 763 in accordance with the Energy and Resources Act 2000.

2.3 LOCATION & LOCAL COMMUNITY

The Mineral Claim is located in north-eastern South Australia, about 45 km northeast of Cockburn and wholly contained within Kalkaroo Pastoral Station. MC3828 is 37 km from the Barrier Highway (A32) via Mooleulooloo Road. Kalkaroo Copper-Gold Project (ML 6498, ML 6499, ML 6500, MPL 158 and MPL 159) is located approximately 8 km north, also the current location of the Kalkaroo Pastoral Station workers camp.

Cockburn is the nearest community to the site located 70 km to the southeast via Mooleulooloo Road and Barrier Highway. Neighbouring pastoral stations are Boolcoomatta HS(17 km south via Mooleulooloo Road), Yarramba HS (33 km northeast via Yarramba Road), Mooleulooloo HS(17 km north via Mooleulooloo Road), Strathearn HS (27 km northwest via Kalabity Road), Kalabity HS (38 km southwest via Kalabity Road), and Mulyungarie HS(48 km northwest via station tracks).

Honeymoon Uranium Mine, also on Kalkaroo Pastoral Station, is located 23 km northeast via station tracks.

Figure 1 shows the regional location of the Mineral Claim.

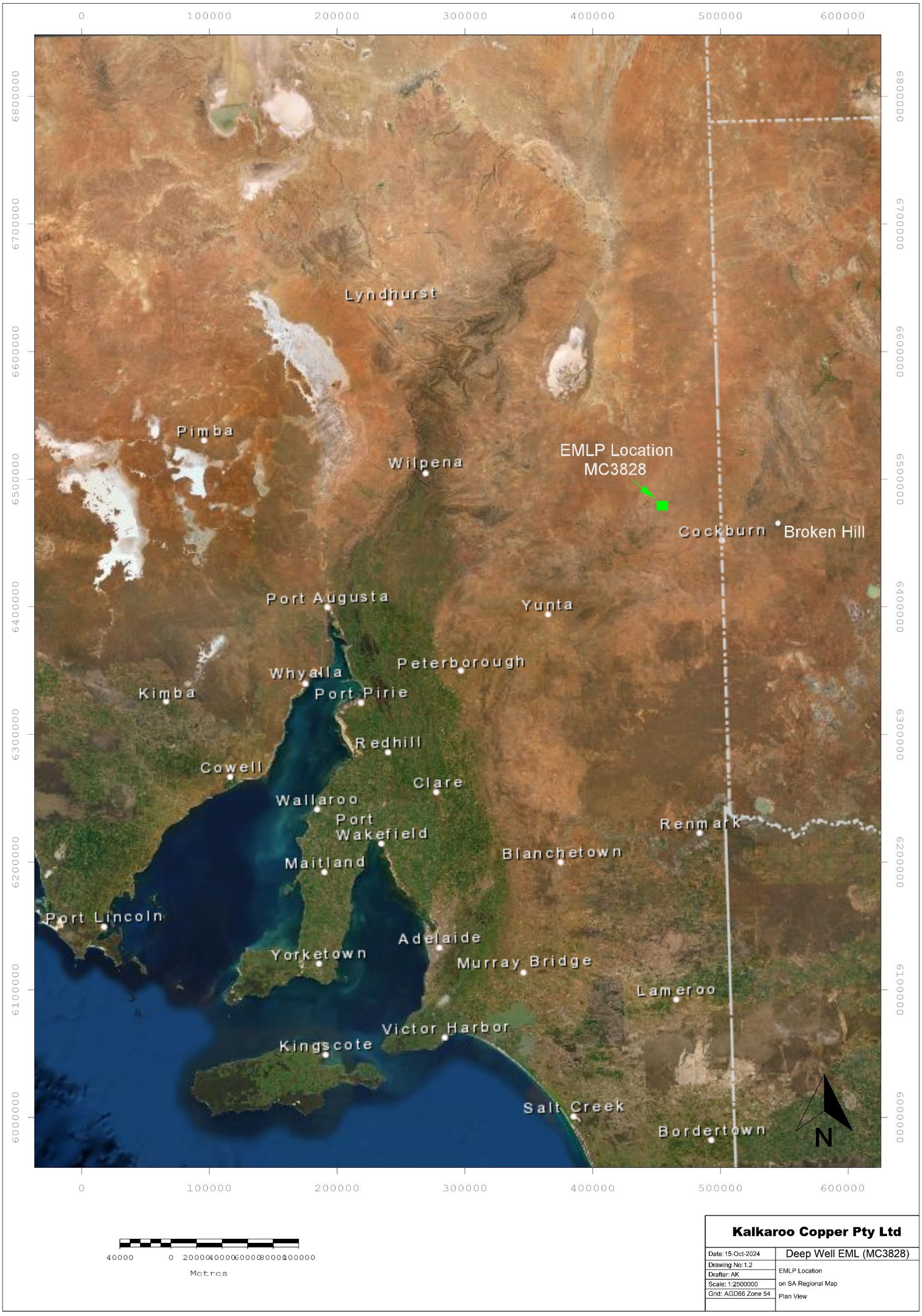

Figure 1 Regional Location

3 Description of Existing Environment

3.1 LAND USE

Historically, the land area has been used primarily for grazing of native pastures. Post-mining, land will be returned to pastoral use.

Given the location, meteorology, soil characteristics and vegetation of the land, the potential uses for the land include pastoral, mining and mineral exploration.

3.2 PROXIMITY TO INFRASTRUCTURE

The Mineral Claim is located on Kalkaroo Pastoral Station, with the nearest station infrastructure being Deep Well Dam (1.3 km to the southwest) and paddock fence lines (1.3 km south, 1.5 km west, 3 km north, and 11.5 km east at the closest points). Kalkaroo Homestead (HS) and the Kalkaroo Pastoral workers camp, is located approximately 7 km north of the Mineral Claim. Honeymoon Mine and workers accommodation is located approximately 13 km to the east – northeast on Kalkaroo Pastoral Station. Kalkaroo Copper mining leases area also located on Kalkaroo Pastoral Station 7 km north.

The nearest residential dwellings to the Mineral Claim (straight line distance) are located on the adjacent pastoral leases: Boolcoomatta HS (17 km south), Yarramba HS (20 km northeast), Mooleulooloo HS (20 km north), Strathearn HS (19 km north west), and Kalabity HS (22 km southwest).

The nearest small population centres are Cockburn, 53 kms southeast, and Olary, 54 km south southwest of the Mineral Claim.

Access to the Mineral Claim is by Mooleulooloo Road, a public road from the Barrier Highway at Mingary, a distance of approximately 37 kilometres.

Kalkaroo Pastoral Station infrastructure proximal to the Mineral Claim is Deep Well Dam, 1.3 kms to the south west. Kalkaroo was de-stocked in 2011.

Figure 2 shows the location of surrounding station infrastructure relative to the Mineral Claim, including fence lines, pastoral boundaries, roads and dams.

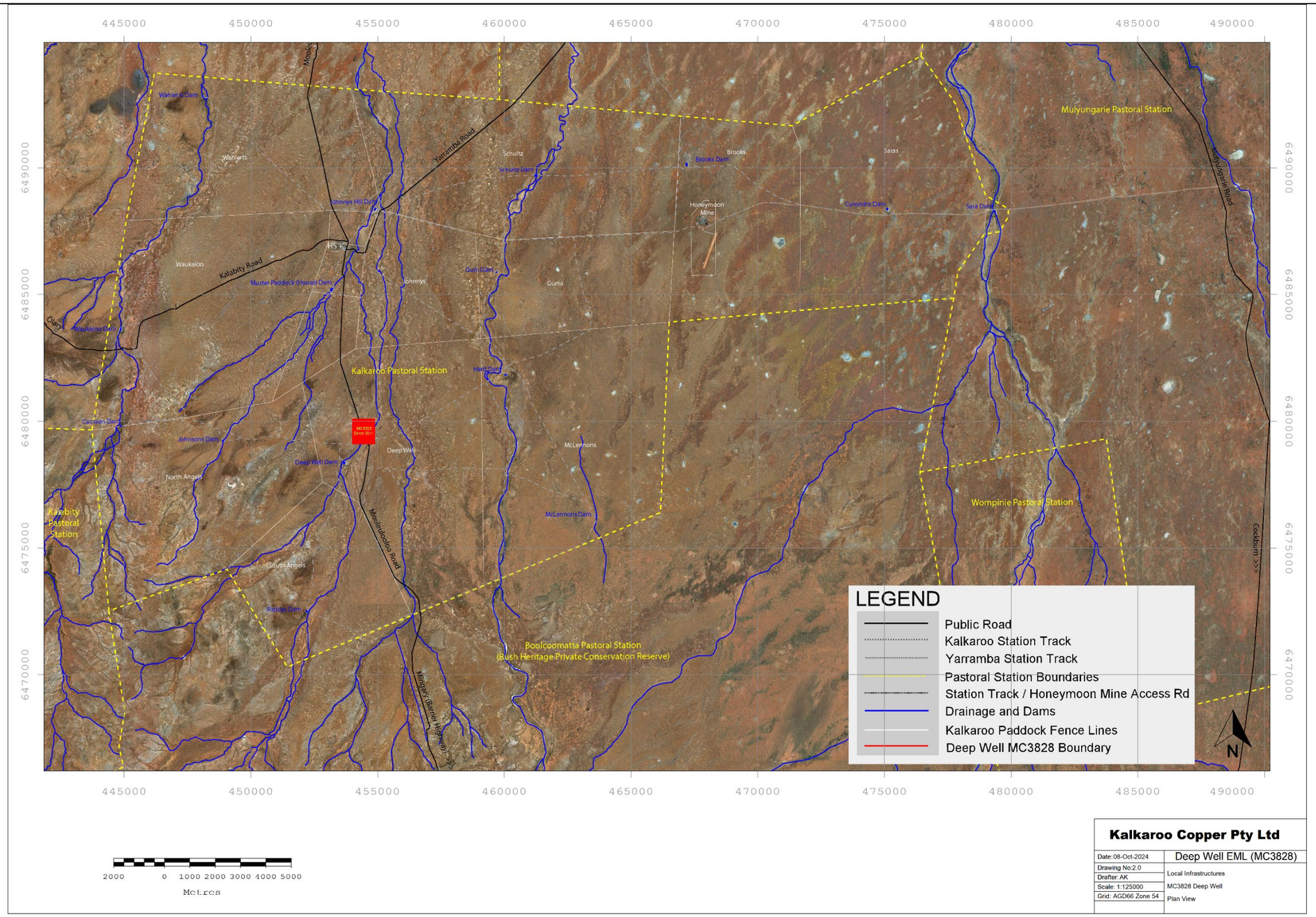

Figure 2 Local Infrastructure

3.3 EXEMPT LAND

No applicable exempt land being as defined under Section 9 of the Mining Act 1971 exists within or near to the Mineral Claim.

3.4 AMENITY

The Mineral Claim is in a region of low visual and cultural amenity and no features of outstanding or noteworthy natural beauty exist in this specific portion of South Australia. Public amenity of the Mineral Claim is low.

3.5 NOISE, DUST AND AIR QUALITY

The locality surrounding the Mineral Claim is sparsely populated, devoid of sources of industrial noise and also noise associated with human habitation and movement.

It is within a semi-arid region with low rainfall, high evaporation, and sparse vegetation that in dry periods results in the natural generation of large amounts of dust during strong winds.

With the exception of dust, no other sources of airborne pollution exist.

3.6 TOPOGRAPHY AND LANDSCAPE

The Mineral Claim containing the borrow pit has a local vertical relief of around 5 metres and is dominated by this local vertical relief which consists of a sparsely vegetated rocky outcrop. From this outcrop, the topography slopes gently away in all directions with slightly more significant gradients to the south and east to the nearest natural drainage. The highest point recorded on the Mineral Claim is approximately 144.0m AHD and the lowest relief approximately 136.0m AHD.

Figure 3 shows existing topography of the Mineral Claim and surrounding area.

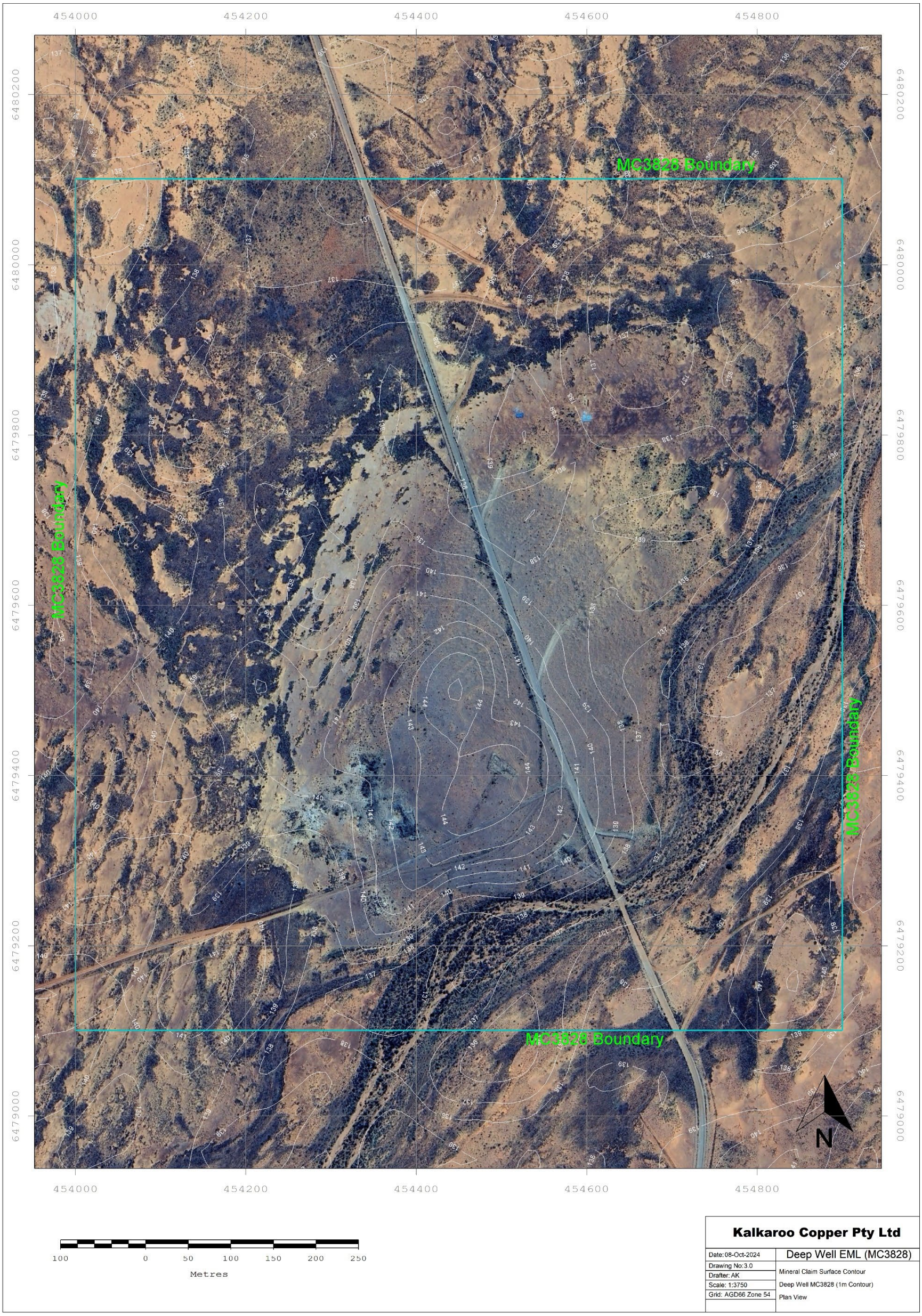

Figure 3 Site Topography of the Mineral Claim Area

3.7 CLIMATE

Meteorological data has been sourced from the Bureau of Meteorology (BOM). The closest weather stations recording all weather observations are Site Number 047048 (Broken Hill Airport, 90 km east southeast) and 020062 (Yunta Airstrip, 150 km west southwest). BOM Site Number 020001 located at Boolcoomatta HS (17 km south) only records rainfall data. (since 1882).

While rainfall is evenly spread across the year, the potential for high intensity rainfall events is more common through Spring, Summer, and Autumn. The highest daily rainfall recorded at Boolcoomatta HS in 142 years of records was 179.1mm in March of 1950.

Summary rainfall and temperature data from BOM are summarised in Figure 4.

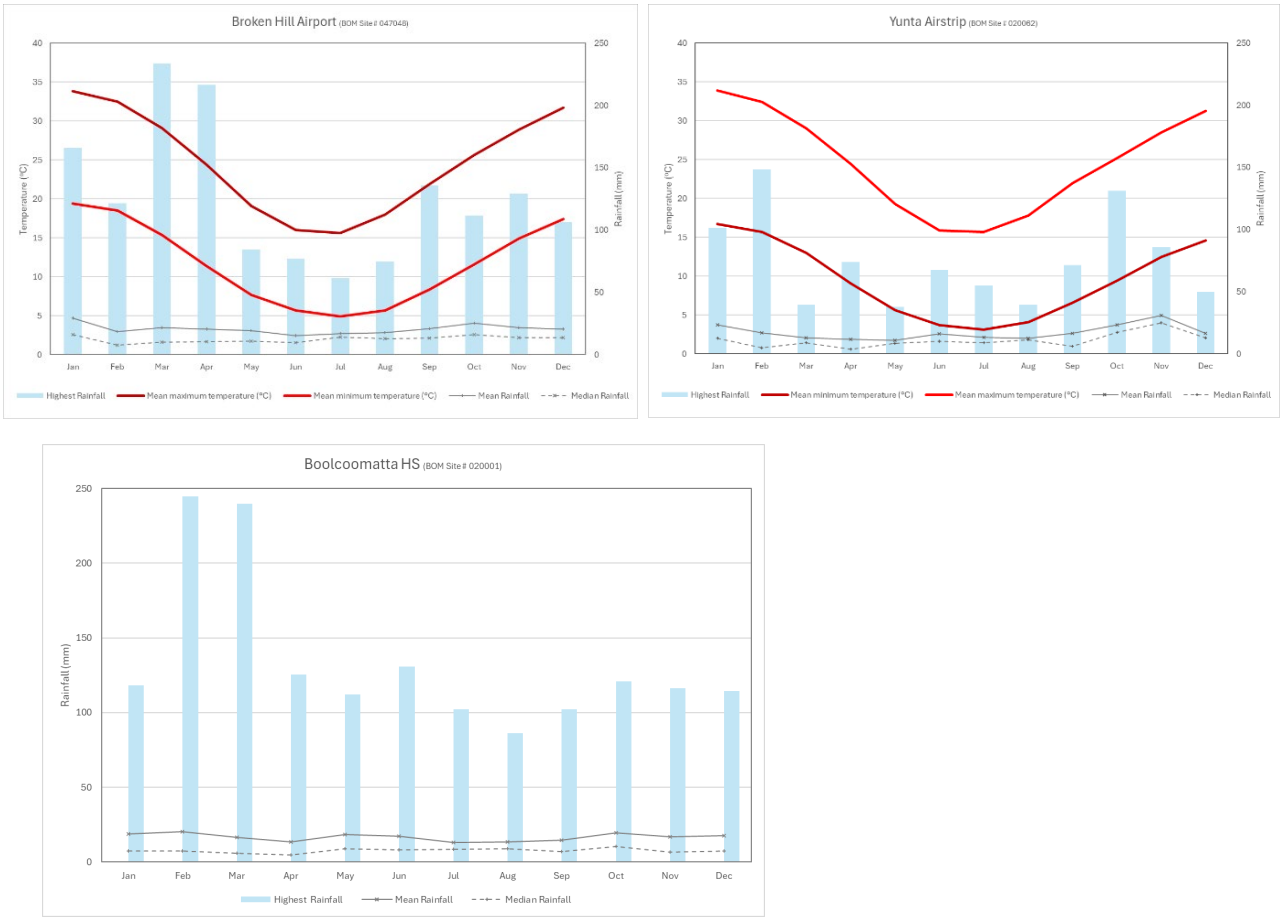

Figure 4 Summary rainfall and temperature data for BOM Sites 047048, 020062 and 020001.

BOM data for Broken Hill Airport indicates average wind speeds year-round are between 13.4 km/h and 21.6 km/h at 9:00 am and 16.8 km/h and 21.0 km/h at 3:00 pm. Prevailing wind directions are:

- October to May – eastern semi-circle with southerlies prevailing at 9:00 am and the southern semi-circle with southerlies prevailing at 3:00 pm.
- May to October – southwest quarter circle and north-northeast with southerlies prevailing at 9:00 am and southwest to west semi-circle at 3:00 pm.

3.8 GEOHAZARDS

3.8.1 Seismicity

Based on published earthquake hazard maps (Love, 1996), the Mineral Claim could experience an earthquake with an acceleration co-efficient exceeding 30mm/s^2 to 50 mm/s^2 every 500 years. No permanent buildings or infrastructure will be erected on the Mineral Claim.

3.8.2 Karsts, Faults and Slips

No natural Karst formations, geological faults or slips have been identified by Geologists within the Mineral Claim.

3.8.3 Radioactive Minerals

No radioactive minerals exceeding concentrations, as defined by the Commonwealth National Directory for Radiation Protection, that trigger the need for further investigation have been identified in representative samples of the material to be mined from the Mineral Claim or nearby mineral exploration drill holes.

Representative samples of the material to be excavated within the borrow pit area measured uranium concentrations less than 80 ppm.

3.8.4 Minerals hazardous to human health

Multi-element scans were conducted on representative samples, taken from the outcropping borrow pit area to be mined. The elements included in the testing program were:

Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Nickel, Selenium, Vanadium, Zinc and Mercury. The results for each element were compared with median crustal abundance data on a log 2 scale to provide an extent of element enrichment. These comparisons are reported as Geochemical Abundance Indices (GAI's). The elemental concentrations were also compared with the Health based Investigation Level (HIL) for parks, recreational open space and playing fields as described under *Schedule B(1) of the National Environmental Protection Council (NEPC) Guideline on Investigation Levels for Soil and Groundwater*.

The results show that all elemental enrichments are below HILs for parks, recreational open space and playing fields as described under *Schedule B(1) of the National Environmental Protection Council (NEPC) Guideline on Investigation Levels for Soil and Groundwater*. The rock is categorised as having elemental concentrations similar to the average in the Earth's crust as all GAI's were zero. Refer to Appendix 2: Rock Characterisation Report for further details.

3.8.5 Asbestos

No Asbestiform minerals have been identified by Geologists from representative samples obtained of the material to be mined within the Mineral Claim.

3.8.6 Acid Forming Potential

Representative samples of the outcropping material to be mined were submitted for analysis of its Acid Forming Potential. The results from the test work classified the material to be won from the borrow pit as being non-acid forming. Refer to Appendix 2: Rock Characterisation Report for further details.

3.9 SURFACE WATER

The Mineral Claim lies within the jurisdiction of the NRM South Australia Arid Lands (SAAL) region. The ten-year strategic SAAL NRM "Regional Natural Resources Management Plan" outlines the visions and goals of the SAAL NRM Board for natural resources management. Most of the strategic directions involve management at a broad regional level with some more specific areas named. The Mineral Claim is not included in any of these specific areas.

The Mineral Claim lies outside of any NRM "Water Protection Area in South Australia" as defined in The Environment Protection Act 1993, The Landscape South Australia Act 2019 and the Environment Protection (Water Quality) Policy including areas under the River Murray Act, 2003.

The Mineral Claim lies outside of the Murray Darling Basin area.

Flood Mapping and Erosion modelling has been completed for the Kalkaroo Copper Project by Inside Infrastructure in 2020. The catchment upstream of the Kalkaroo Copper Project is approximately 354 km2 and arid, with sparse low-lying vegetation and grasses typical of the region. The Mineral Claim MC3828 also lies within this catchment boundary as shown in Figure 5.

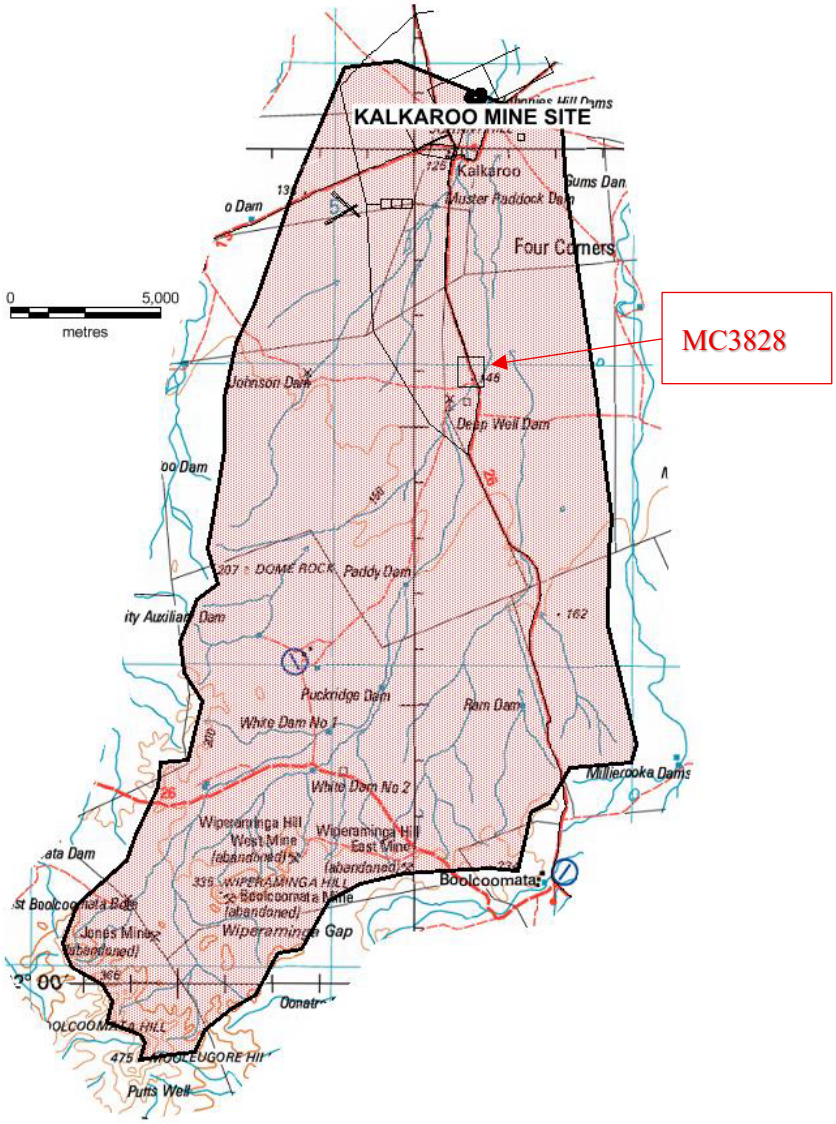

Figure 5 showing flood water catchment boundary encompassing MC3828.

An ephemeral drainage line transects the southwest corner of the Mineral Claim and existing drainage is shown in Figure 8.

The boundaries of the planned borrow pit are at least 90 metres north and between 2 metres and 8 metres higher than the level of this drainage line. The borrow pit will have no impact on the natural surface flow regime.

In the immediate vicinity of the Mineral Claim where borrow materials will be won, the landscape is characterised by the rocky outcrop of interest which slopes away at a shallow 4% gradient towards the drainage line on the southern side. Towards the northern side of the Mineral Claim, the outcrop runs down to a plain with a 0.5%-1.0% fall north towards Lake Frome. The surface drainage of the Mineral Claim and the encompassing borrow pit on completion of Mining is shown in Figure 6 and in Figure 7.

Rainwater runoff generally occurs as sheet flow in the direction of prevailing ground slopes to natural drainage lines (ephemeral creeks) as described above.

Stock water dams such as Deep Well Dam, approximately 1 km south west and upstream of the Mineral Claim, has been historically excavated next to ephemeral creeks with wing banks constructed to direct flow into the dams and then erode away to allow flow to continue after the dams reach capacity.

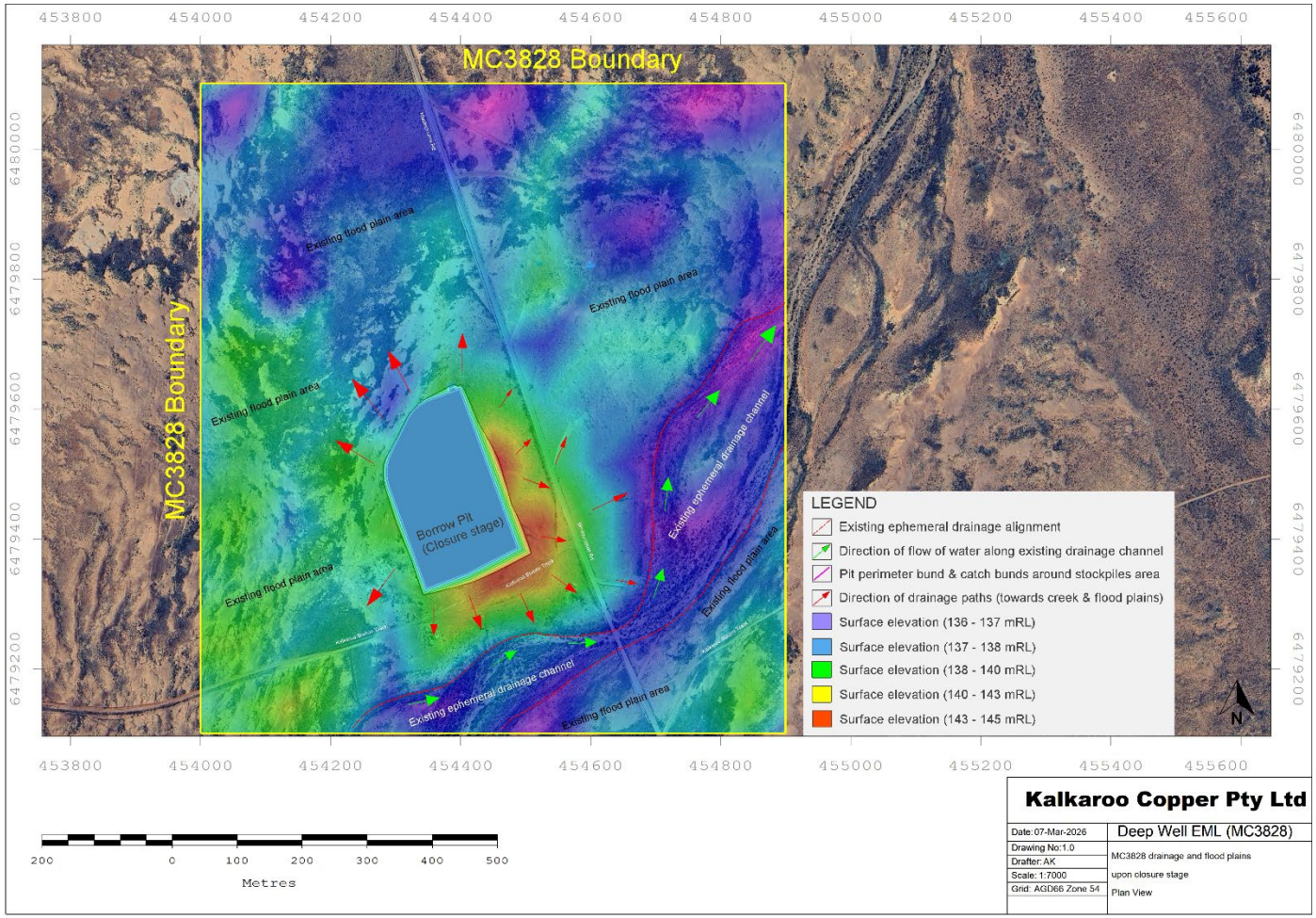

Figure 6 Local Surface water drainage of MC3828 on closure.

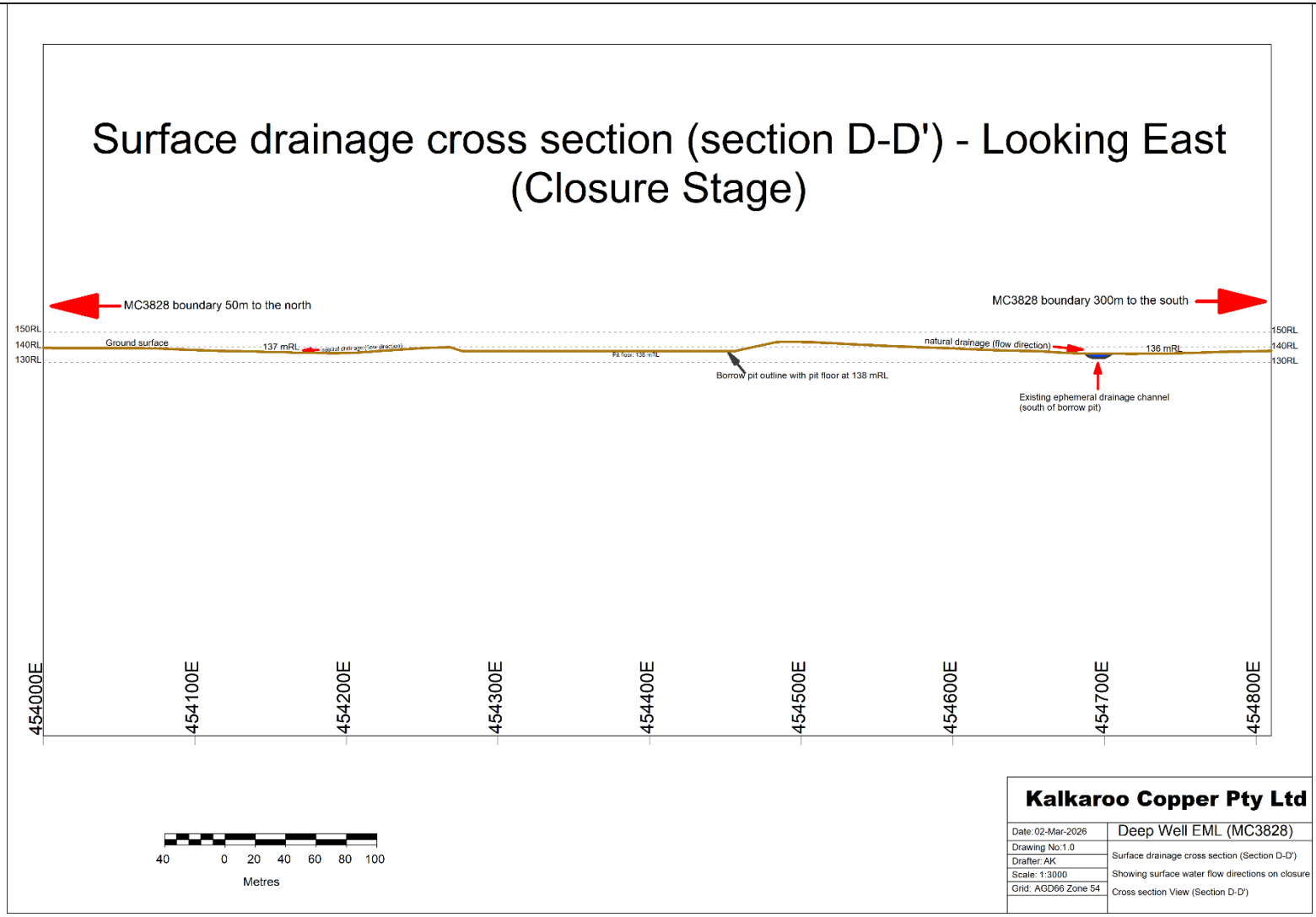

Figure 7 Crossection D-D' looking North through MC3828 showing RL of borrow pit to adjacent drainage

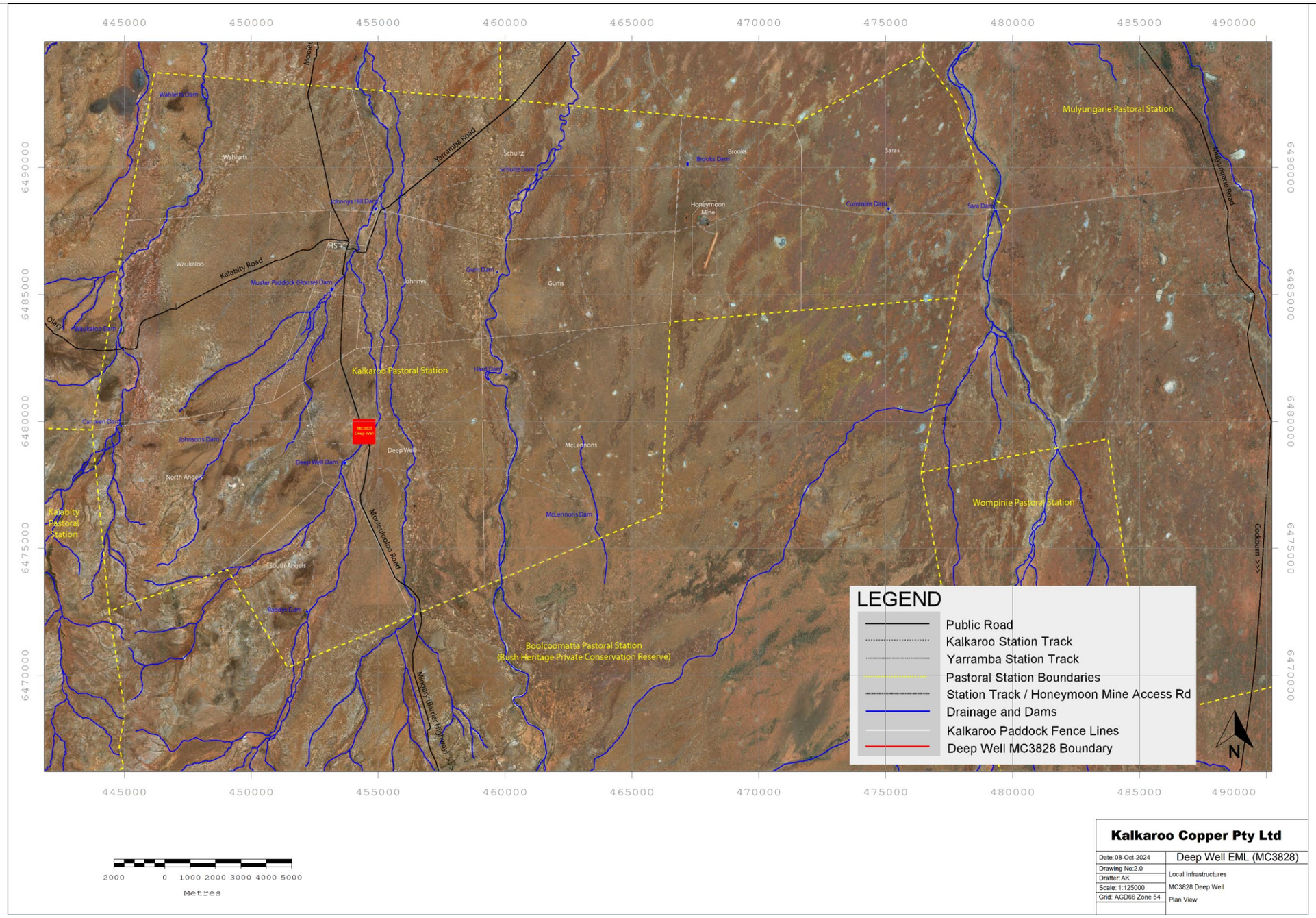

Figure 8 Existing Drainage

3.10 GROUNDWATER

The Mineral Claim lies within the jurisdiction of the NRM South Australia Arid Lands (SAAL) region but lies outside of any NRM "Water Protection Area in South Australia" as defined in under the Landscape South Australia Act 2019.

The nearest and only bore (Unit Number 7034-51) to the Mineral Claim within a 5 km radius is located approximately 220 metres to the east of the proposed mine infrastructure (refer to Figure 9). This bore was constructed for stock purposes in early 1990 but has not been used for many years (in excess of 15 years) due to poor water quality, i.e. groundwater salinity (TDS) of around 4400 ppm and low yield.

Depth to the Water Table at 7034-51 is 37m below ground level (bgl) or 62.54mRL (AHD). The surface level at this location is 99.54mRL (AHD). The excavated floor level of the proposed borrow pit will be at 138mRL (AHD). The buffer between groundwater seasonally high water table and the floor of the borrow pit is estimated at 75m. Refer to Figure 10 for a visual description of the seasonally high water table level in relation to the floor of the proposed borrow pit.

The existing water table will not be intersected during mining of the proposed borrow pit.

There are no seepages of groundwater from slopes and no permanent water holes within the Mineral Claim area to indicate or suggest the presence of groundwater.

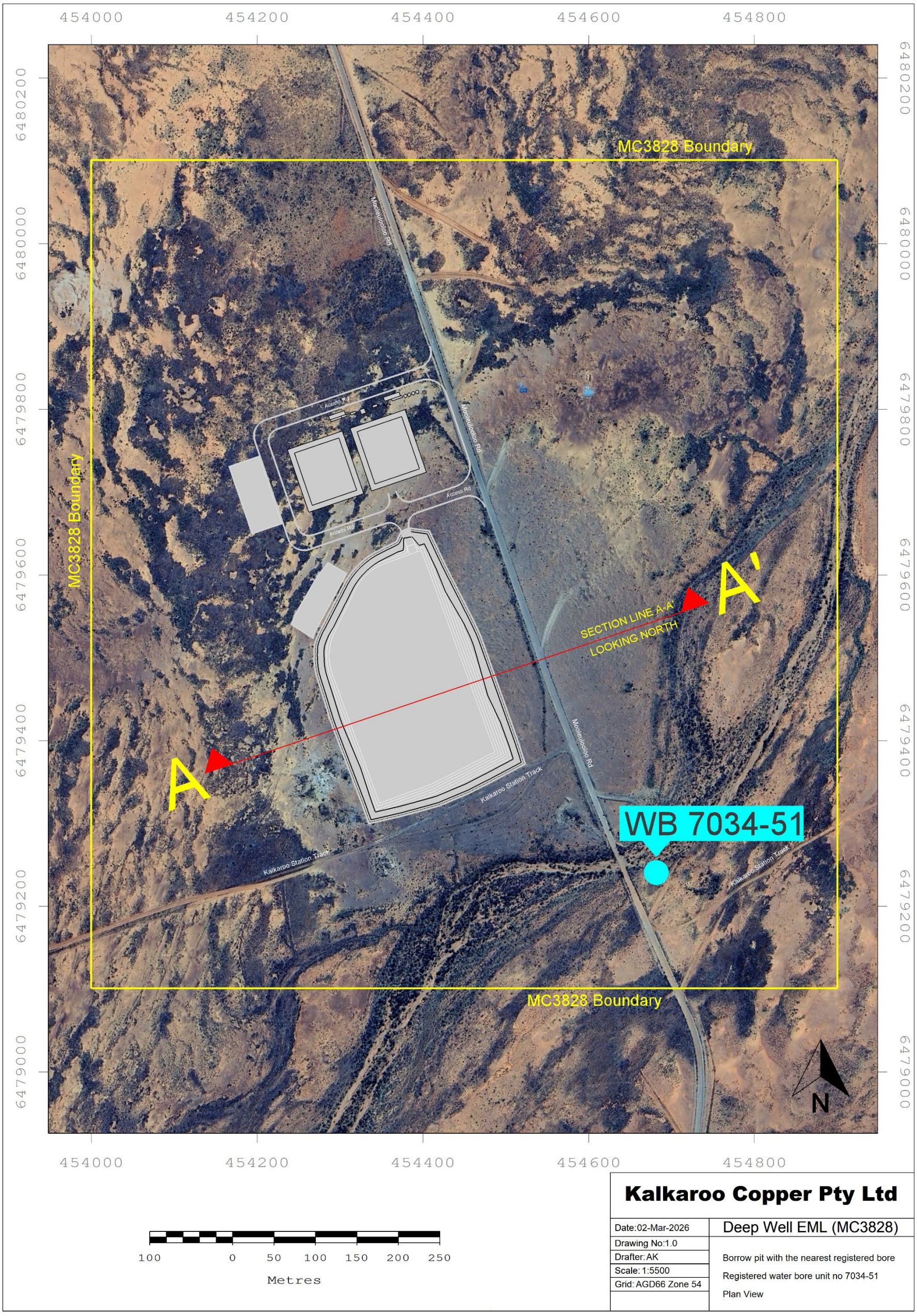

Figure 9 Location of registered Wells within a 5km radius of the Mineral Claim area

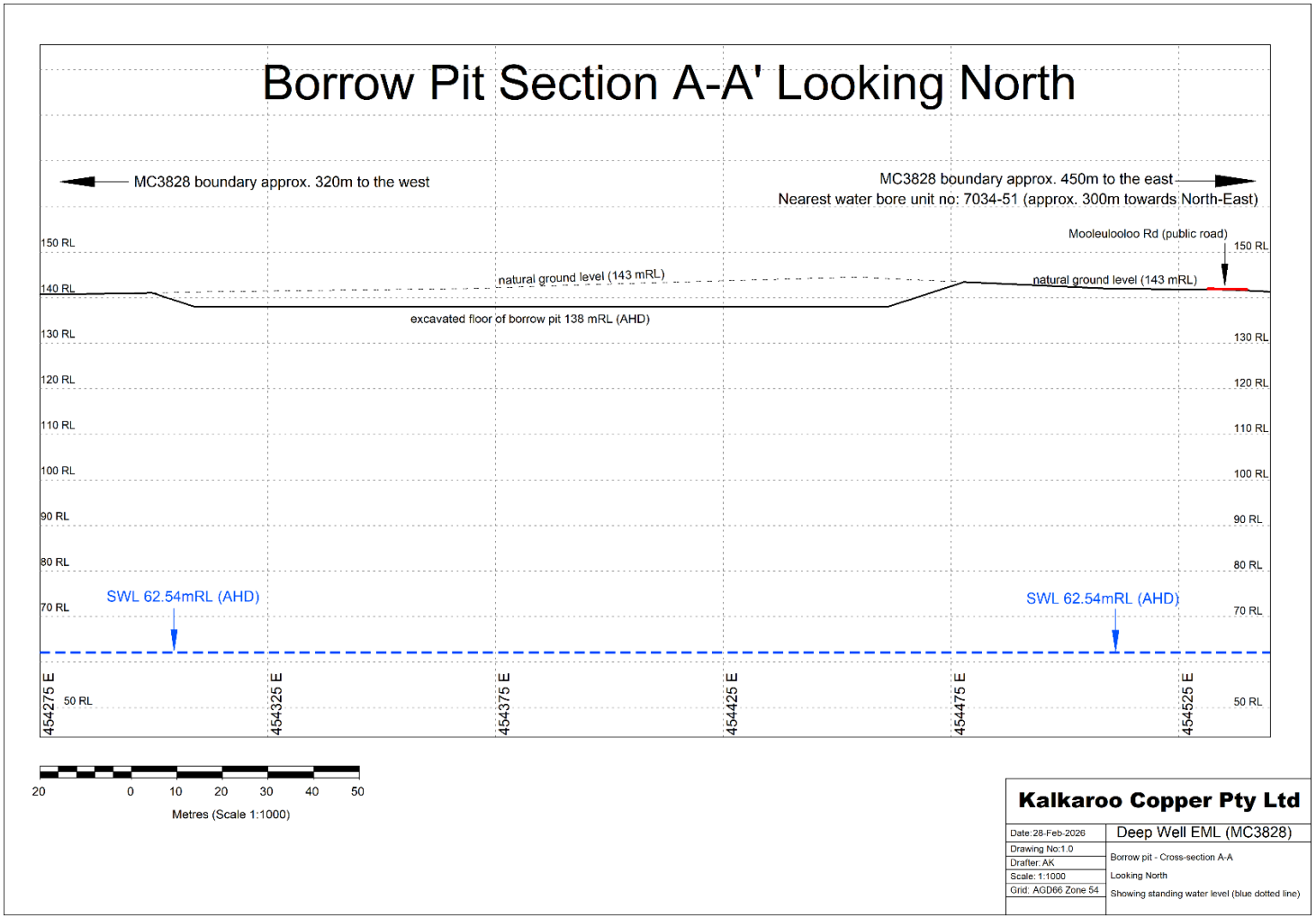

Figure 10 Cross section of the Borrow pit showing seasonally high water table.

3.11 VEGETATION

3.11.1 Vegetation

The Mineral Claim is situated within the Broken Hill Complex subregion and lies to the north of the Olary Spur. Regionally, it is part of a large internal drainage basin, the centre of which is occupied by Lake Frome. This plain consists of highly calcareous loamy earths, crusty loamy soils with red clayey subsoils and hard setting loamy soils with red clayey subsoil. The dominant vegetation communities are various low chenopod shrublands occurring as either communities dominated by a single species or as mosaics of several species on plains and low rises. Smaller areas of grasslands are also found on the plains. The vegetation structure and composition has been altered as a result of past land-use practices (ie. stock grazing); however, the destocking of the property has allowed highly palatable short-lived perennial species such as Maireana integra (Entire-wing Bluebush) and Solanum lanceolatum (Orangeberry Nightshade) to grow unhindered, indicating that the vegetation is regenerating in the absence of grazing pressures.

Ecosphere Ecological Solutions were commissioned to complete a Native Vegetation Management Plan for the Mineral Claim. A copy of this report can be found in Appendix 1: Native Vegetation Management Plan and is summarised herein.

The Mineral Claim is located on a plain with low relief, with a rocky outcrop centred within the Claim. The soils are generally heavy clay flats with minor Gilgai and flood out areas occupied by larger perennial shrubs. Low chenopod shrubland occupied much of the Project area, and the area was almost entirely devoid of trees.

Five vegetation associations were recorded on the Mineral Claim area. None of the vegetation associations recorded were associated with a Threatened Ecological Community listed under the EPBC Act or the Provisional List of Threatened Ecosystems of South Australia.

A vegetation survey map of the Mineral Claim area is shown in Figure 11.

3.11.2 Threatened Species

No Threatened Ecological Communities were identified in the EPBC Act Protected Matters Search Tool (PMST) report as potentially occurring within 50 km of the Project area.

Six flora species listed as threatened under the EPBC Act were identified in the PMST report as potentially occurring or having suitable habitat within 50 km of the Project area. Two species listed as threatened under the EPBC Act had historical records identified within 50 km of the Project area and were considered to possibly occur within the Project area. These species were:

- **Acacia carneorum (Needle Wattle - EPBC: VU, NPW: V)** was considered possible to occur within the Project area. This species was added to the threated flora list under the EPBC Act on 16th July 2000 due to continued population decline

(DCCEEW 2024b). Acacia carneorum is a straggly, spreading, prickly shrub or small tree to 5 m high and several metres in diameter and grows on sand ridges or sandy flats or in alluvium along watercourses.

A distinctive woody perennial, this species was not observed during the field survey however is known from sandy rises that occur across the level plain areas in proximity to the site.

A highly conspicuous species, all population locations in the area are well known and do not interact with the Project area.

- **Codonocarpus pyramidalis (Slender Bell-fruit - EPBC: VU, NPW: E)** was considered to possibly occur within the Project area. This species was added to the threatened flora list under the EPBC Act on 16th July 2000 due to continued population decline (DCCEEW 2024c). Codonocarpus pyramidalis occurs in the Northern Lofty Ranges, Flinders Ranges and eastern regions of South Australia. It is a shrub or small tree up to 8 m tall. Populations occur as scattered individuals or in small, localised stands, and grow on the crests and slopes of low ridges, hills and along creeks in loamy sand or sandy clay loam. In particular, the species is short-lived and is more common after fire. The key threat to this species is seedling grazing by rabbits and goats.

  A distinctive woody perennial this species was not observed during the field survey.

Seven flora species of State conservation significance, as listed under the NPW Act, but not of national significance were identified in the BDBSA search as being previously recorded within 50 km of the Project area (Table 8 and Figure 6). Of these, four species were considered to possibly occur within the Project area:

- Malacocera gracilis (Slender Soft-horns - NPW: V)
- Rytidosperma laeve (Smooth Wallaby Grass - NPW: R)
- Senecio gawlerensis (Gawler Ranges Groundsel - NPW: R)
- Swainsona fuscoviridis (Dark Green Swainson-pea - NPW: R)

Two additional species with denatured records within 50 km of the Project area were also considered to possibly occur within the Project area (Table 8):

- Dianella porracea (Pale Flax-lily - NPW: V)
- Swainsona procumbens (Broughton Pea - NPW: V)

One species was considered unlikely to occur within the Project area, however likely to occur in close proximity to the Project area within the creek line:

- Orobanche cernua var. australiana (Australian Boomrape - NPW: R)

None of these species were observed during the field survey, although the herbaceous species Malacocera gracilis (Slender Soft-horns), Orobanche cernua var. australiana (Australian Broomrape), Rytidosperma laeve (Smooth Wallaby Grass), Swainsona

fuscoviridis (Dark Green Swainson-pea), and Swainsona procumbens (Broughton Pea) may not have been visible at the time of the field survey.

3.11.3 Weeds and Plant Pathogens

Declared plants are weeds that are regulated under the Landscape South Australia Act 2019 due to their threat to primary industry, the natural environment and public safety. Eight declared weed species had historical records from the NatureMaps BDBSA search within 50 km of the Project area. Four of these were also Weeds of National Significance (in bold):

- Cenchrus ciliaris (Buffel Grass)
- Echium plantagineum (Salvation Jane)
- **Lycium ferocissimum (African Boxthorn)**
- Marrubium vulgare (Horehound)
- **Parkinsonia aculeata (Jerusalem Thorn)**
- **Solanum elaeagnifolium (Silver-leaf Nightshade)**
- **Tamarix aphylla (Athel Pine)**
- Xanthium spinosum (Bathurst Burr)

No declared weeds were identified within the Project area, however the declared weeds Echium plantagineum (Salvation Jane) and Xanthium strumarium (Noogoora burr) were identified in the creek line south of the Mineral Claim. Control measures for Noogoora burr are currently implemented along the creek line.

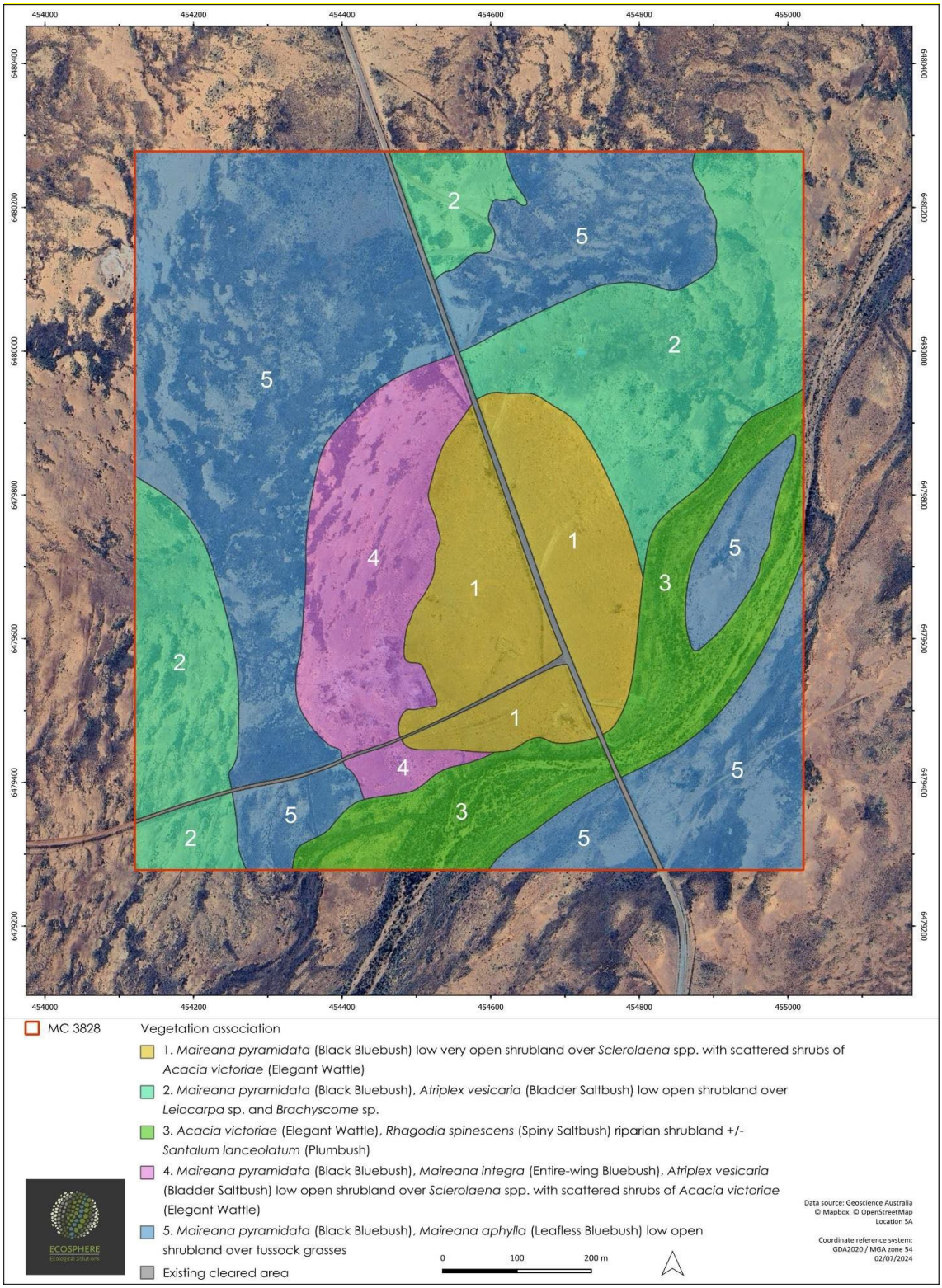

Figure 11 Vegetation Map of the Mineral Claim disturbance area.

3.12 FAUNA

Ecosphere Ecological solutions completed a fauna survey, both observed and potentially occurring, within the Mineral Claim proximity.

Nine fauna species were recorded within and surrounding the Project area during the survey and are presented in Table 3. No EPBC or State rated fauna species were observed however, the vegetation community homogeneity means that many species are likely to move through the wider area in response to habitat resource availability.

The species seen during the survey are not representative of the total species richness for the area and at the times of year when there are better conditions, threatened species such as the Southern Whiteface (*Aphelocephala leucopsis leucopsis)*, Australian Bustard (*Ardeotis australis*) and Elegant Parrot (*Neophema elegans elegans)* would be more likely to be observed within the area.

Threatened species that are possibly or likely to be using the Project area are discussed further below in Section 3.12.1

Table 3 Fauna species observed during field Survey

Species Name	Common Name
Acanthagenys rufogularis	Spiny-cheeked Honeyeater
Anthus australis	Australian Pipit
Elanus axillaris	Black-shouldered Kite
Falco cenchroides	Australian Kestrel
Gavicalis virescens sonorus	Singing Honey-eater
Macropus (Osphranter) rufus	Red Kangaroo
Malurus leucopterus	White-winged Fairy-wren
Psophodes cristatus	Chirruping Wedgebill
Taeniopygia guttata castanotis	Zebra Finch

3.12.1 Threatened Species

A total of 17 fauna species listed as threatened under the EPBC Act were identified in the PMST report as having suitable habitat potentially occurring within 50 km of the Mineral Claim. This included 12 bird species, four mammals and one fish. Of these, seven species had historical records within a 50 km radius of the Project area (Figure 7), and two species were considered to possibly use habitat within the Project area:

- **Southern Whiteface (Aphelocephala leucopsis leucopsis, EPBC: VU)** were considered to possibly occur within the vicinity Mineral Claim area. This species was added to the threated fauna list under the EPBC Act on 31st March 2023 due to continued population decline (DCCEEW 2024d). The species occurs across most of mainland Australia south of the tropics in a wide range of open woodlands and shrublands where there is an understorey of grasses or shrubs, or both. The species

prefers habitat with low tree densities and herbaceous understory litter cover which provides essential foraging habitat.

The most recent record for this subspecies within 50 km of the Project area is from 2012. Although the subspecies may periodically move through the wider area, habitat within the Project area is not deemed critical for the species given the lack of trees with hollows/crevices required for breeding and roosting and the lack of Acacia/Eucalypt dominated woodland/shrubland (preferred habitat). Key threats for the species are broad landscape based and relate to pastoralism, loss of shrubs and grasses and predation.

Southern Whiteface was not observed during the field survey. Vegetation clearance within the Project area is highly unlikely to negatively impact any important population(s) of the species as per the Significant impact criteria for a Vulnerable species listed in the Significant Impact Guidelines 1.1 Matters of National Environmental Significance (2013) (SIG 1.1).

- **Plains-wanderer (Pedionomus torquatus, EPBC: CR, NPW: E)** were considered to possibly occur within the vicinity of the Mineral Claim. This species was transferred from Vulnerable to Critically Endangered under the EPBC Act on 8th July 2015 (DCCEEW 2024e). Plains-wanderers occur across north-central Victoria, southern New South Wales around the Riverina regions, eastern South Australia and west-central Queensland. The species is thought to typically inhabit sparse, treeless grasslands of approximately 50 % bare ground with most vegetation less than 5 cm in height and some widely spaced plants up to 30 cm high. The main threat to the Plains-wanderer is the conversion of native grasslands to crops and dense pastures, which even if left to recover, remain unsuitable as habitat for decades (Garnett et al. 2011). Other factors include overgrazing reducing the grass to less than 2-3 cm in height and making the species more vulnerable to both introduced (Foxes and Cats) and native predators (Spotted Harrier and Black Falcon), inappropriate fire regimes, and pesticide use.

  One record for the Plains-wanderer from 2006 was located 3.5 km south of the Project area, and there are several records from within Boolcoomatta Reserve (approximately 16 km south of Kalkaroo). While it is possible that the species could utilise habitat within the Mineral Claim, more suitable habitat occurs outside of the area (Bellchambers and Baker-Gabb 2006; Pers. Obs.). Plains-wanderer was not observed during the field survey. Nevertheless, this does not mean that the Mineral Claim area may not become more suitable habitat in the future, particularly given the dynamic nature of vegetation structure in arid environments. A recent study also provides evidence that Plains-wanderer utilise a broader range of vegetation densities than previously thought (Nugent et al. 2022). It is here considered that vegetation clearance within the Mineral Claim is unlikely to significantly negatively impact any population(s) of the species as per the Significant impact criteria for a Critically endangered species listed in the Significant Impact.

A total of 11 fauna species of State conservation significance but not national significance had historical records from the NatureMaps BDBSA search within 50 km of the Mineral Claim. Of these, four were considered to possibly utilise habitat within the Project area:

- Australian Bustard (Ardeotis australis - NPW: V)
- Elegant Parrot (Neophema elegans elegans - NPW: R)
- Flock Bronzewing (Phaps histrionica - NPW: R)
- Woma (Aspidites ramsayi - NPW: R)

An additional species of State conservation significance with denatured records within 50 km of the Project area was considered to possibly occur within the Project area (Table 9):

- Elanus scriptus (Letter-winged Kite - NPW: V)

None of the above species were observed during the field survey conducted by Ecosphere Ecological Solutions.

3.12.2 Migratory Species

Eight listed migratory species were identified in the PMST report as having suitable habitat potentially occurring within 50 km of the Mineral Claim. Most of these species are unlikely to utilise the area other than as a brief flyover considering the lack of suitable habitat. Migratory species are largely associated with waterbodies necessary for feeding and or refuge areas which are not present within the Mineral Claim.

3.12.3 Pest Species

Exotic fauna species have been recorded as they are a listed threat to several Matters of National Environmental Significance. Fourteen exotic fauna species had historical records from the NatureMaps BDBSA search within 50 km of the Project area. These were:

- European Cattle (Bos taurus)
- Dingo (Canis lupus)
- Goat (Feral Goat) (Capra hircus)
- European Goldfinch (Carduelis carduelis britannica)
- Feral Pigeon (Columba livia)
- Horse (Brumby) (Equus caballus)
- Feral Cat (Felis catus)
- House Mouse (Mus musculus)
- Rabbit (European Rabbit) (Oryctolagus cuniculus)
- Sheep (Feral Sheep) (Ovis aries)
- House Sparrow (Passer domesticus domesticus)
- Common Starling (Sturnus vulgaris vulgaris)
- Pig (Feral Pig) (Sus scrofa)
- Fox (Red Fox) (Vulpes vulpes)

Signs of European rabbits were identified within the Project area (one older warren, droppings and remains), and pigs have been seen in the wider area using muddy dam edges as wallows.

3.13 TOP SOIL AND SUBSOIL

In a regional context, the Mineral Claim area straddles the Barrier Range Outwash zone of BHC4 57. This area is described as Erosional/Depositional, with the depositional plain featuring longitudinal sand dunes and clay pans or low sandy rises. These are cut across by through drainage ways, with sheet sand outwash from broad alluvial channels.

Within the Mineral Claim, soil development is scant with the major soil types being orange or red-brown duplex clays and calcareous earths (+/- gypsiferous and quartz lag) with some irregular shallow depression-type gilgai and claypans. There are alluvial and colluvial soils along the drainage lines and in clay pans and flats.

The distribution of soil types varies across the Mineral Claim, with skeletal soils present across the outcrop rise and transported clay-silt and sand dominated soils, often as sands or red duplex silty soils on the plains and along the existing drainage line.

A Map showing the distribution of soils within the Mineral Claim is presented in Figure 12.

The majority of the area to be mined contains scant or skeletal topsoil to a maximum thickness of 50mm.

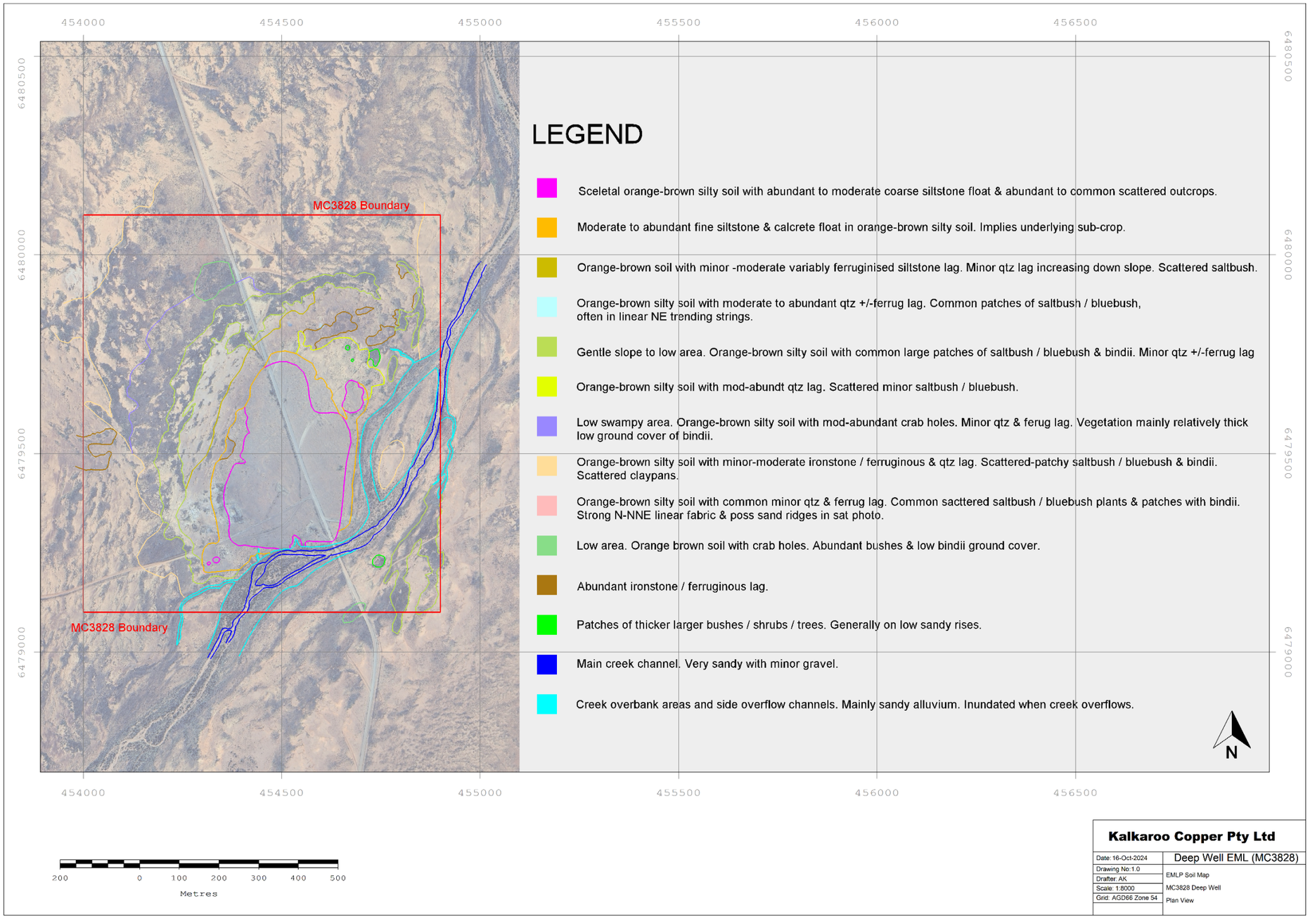

Figure 12 Soils Map of MC3828

3.14 GEOLOGICAL ENVIRONMENT

The material to be won from the Borrow pit consists of dark grey weakly metamorphosed siltstone-shale of the ~1650 ma Palaeo-Proterozoic metasediments of the Strathearn Sub-group which forms part of the Wilyama Super Group of the Olary Domain, part of the Curnamona Province in north-eastern South Australia. This material is generally uniform, consisting predominantly of flaggy dark grey (reduced) variably biotitic &/or graphitic siltstone (pelite), with a low metamorphic grade of probable lower greenschist facies.

The siltstone is visually outcropping and forms a low surface rise within the Mineral Claim which is the top of a basement topographic high or ridge, that protrudes through onlapping Quaternary age cover sequence. A visual description of the Geology within the Mineral Claim can be seen in Figure 13.

The outcropping rock to be mined has an anticlinal axis passing through the eastern part of this area, with its axis plunging 65 to 80 deg and Trending to 207deg True. The western limb of this anticline is dipping at 75 to 85deg to the West and striking 000deg True (True Nth). Dips in the outcropping material towards the nose of the anticlinal fold are consistent with the fold plunge of 65 to 75deg and striking 120deg True. The eastern limb is dipping 75 to 85deg to the east & striking 000deg True. The eastern limb of the fold is covered by Quaternary age cover sequence outside of the Mineral Claim boundary. A typical geological cross section is shown in Figure 14 which shows the thickness and extent of the siltstone to be won.

The proposed borrow pit is to be excavated to no more than 5 metres deep (see Figure 17). With the material to be mined from the Borrow pit being visible and outcropping on the land surface as described above, exploration work on the Mineral Claim has consisted of rock chip sampling, field geological mapping and structural interpretation to identify and quantify the resource extent. For these reasons, no drilling of the resource was necessary.

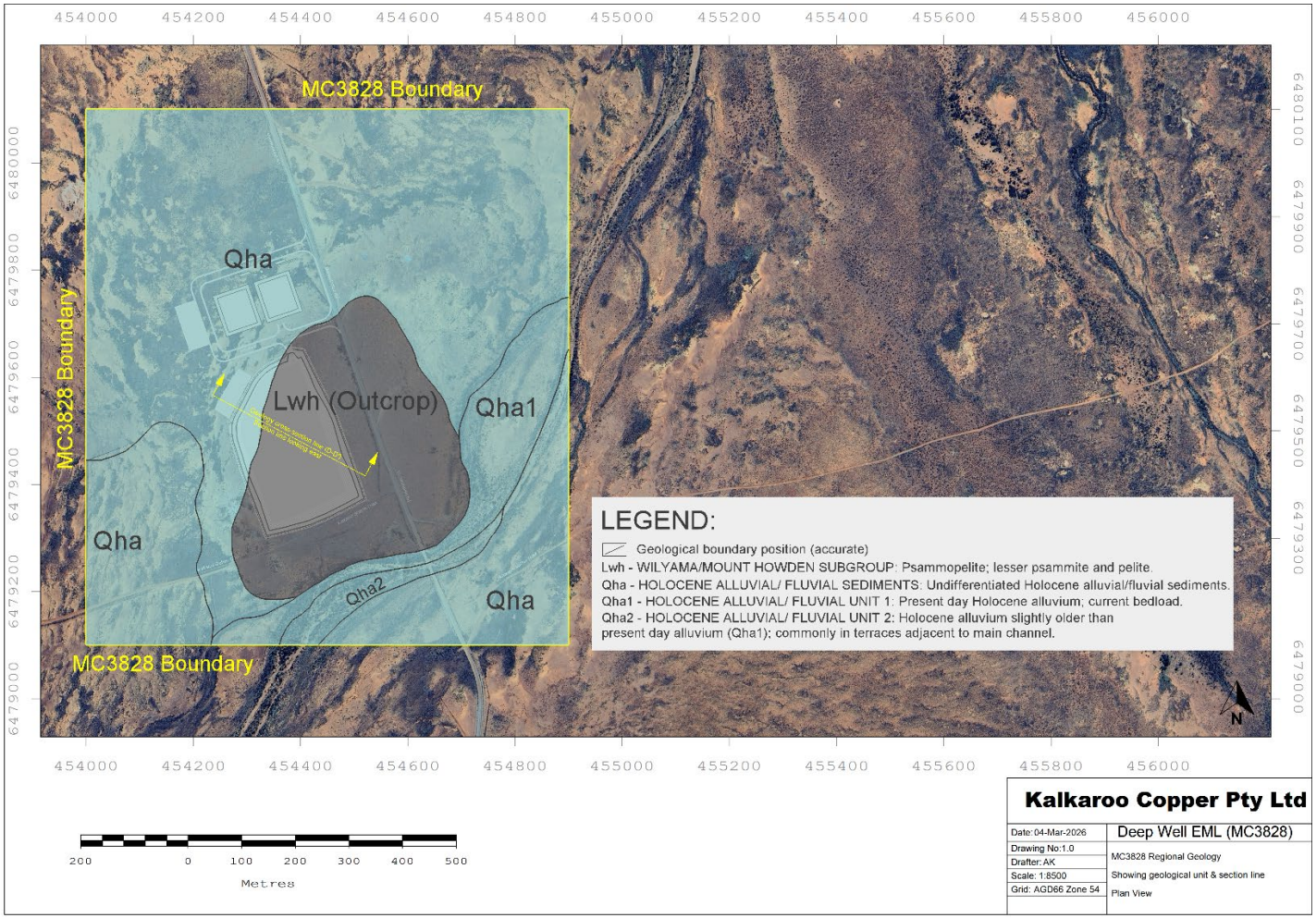

Figure 13 Local geology of the Mineral Claim area.

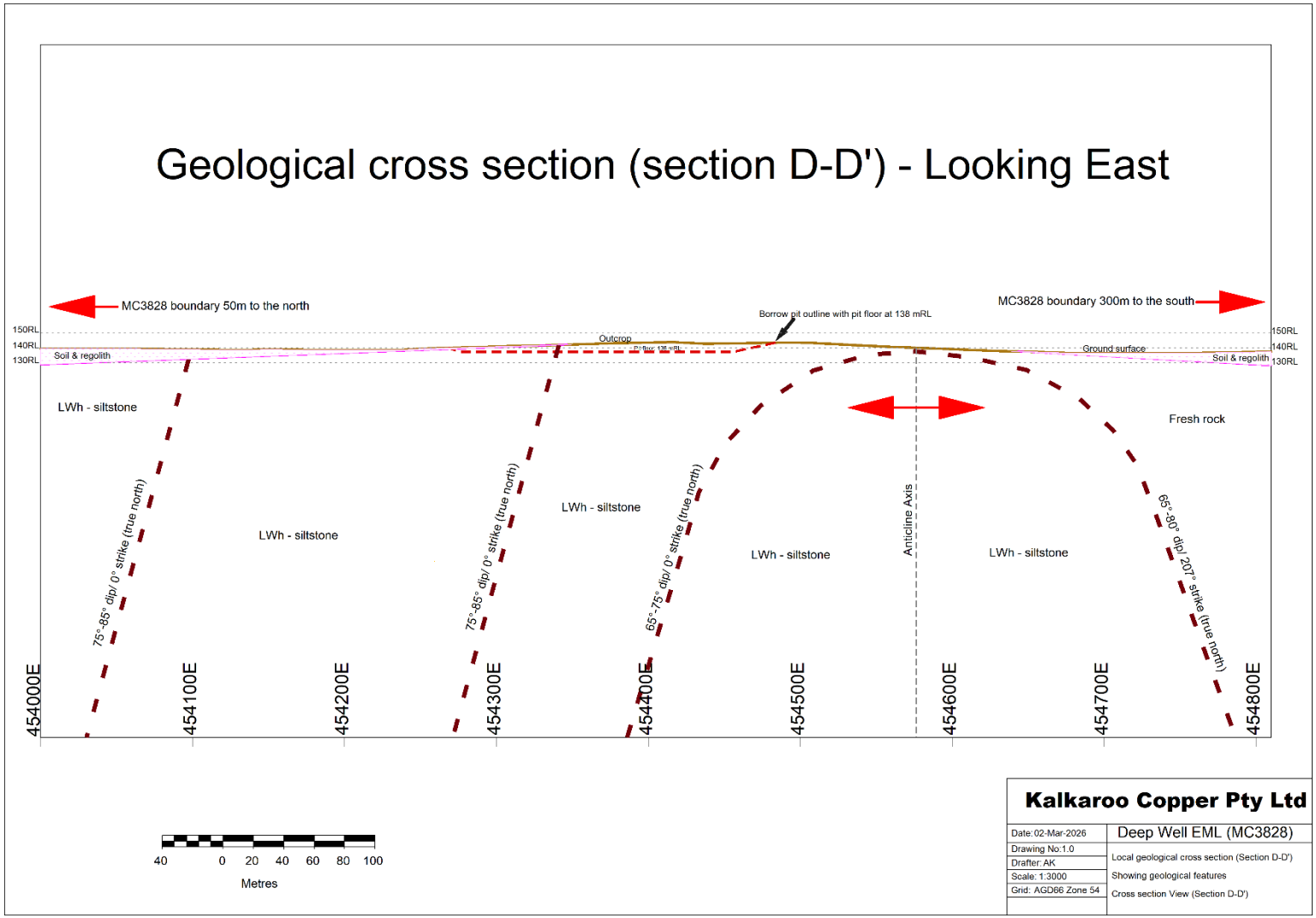

Figure 14 Typical Geological Crossection

3.15 HISTORY (INDIGENOUS, EUROPEAN, GEOLOGICAL)

3.15.1 Indigenous Heritage

The Mineral Claim falls within the East Area of the Ngadjuri Adnyamathanha Wilyakali Native Title Aboriginal Corporation (NAWNTAC) Determination. A Native Title Agreement pursuant to Part 9B of the Mining Act was entered into PIRSA's register in February 2019 and covers the proposed activities on the Mineral Claim.

A basic search occurred in December 2021 of the Central Archive (which includes the Register of Aboriginal Sites and Objects), maintained by the Department of Premier and Cabinet – Aboriginal Affairs and Reconciliation. This search found that there are no registered sites of Aboriginal Cultural heritage within the Mineral Claim or within close proximity to the Mineral Claim.

An Australian Heritage Database search of the Curnamona Map sheet (7034) found that there are no registered places that hold meaning and significance to Indigenous people within the Mineral Claim.

A field survey was undertaken with NAWNTAC representatives together with an anthropologist and two representatives of Kalkaroo Copper in December 2021. Locations requiring preservation measures within the Mineral Claim were identified at this time and an exclusion zone has been incorporated to ensure that no impacts to these areas of significance will arise during mining. In summary, the exclusion zone includes the natural drainage line (ephemeral creek) approximately 90 m south of the proposed borrow pit (refer to Figure 17).

3.15.2 European Sites of Historical or Cultural Significance

A South Australian Heritage Register database search and an Australian Heritage database search of the Curnamona Map sheet (SH-54-14) found that there are no registered sites of significance found on the Mineral Claim, or in proximity to it.

3.15.3 Geological

There are no known geological sites of significance including caves and karst formations existing within the Mineral Claim.

3.16 PROXIMITY TO CONSERVATION AREAS

The nearest conservation area is Boolcoomatta Reserve on the Boolcoomatta Pastoral Lease, privately owned and operated by Bush Heritage Australia. The proximity to Conservation areas is shown in Figure 15.

Boolcoomatta Reserve (HS) is approximately 17 km south of the Mineral Claim. Bimbowrie Conservation Park is a government conservation area located approximately 50 km south-west of the Mineral Claim. There are no formal 'conservation reserves' located in the Mineral Claim. There are no unusual habitats, sites of significance or other items that are likely to make this area suitable for conservation.

The nearest Ramsar site is at Lake Pinaroo 799 (Fort Grey Basin) situated approximately 280 km to the northeast of the Mineral Claim within the Sturt Conservation Park, NSW.

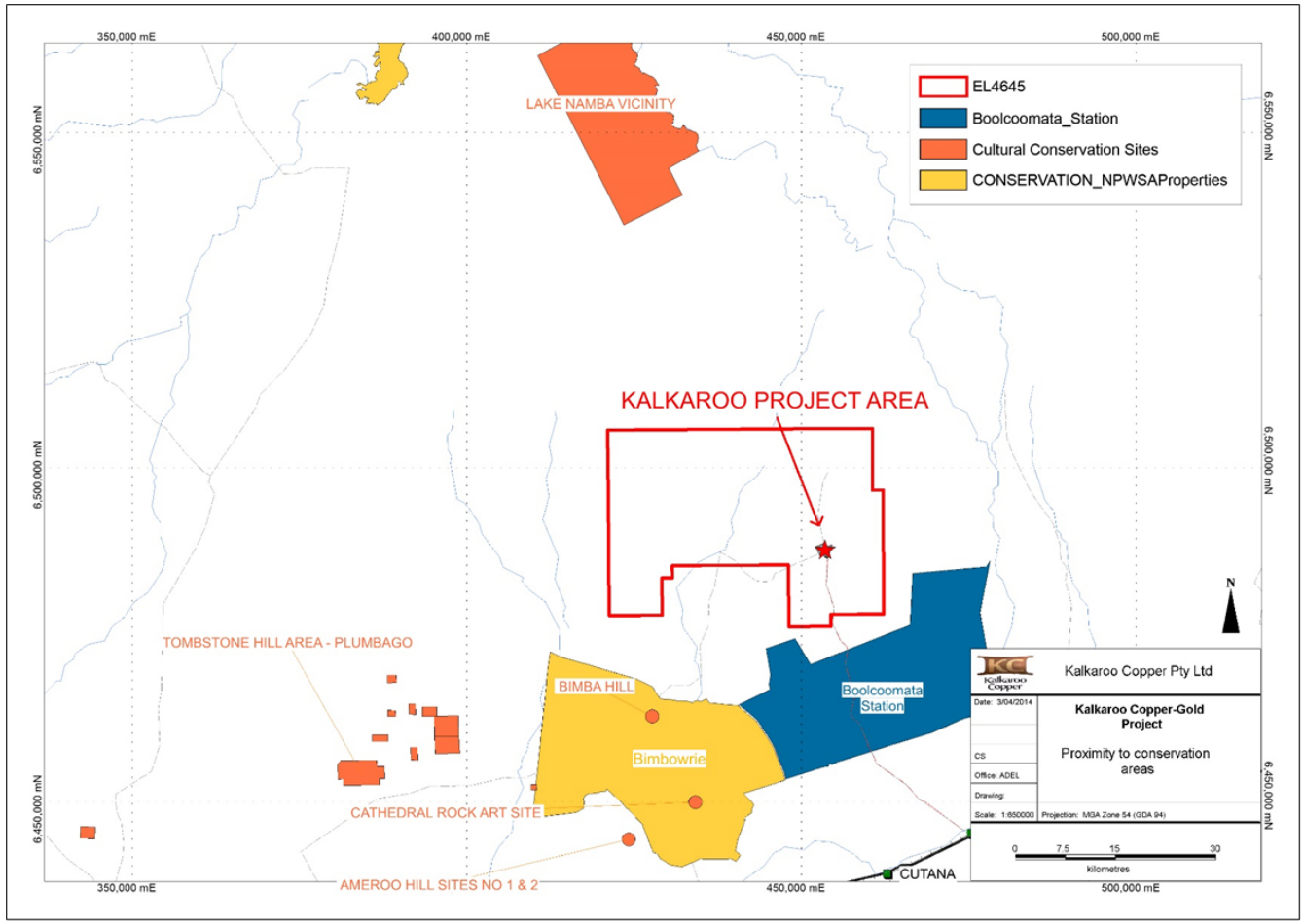

Figure 15 Proximity to Conservation Areas

3.17 PRE-EXISTING SITE DISTURBANCE

There are no known contamination issues within the Mineral Claim.

Pre-existing disturbance has occurred within the Mineral Claim in the form of historic and existing borrow pits where material was historically excavated and used to sheet sections of the Mooleulooloo and Yarramba Roads to improve their trafficability.

Mineral exploration activities have resulted in a number of historical drill holes completed on and around the Mineral Claim. None of these holes are located within the footprint of the proposed borrow pit or related operations.

Pre-existing site disturbance found within and near to the Mineral Claim is shown in Figure 16.

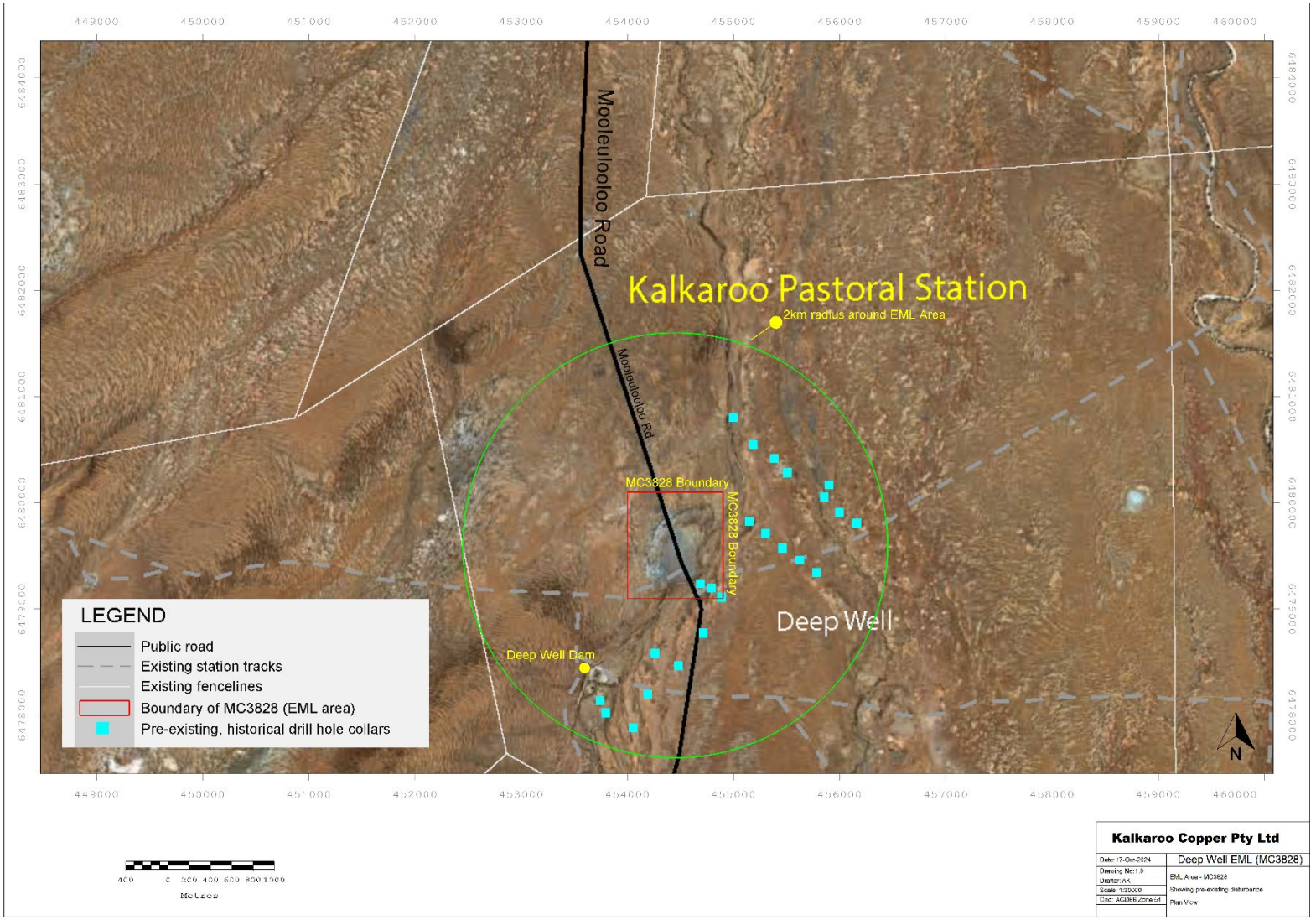

Figure 16 Pre-Existing Site Disturbance

4 Description of Operation

4.1 GENERAL DESCRIPTION

Kalkaroo Copper propose to excavate a small borrow pit on a low rocky rise consisting of siltstone. The intended use of this rock is to provide a source of aggregate for road construction and upgrade of the public access road as needed, as well as sheeting applications necessary to support development of the Kalkaroo Copper-Gold Project, located on ML 6498, ML 6499, ML 6500, MPL 158 and MPL 159. The Kalkaroo Copper-Gold Project is located approximately 10 km north of Mineral Claim MC3828.

The low rocky rise which exists on the Mineral Claim is the closest known outcropping source of suitable hard rock material (siltstone) to the Kalkaroo Copper-Gold Project. The siltstone will be used for road sheeting and construction of hardstands within the Kalkaroo Copper-Gold Project.

This material will play an important role during construction and mining of the Kalkaroo Copper-Gold Project.

4.2 RESOURCES AND PRODUCTS

The Mineral Claim containing the siltstone outcrop was surveyed and mapped using DGPS instrumentation by Havilah Resources personnel. Data from this DGPS survey was then triangulated to produce a three-dimensional Digital Terrain Model (DTM). From this DTM, a mineable surface rock resource of approximately 240,000 cubic metres of material has been calculated. This amount will be sufficient to meet the requirements of its intended use at the Kalkaroo Copper-Gold Project.

Kalkaroo Copper confirm that the resource has been appropriately identified, modelled and estimated by experienced and competent Geologists.

4.3 PRODUCTION RATES AND PRODUCTS

To supply the needs of the Kalkaroo Copper-Gold Project, siltstone rock from the borrow pit will be quarried at an annual production rate equivalent to 50-60,000 m^3 per annum (pa).

Since the area to be mined already outcrops, no overburden material will be mined. The projected life of the proposed borrow pit on the Mineral Claim is approximately 3 years.

4.4 MINING AND COMPLETION PLAN

4.4.1 Type of mining to be carried out

The borrow pit will cover an area of approximately 4.7 Ha, consisting of a base footprint 288m long and 180m wide. A total of 172,000 cubic metres of siltstone is planned to be won from the borrow pit and it shall reach a maximum depth of 5.0 metres below ground level on completion of mining. Mining will be completed using conventional quarrying methods.

Topsoil (where present) will firstly be removed and stockpiled in designated locations from the planned areas of disturbance. The rock will be won using truck, excavator and dozing excavation techniques. Rock material that is not able to be freely dug will be ripped using a large dozer.

Broken rock will be loaded using a Front End Loader (FEL) into a mobile crushing and screening plant for crushing and final stockpiling of a finished product ready for use. The finished product will then be used to upgrade sections of the Mingary to Kalkaroo public road and to sheet haul roads and hardstand areas of the Kalkaroo Copper-Gold Project.

A general arrangement drawing showing all site roads, borrow pit location, stockpile locations and temporary topsoil storage areas can be found in Figure 17. A mine plan is shown in Figure 18 and Figure 19 through to Figure 22 depict typical cross-sections through the Mineral Claim active mining area during mining of the proposed borrow pit.

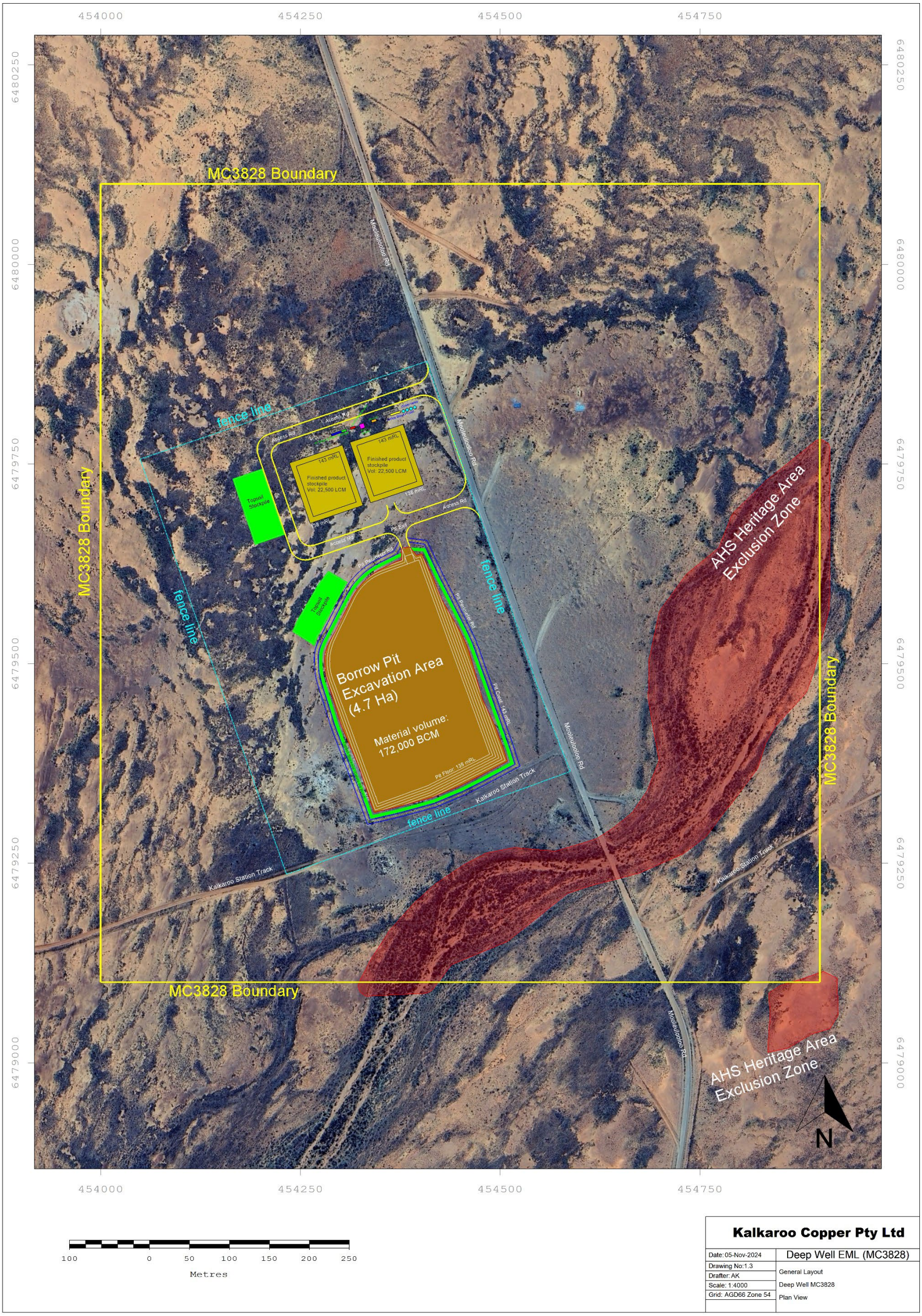

Figure 17 General Arrangement Drawing for the Mineral Claim

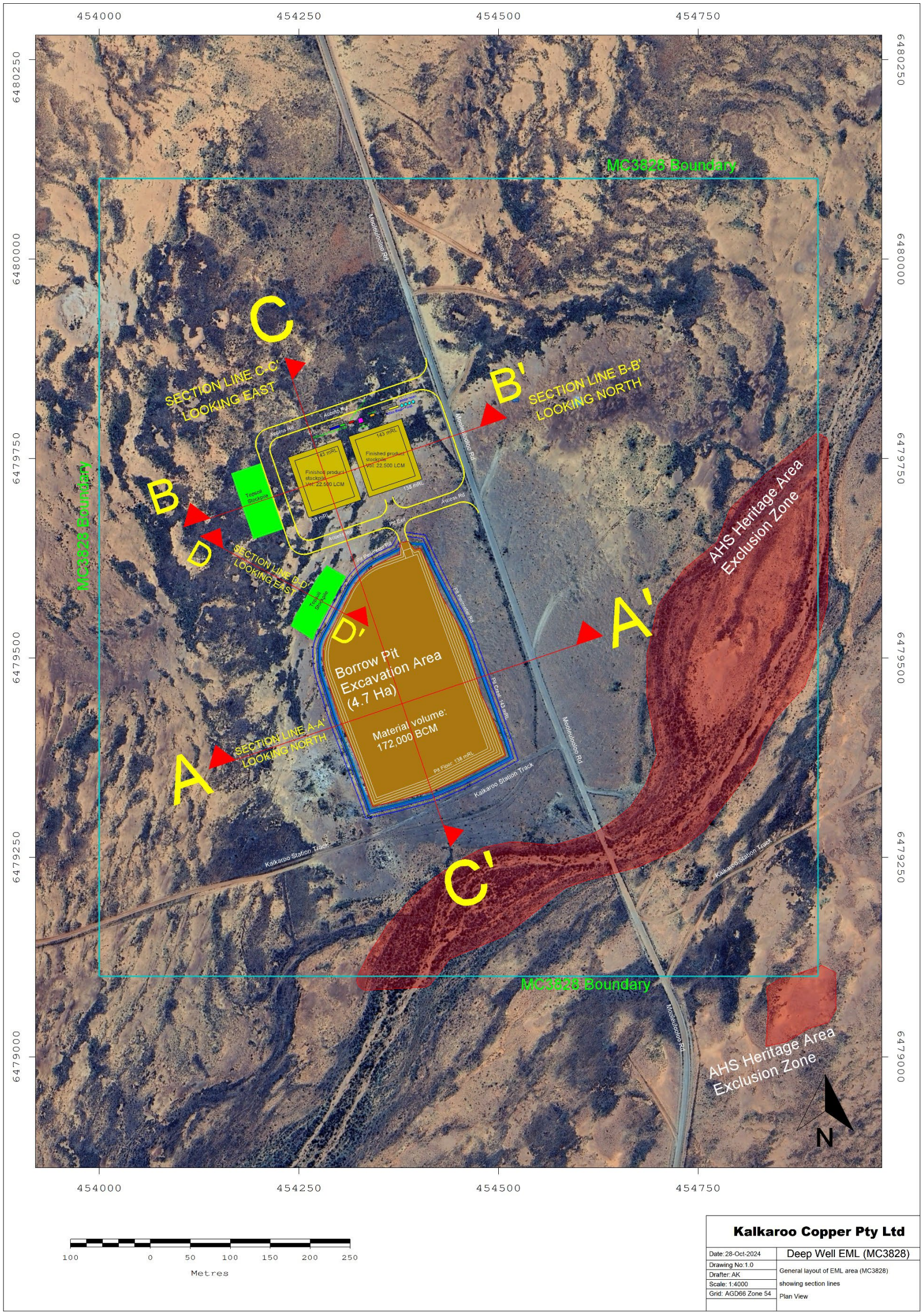

Figure 18 Plan view of Borrow Pit Design with Section Lines

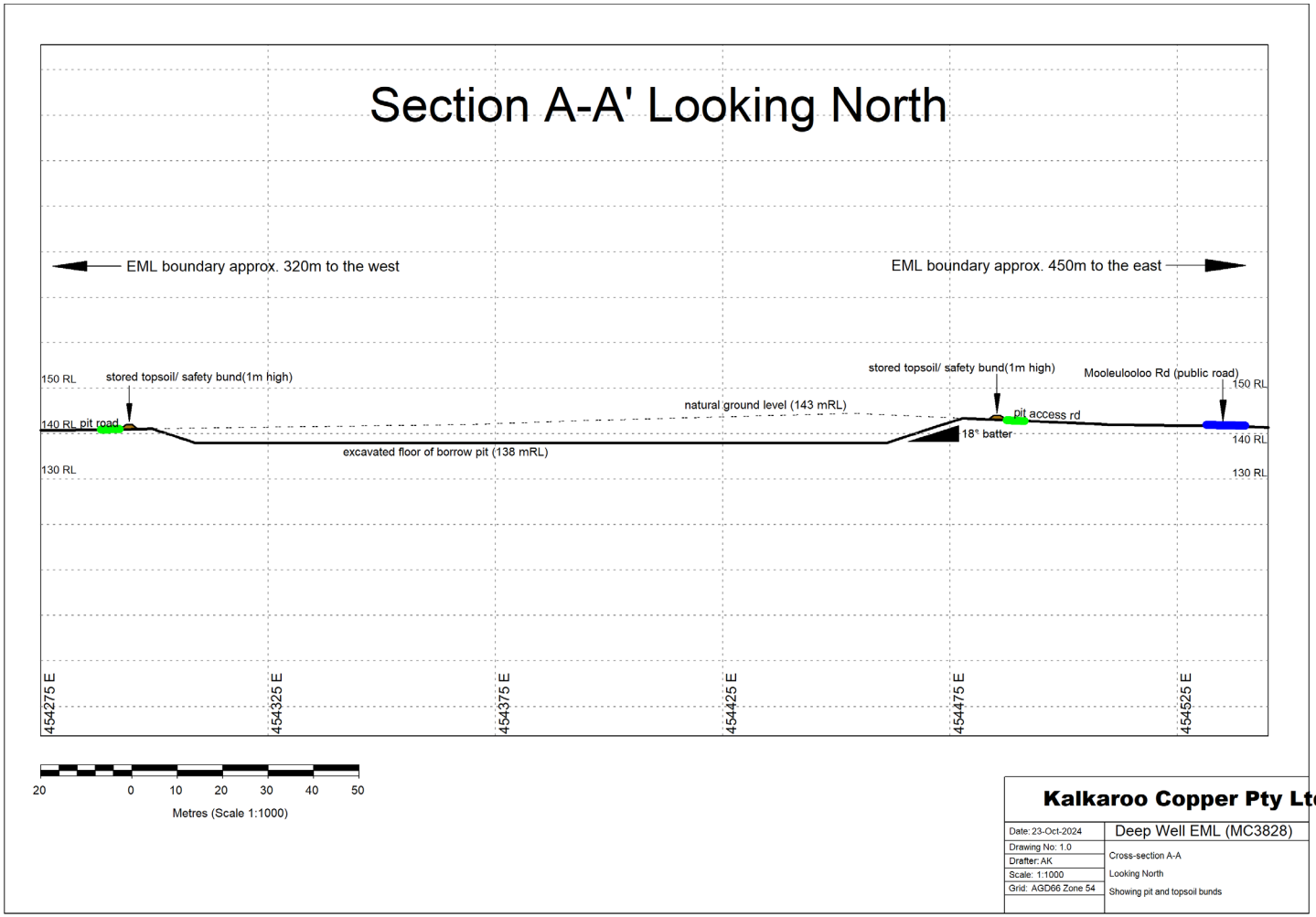

Figure 19 Section A-A' Looking North

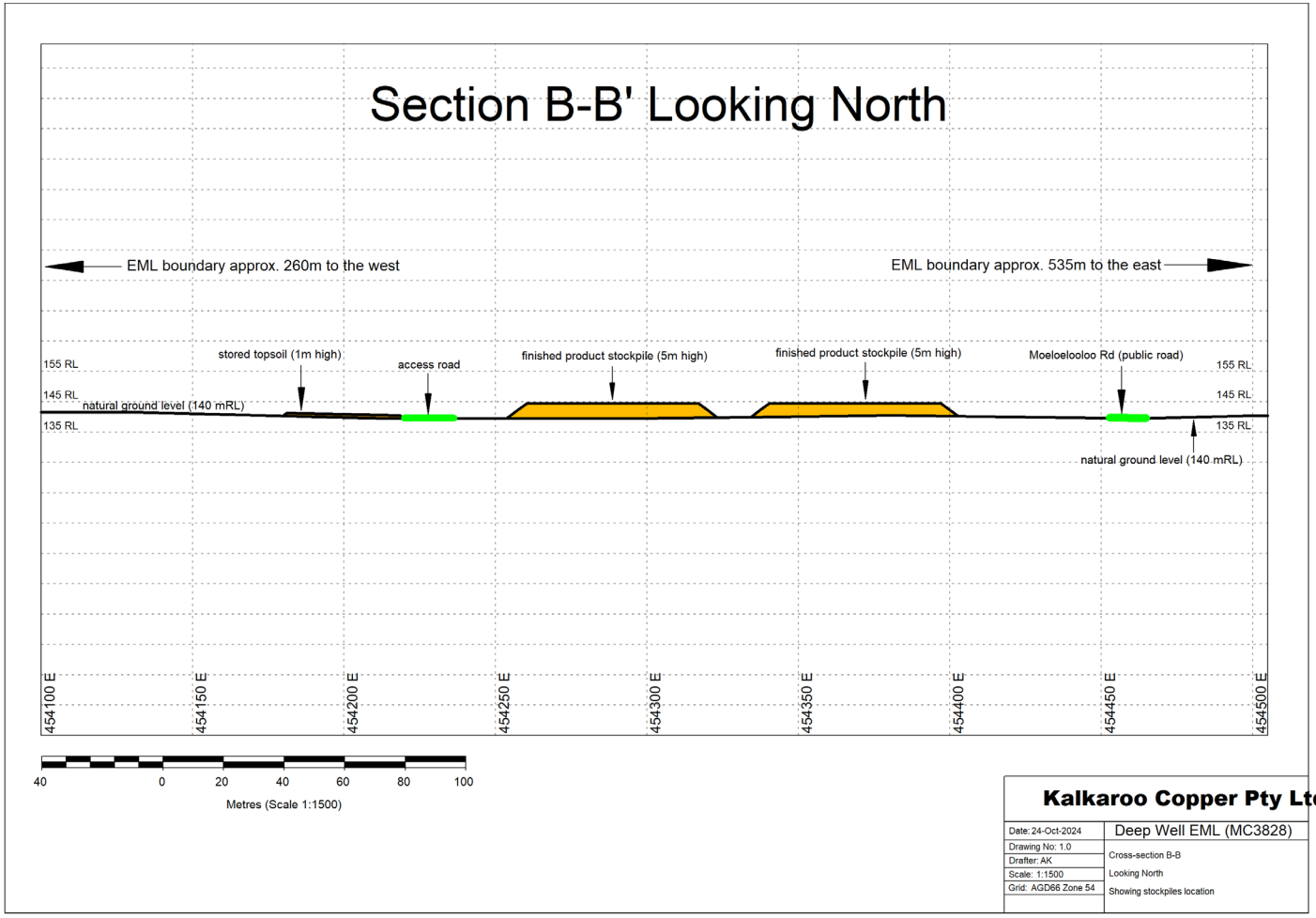

Figure 20 Section B-B' looking North

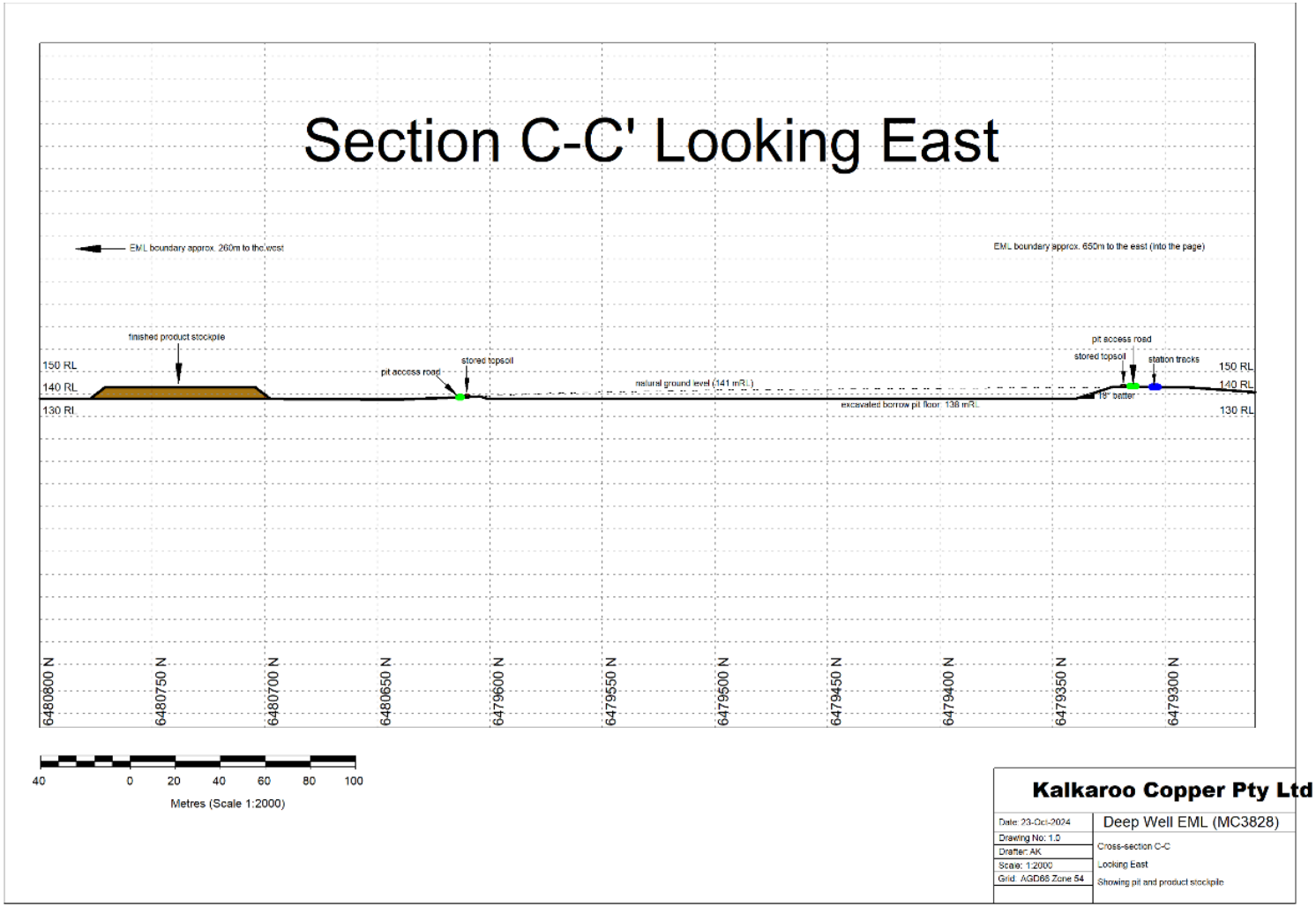

Figure 21 Section C-C' looking East

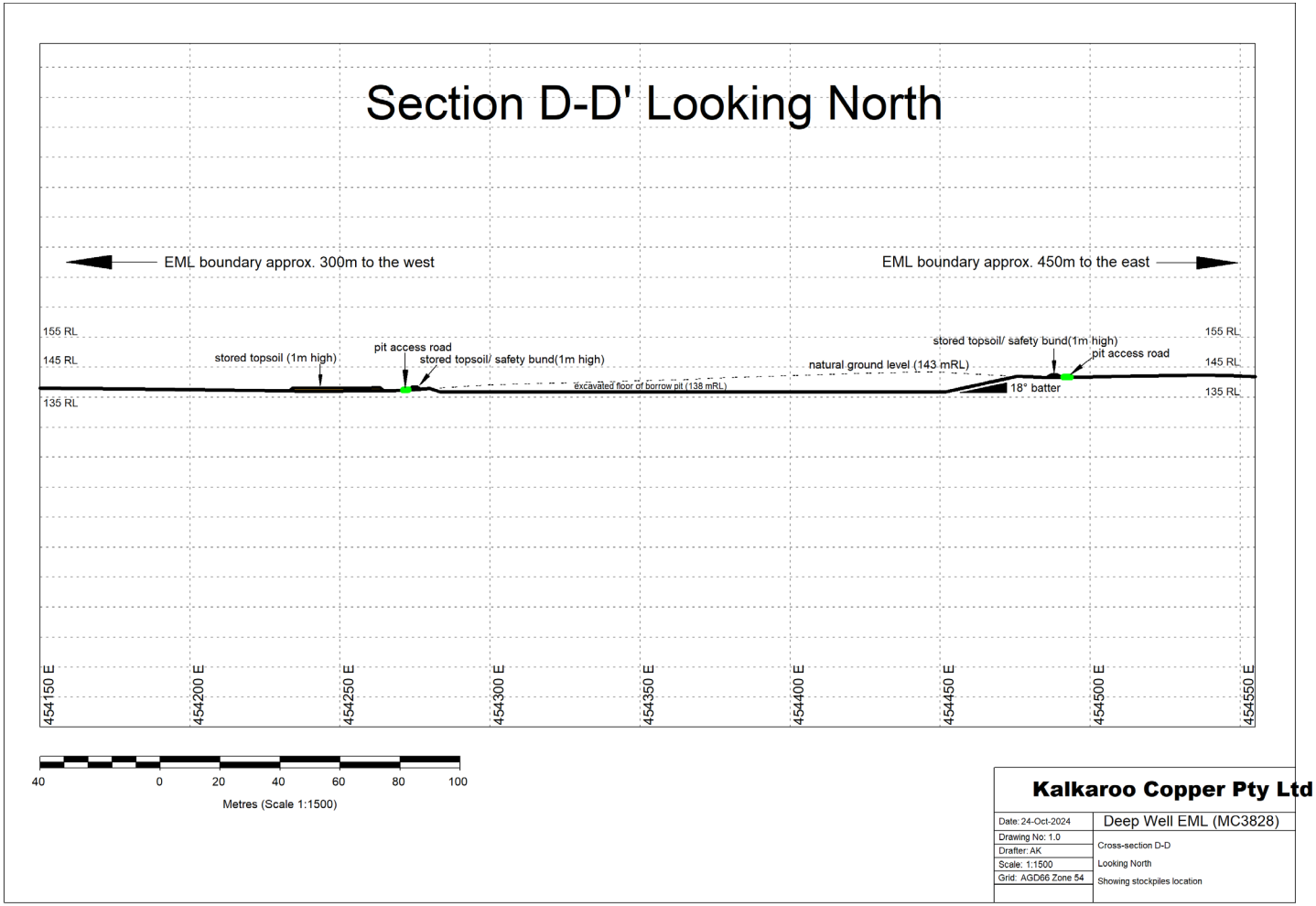

Figure 22 Section D-D' looking North

4.4.2 Sequence of mining and rehabilitation operations

Mining will commence at the highest point of the proposed borrow pit and extend generally concentrically outwards to the pit boundary. The pit shall be progressively levelled and benched to the final reduced floor level of the proposed borrow pit. This sequence of mining activities is represented in Figure 23 for the proposed life of the borrow pit.

During the sequence of mining shown in Figure 23, the walls of the borrow pit shall be battered and profiled to final design as benching occurs in accordance with the mining plan. Upon completion of mining, any remaining stockpiles of material shall be removed from the borrow pit floor. The intended sequence of mining and rehabilitation activities is summarised in Table 4.

Table 4 Summary sequence of mining and rehabilitation activities

Item	Activity	Activity description	Duration (Years)			
			Yr 1	Yr 2	Yr 3	Yr 4
1	Remove topsoil from areas of disturbance	Removal and storage of existing topsoil and storage in temporary stockpiles in accordance with the Topsoil management plan.				
2	Commence Mining	Winning and crushing of material in accordance with mine design and general sequence shown in Figure 13				
3	Batter wall of borrow pit to final landform shape	Progressively batter walls during the proposed mining sequence of operation				
4	Final trim pit walls and pit floor	Profile walls and floor to achieve design for closure				
5	Completion of Mining					
6	Removal of remaining stockpiles of material from the pit floor and profiling to prevent surface water run-off.	Remove all stockpiled material from the pit floor				
7	Removal remaining stockpiles of material from the EMLP area	Remove all remaining stockpiled material from the EMLP area prior to re-spreading stored topsoil and subsoil.				
8	Remove Ancillary infrastructure	Remove all demountable buildings and ancillary infrastructure from the site				
9	Rip roads and hardstand areas.	Where no rock exists, rip to 300mm all roads, and stockpile storage areas				
10	Spread available topsoil and subsoil	Spread stored topsoil and subsoil on areas of disturbance that were not previously rock outcrop.				
11	Scarification and re-seeding	Scarify and sow collected endemic native vegetation seed to all areas which have been re-spread with topsoil and subsoil.				

Within the context of this Proposal, considering the campaign nature of the mining (refer to Section 4.5) and the ultimate size and depth of the borrow pit, progressive rehabilitation opportunities during operation will be limited to the following activities:

- Progressively batter walls of the borrow pit during the proposed mining sequence of operation to achieve design for closure.
- Profile walls and floor of the pit to achieve design for closure during the proposed mining sequence of operation
- Removal of remaining stockpiles of material from the pit floor and profiling the pit floor to achieve design for closure.
- Removal of all remaining stockpiled material from the Mineral Claim during the proposed mining sequence of operation.

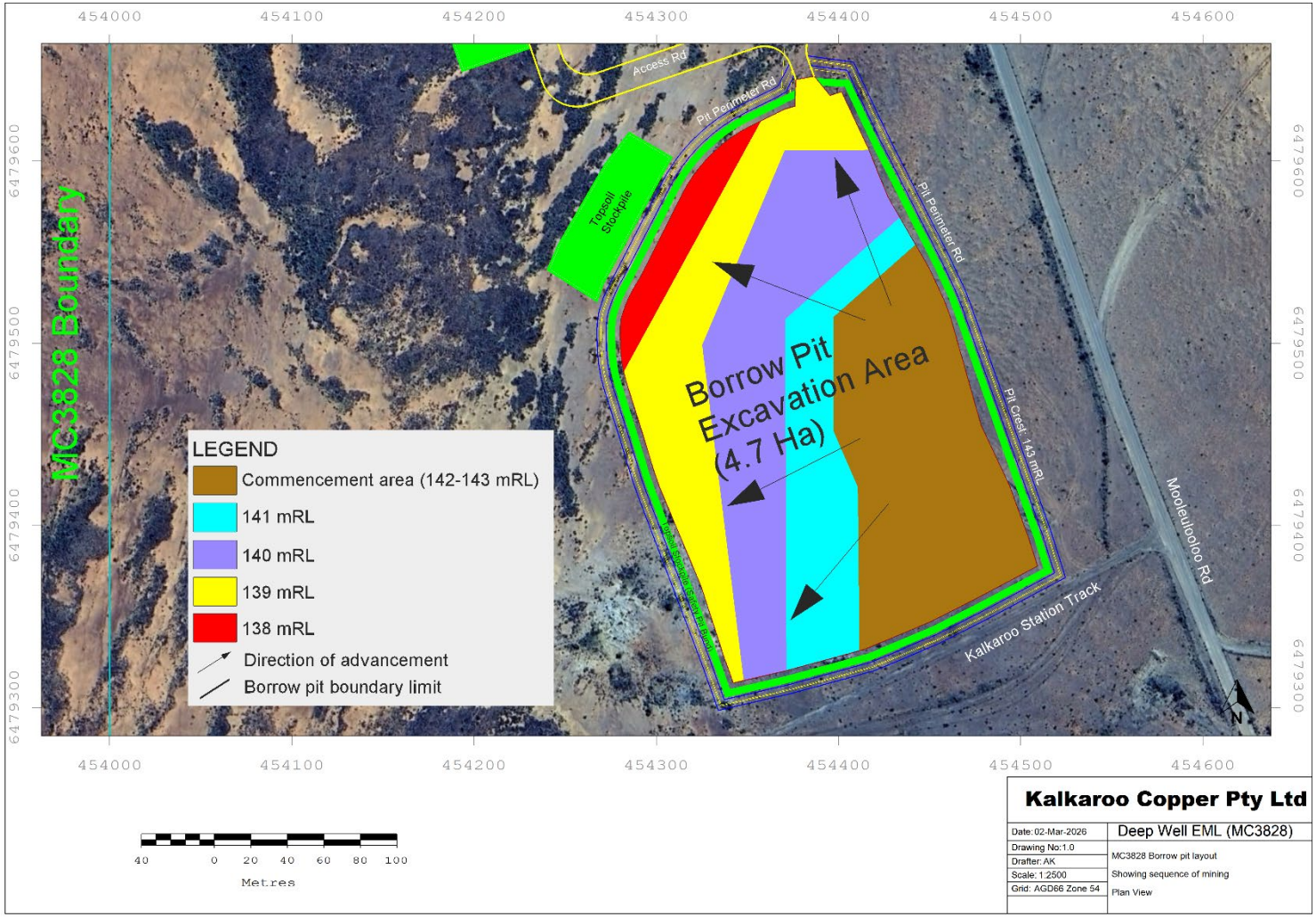

Figure 23 Sequence of mining operations

4.5 MINING OPERATIONS

4.5.1 Mode and hours of operation

The borrow pit will be mined on a campaign basis. The site will be active for a minimum of 1250 hours per year. The duration of each campaign is expected to be up to 12 weeks, allowing for normal roster cycles.

Campaign frequency will be dictated by the demand for the product. Campaigns will be initiated whenever demand for the product cannot be met by existing stockpiled quantities of available material. Successive campaigns are predicted to occur at intervals of between three and nine months apart (i.e. 2 campaigns per year). During mining campaigns, operations would occur on a nominal 2 week on 1 week off rotation on a day shift only basis.

Minimum and maximum quantities of mined material from the borrow pit would range from between 10,000 m^3 to 30,000m^3 respectively per mining campaign. Minimum and maximum annual volumes of mined material from the borrow pit would range from between 20,000 m^3 to 60,000 m^3 per year respectively from the work site.

4.5.2 Explosives and blasting

With mining to occur to a maximum depth of only 5 metres, historical drilling on or adjacent to the Mineral Claim being completed using air-core methods and the "flaggy" nature of the siltstone means that the material will be amenable to free dig excavation. No blasting is predicted to be required in the Mineral Claim.

4.5.3 Type of Equipment

The type of equipment to be used on the site for mining operations will comprise of:

- 1 x 40t capacity articulated off-highway dump truck;
- 1 x 40t size Excavator;
- 1 x Dozer (D10 size or equivalent),
- 1 x Service truck,
- 1 x Water truck.

4.6 STOCKPILES ON THE SITE

All Temporary Stockpile locations for the work site can be found in Figure 17. Some coarse rock may be temporarily stockpiled within the active mining zone (ie floor of the borrow pit).

Finished product stockpiles have been designed to hold a nominal volume of 45,000 m^3 of rock. Stockpiles will be built to a height of 5.0m at the natural angle of repose of the

material (approx. 37°) and generally built using conventional methods utilising a truck and FEL.

Topsoil stockpiles will be built to a maximum height of 2.0m and shall be placed at locations to enable efficient re-use and handling during final rehabilitation activities to disturbed areas.

All stockpiles, including topsoil stockpiles, shall be constructed with small perimeter bunds to minimise erosion and loss of material from surface water run-off and to prevent heavy rainfall from discharging sediment laden water away from the stockpiles.

Topsoil stockpiles will be monitored at 6 monthly intervals to assess soil stability, vegetation establishment and the presence and removal of weeds. Weeds will be eradicated as they germinate and prior to using the topsoil in site rehabilitation.

4.7 CRUSHING PROCESSING AND PRODUCT TRANSPORT

4.7.1 Fixed Plant

No fixed crushing plant shall be used within the Mineral Claim.

4.7.2 Mobile Plant and Hours of Operation

Coarse Siltstone rock from the mining process will be crushed to produce a nominal minus-50mm coarse aggregate rubble utilising a single stage mobile crushing plant at a rate of around 100 tph. The mobile plant will be located within the footprint of the borrow pit or within close proximity to the finished product stockpile area. (See Figure 15). During mining campaigns, crushing will occur on a 12 hour per day, seven day per week rotation. Crushing operations on stockpiled rock may commence on completion of each mining campaign to minimise traffic and dust concerns.

Crushing and Processing equipment requirements will be

- 1 x 20t size Front end loader (Cat 966 size or equivalent),
- One mobile crushing plant capable of delivering -50mm product at a nominal rate of around 100tph,
- 1 x Water truck.

Finished product used to sheet roads would be delivered utilising road registered and compliant side tipping road trains hauling approximately 60t per truck load. Delivery of the product to the Project will occur using the Public Road network.

It is estimated that around 12 truck movements per operational day will deliver the product to the Kalkaroo Project. Trucks would operate during daylight hours only.

4.7.3 Overburden

No overburden waste will be generated within the Mineral Claim due to the outcropping nature of the material to be mined.

4.7.4 Processing wastes

No processing wastes will be generated.

4.7.5 Industrial and domestic wastes

Putrescible wastes will be collected in 100 litre bins with lids for disposal at an EPA approved landfill.

Wastes will be generated when servicing mobile equipment and range from grease cartridges to oil filters, fuel filters, used oil, rubber hoses, tyres etc. Waste oil and other hydrocarbon wastes (oily wastes) collected will be removed from the Mineral Claim for recycling by a licensed waste contractor or disposal to an EPA approved facility. Accidental spillages of hydrocarbon materials will be managed by the placement of absorbent material and/or excavation and removal of contaminated soil. Any soil contaminated by hydrocarbons will be disposed of at an EPA approved facility.

Waste will also be generated as mining, crushing and screening plant wear. Most of this waste (e.g. crusher wear plates, screens, loader teeth etc.) is metallic and will be collected and taken off site for recycling.

4.7.6 Erosion, Silt Control and Drainage

The flat topography adjacent to the rock stockpile locations on the site, the minimum 40 metre separation distance away from the existing ephemeral drainage line within the immediate vicinity of the borrow pit, the low average seasonal rainfall of the region, the proposed quarrying techniques to be employed, the coarseness of the crushed rock to be produced and the installation of small perimeter bunds around all stockpile and hardstand areas on the site means that surface run-off and sedimentation issues arising during mining are unlikely to occur. Refer to Figure 24 for the location of Stormwater and sediment containment structures.

Post mining, the final rehabilitated borrow pit landform will contain gentle slopes of 18.4 degrees or less. This will prevent any erosion and gullying from significant rain events occurring.

Water that accumulates in any erosion or sediment run-off catch bunds after rain fall events will be left in place to evaporate.

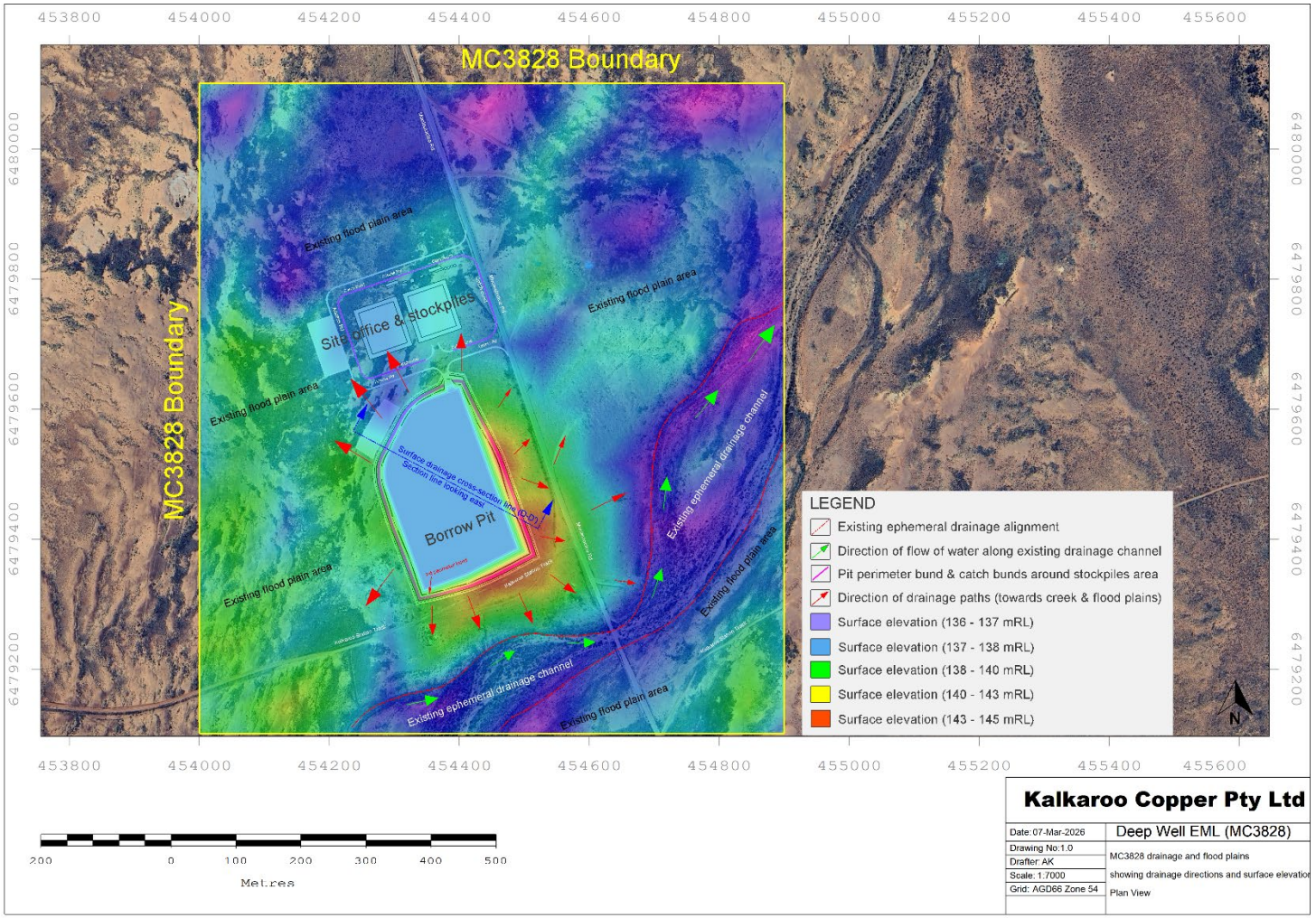

Figure 24 Plan view showing silt control and stormwater management control on the site.

4.8 SUPPORTING SURFACE INFRASTRUCTURE

4.8.1 Access

Access to the Mineral Claim is via the unsealed Mingary to Kalkaroo Government road (Mooleulooloo Road). The area of Mining to occur on the Mineral Claim is located approximately 50 metres west from the Road location (See Figure 17). The access route to the Mineral Claim is shown in Figure 25.

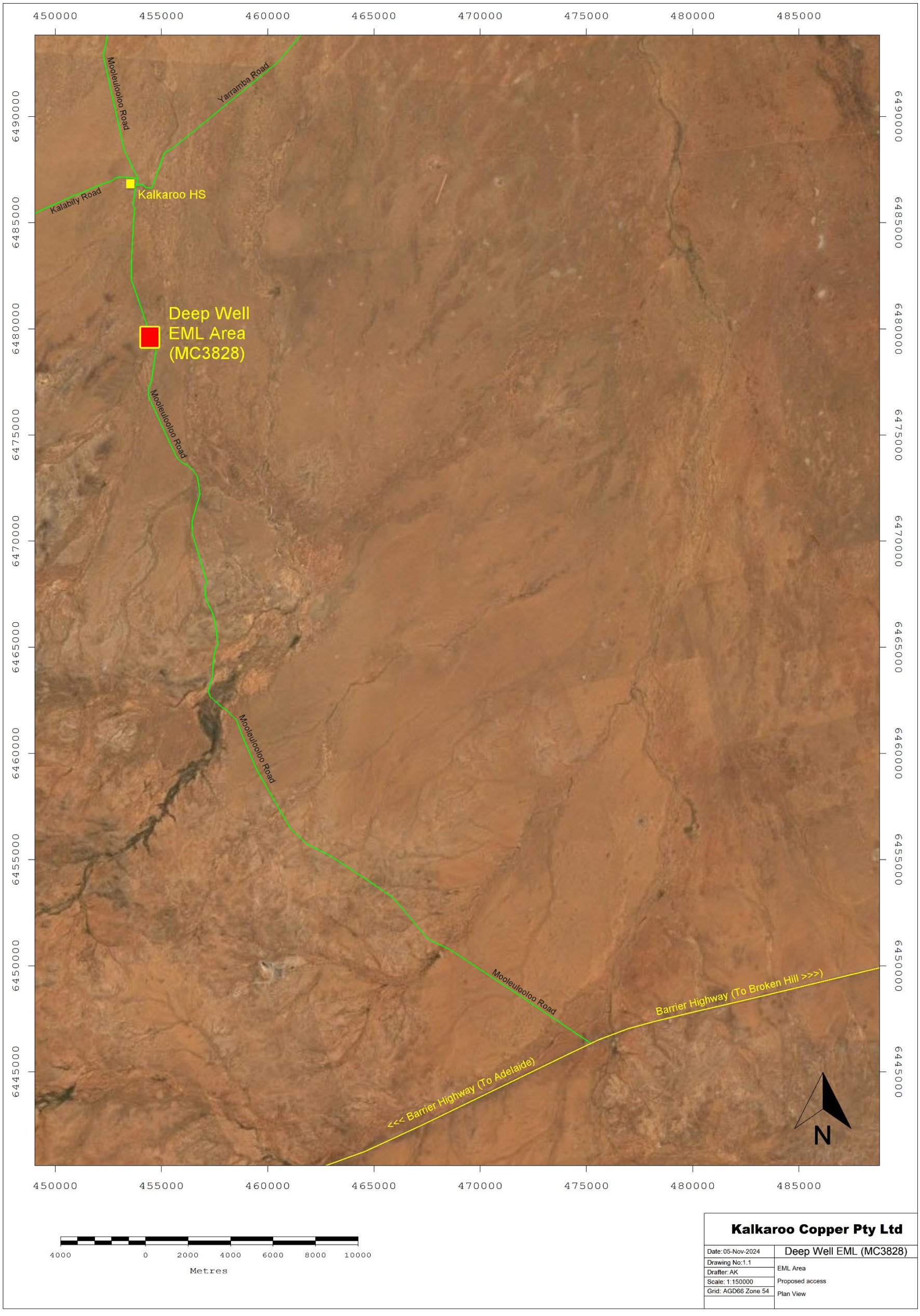

Figure 25 Access to MC3828.

4.8.2 Accommodation and Offices

There will be a small demountable lunch/meeting/first aid room on the site which will contain handwashing and ablution facilities. Septic facilities will comply with Department of Health requirements and shall be installed by a qualified and registered plumber in the state of South Australia. Power to these facilities will be provided by a small portable onsite generator. Potable water will be provided by rain water harvesting from the roof of the building and topped up with potable water supplied from the Kalkaroo Project. All water will be stored in poly tanks. Refer to Figure 26.

All personnel will stay in the accommodation complex located at the proposed Kalkaroo Copper-Gold Project.

4.8.3 Public roads, services and utilities used by the operation

Refer to Section 4.8.1 above. The estimated number of vehicles to travel between the Mineral Claim and the Kalkaroo Project via public access roads is expected to be an average of 30 vehicle movements per day during active mining campaigns.

4.8.4 Visual screening and site security

Because of the remote location and absence of landholders within close proximity to the Mineral Claim, screening is not considered necessary.

To limit unauthorised access to the Mineral Claim when no mining occurs, access to the work site will be prevented by installing a stock fence and lockable gates around the perimeter of the Active Mining Zone. Signage stating no unauthorised entry will also be installed at the gateway and along the perimeter fence-lines. Fencing and the gateway entrance location is shown in Figure 17.

4.9 FUEL AND CHEMICAL STORAGE

Diesel fuel will be stored in a nominal 10,000 L self-bunded fuel tank and bowser dispensing system.

Oils will be stored in either 1000 Lt IBCs or 200 lt drums, on bunded pallets or in a purpose-built portable hydrocarbon storage self-bunded container. Approximately 2500 Lt of oils and 60 Kg of grease will be stored on site during mining campaigns.

No chemicals will be stored on site. Refer to Figure 26.

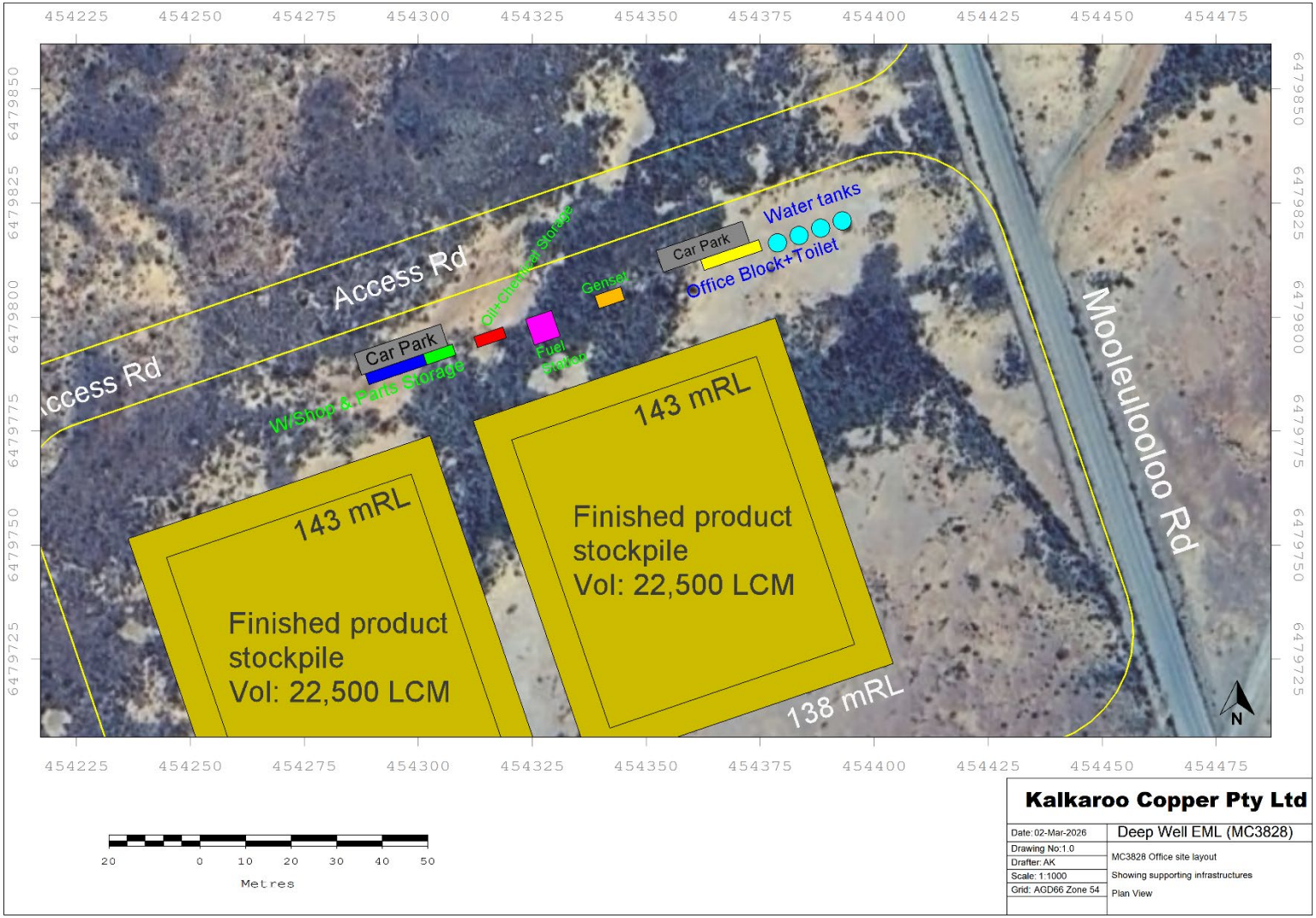

Figure 26 Location of Ancillary infrastructure and services on the Mineral Claim

4.10 VEGETATION CLEARANCE

A Native Vegetation Management Plan has been prepared by Ecosphere Ecological Solutions. This report can be found in Appendix 1: Native Vegetation Management Plan.

Three vegetation associations were recorded within the Project area covering an area of 10.5 ha representing the total Vegetation Clearance area proposed within the Mineral Claim. Refer to Figure 11 and Table 5 Vegetation association summary.

None of the vegetation associations recorded were associated with a Threatened Ecological Community listed under the EPBC Act or the Provisional List of Threatened Ecosystems of South Australia.

Table 5 Vegetation association summary. (Ecosphere Ecological Solutions, 2024)

Association #	Description	Area (ha)
1	*Maireana pyramidata* (Black Bluebush), *Maireana aphylla* (Leafless Bluebush) low open shrubland over tussock grasses.	1.99
2	*Maireana pyramidata* (Black Bluebush), *Maireana integra* (Entire-wing Bluebush), *Atriplex vesicaria* (Bladder Saltbush) low open shrubland over *Sclerolaena* spp. with scattered shrubs of *Acacia victoriae* (Elegant Wattle).	5.59
3	*Maireana pyramidata* (Black Bluebush) low very open shrubland over *Sclerolaena* spp. with scattered shrubs of *Acacia victoriae* (Elegant Wattle).	2.92
	Total	**10.5 ha**

The Clearance Area Summary table determined by Ecosphere Ecological Solutions is provided below in Table 6 and shows the estimated quantum of environmental benefit (SEB) to be gained in exchange for the proposed clearance.

At this time, Kalkaroo Copper propose to pay the SEB offset into the Native Vegetation Fund.

Table 6 Clearance Area Summary Table (Ecosphere Ecological Solutions, 2024)

Block	Site	Threatened Ecological community Score	Threatened plant score	Threatened fauna score	UBS	Area (ha)	Total Biodiversity score	Loss factor	Loadings	Reductions	SEB Points required	SEB payment	Admin Fee
1	1	1	0	0.1	69.50	1.99	138.31	1			145.322	$10,061.13	$553.36
1	2	1	0	0.1	56.89	5.59	318.02	1			333.92	$23,134.31	$1,272.39
1	3	1	0	0.1	59.85	2.92	174.76	1			183.50	$12,713.23	$699.23
					Total	**10.50**	**631.09**				**662.64**	**$45,908.67**	**$2,524.98**

4.11 SITE WATER MANAGEMENT

The amount of water required for mining operations is estimated at 43,000. litres per day.

Water will be sourced from dam water supplied in agreement with the Landholder or dewatering water provided from the Kalkaroo Project Mining Lease. The dam water has a salinity of around 700 ppm and Kalkaroo mine water has a salinity of around 20,000 ppm.

A water truck, tanks and/or small portable pump and reticulated pipelines will provide dust suppression requirements within the Mineral Claim during work campaigns to suppress dust generated from crushing and mining.

Water would be principally used for dust suppression during crushing operations. The Landholder has no objection to the use of this water to suppress dust generated by mining operations within the Mineral Claim and at other times as deemed necessary to maintain safe working conditions along the existing roads from the Mineral Claim to the Kalkaroo Copper-Gold Project given the short duration of planned operation.

4.12 DESCRIPTION OF QUARRY SITE AT COMPLETION

On completion of mining, the borrow pit will resemble a shallow surface depression with a generally flat basal footprint. The floor of the mined area will remain as exposed rock, thereby replicating the original exposed outcrop surface. This exposed surface shall enable water captured from rain events the opportunity to percolate through the rock bedding and replenish soils and vegetation adjacent to the area as would have previously been a function of the original rock outcrop. The borrow pit is located on a localised topographic high (approximately 143m AHD) that protects it against overland surface water runoff flows as shown in Figure 6 and Figure 7.

All stored topsoil and subsoil cleared as part of preparations for the mining process of the borrow pit will be re-spread over the roads and stockpile areas to enable re-seeding with perennial native species endemic to the area.

The walls of the borrow pit, where exposed, will be battered back to a designed 18.4 degree slope angle during mining, thereby ensuring that no steep drop-offs exist and that the final landform remains safe and stable in the long term. This will eliminate the need for the installation of any bunds or other necessary barricades or structures which would otherwise be required.

Remaining stockpiles of material will be removed from within the Mineral Claim on closure. Roads and stockpile footprint areas will be deep ripped before being re-spread with topsoil and subsoil stored from these areas in low stockpiles as part of the initial clearing process. This respread topsoil and subsoil will be scarified before re-seeding with perennial native species endemic to the area.

All existing stock fence lines and tracks that lie within the Mineral Claim and which were previously in use by the Landholder prior to commencement of operation will remain in place on closure.

No infrastructure shall remain in place on completion of mine closure. Septic tanks will be filled in and covered with 150mm of top soil.

A contour plan showing the final landform shape post closure can be found in Figure 27.

Final landform cross sections are shown in Figure 28 and Figure 29, on preceding pages.

On closure, the area would be returned to Pastoral Land use activities.

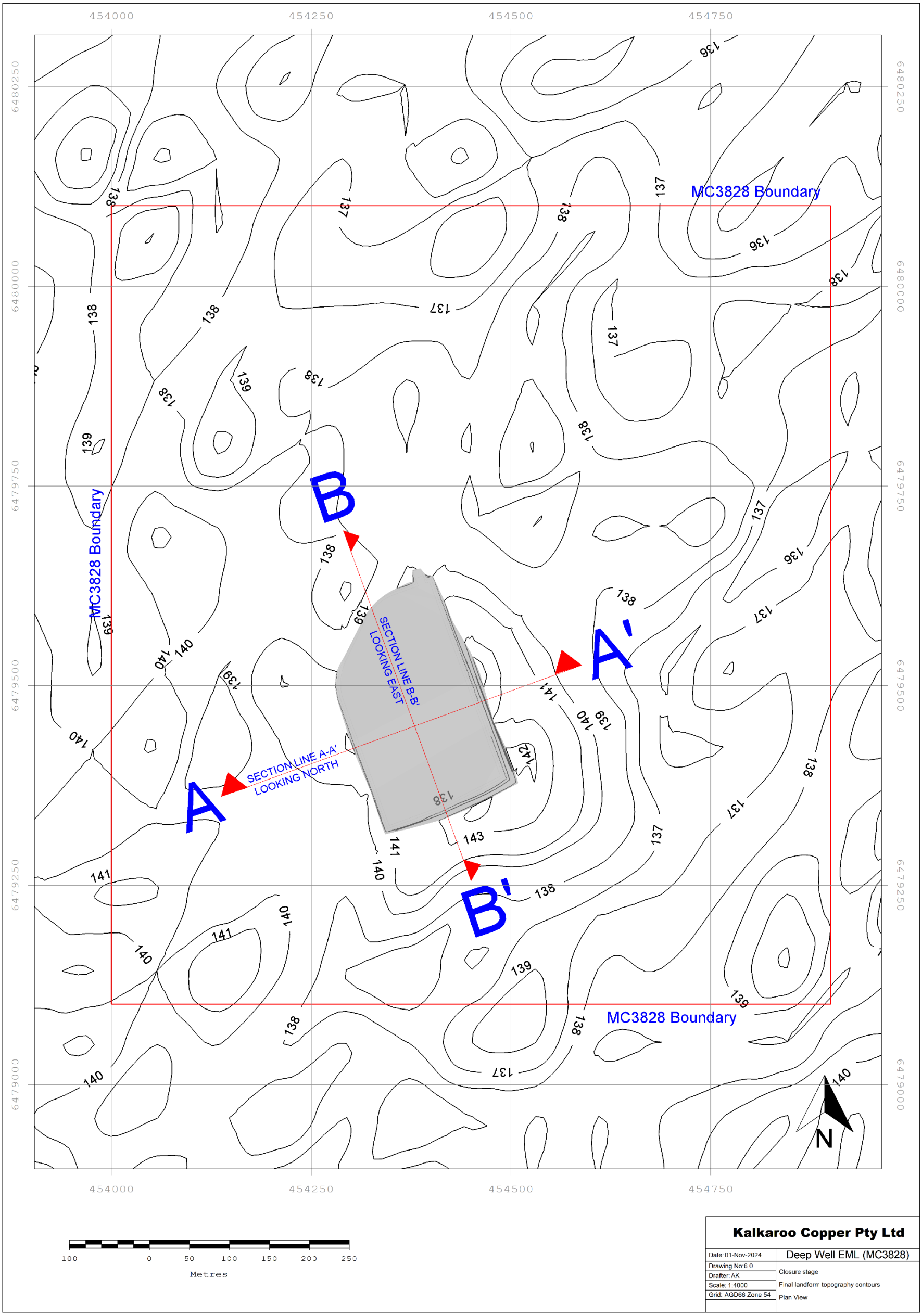

Figure 27 Final rehabilitation landform contours

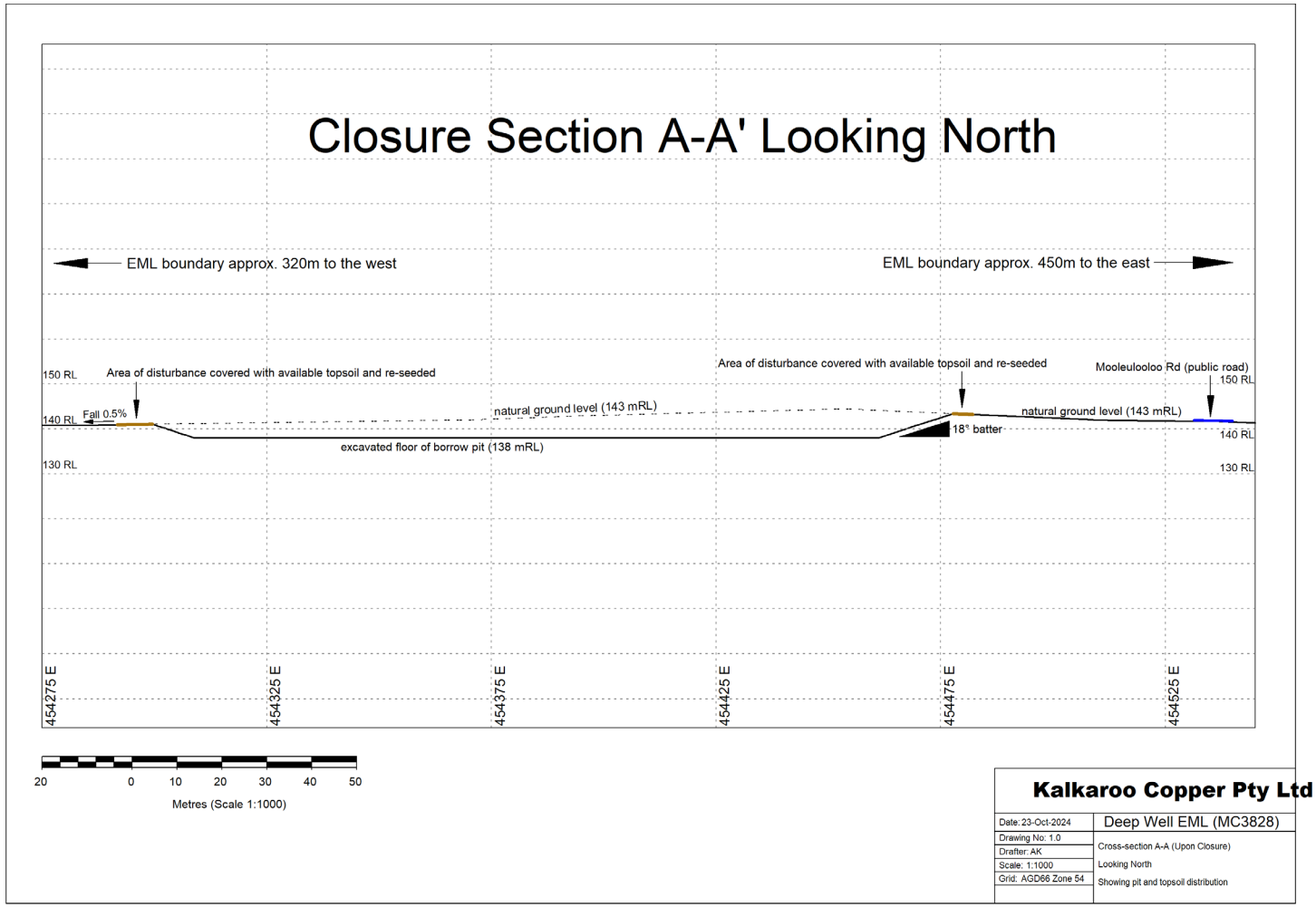

Figure 28 Closure section A-A'

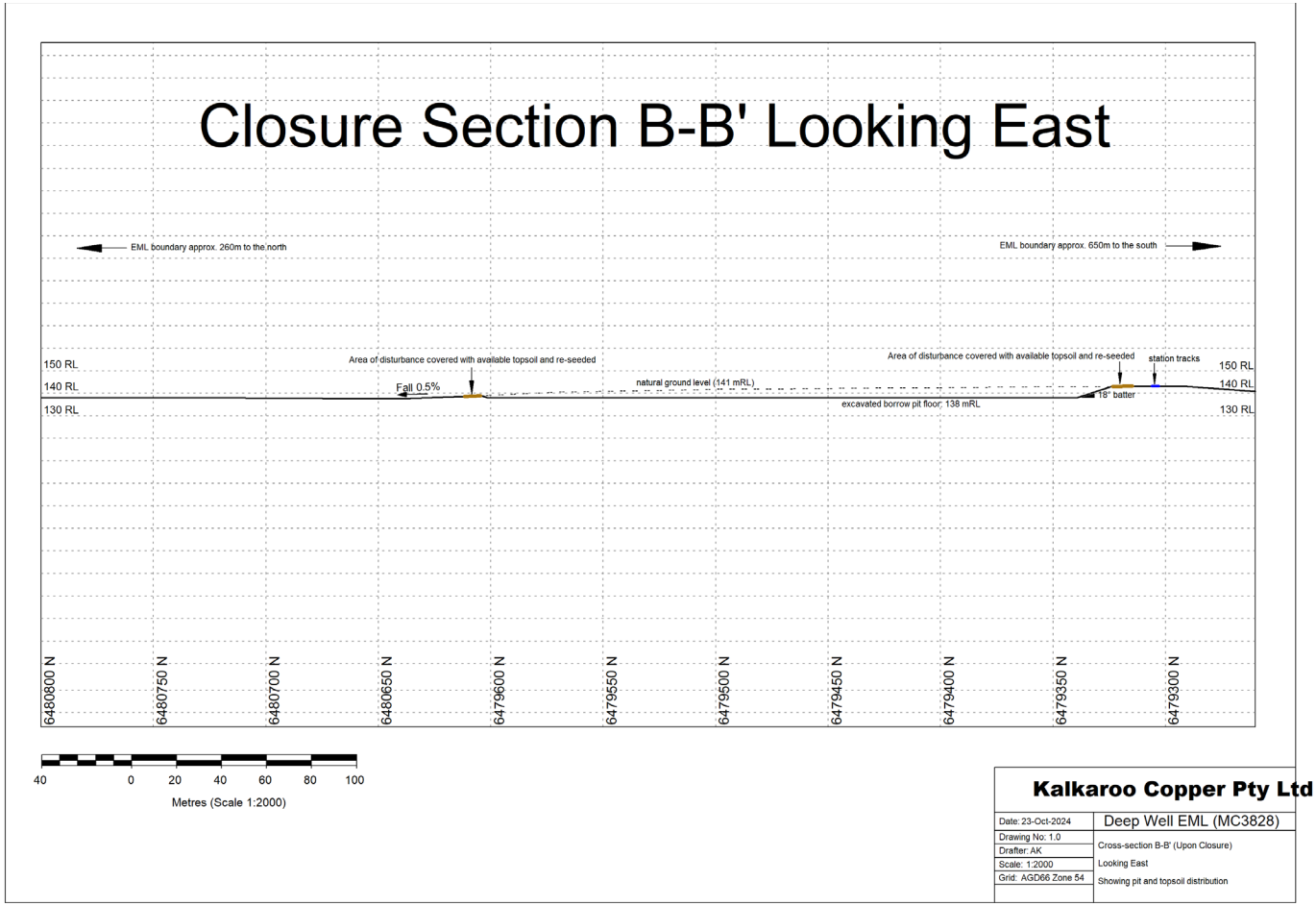

Figure 29 Closure section B-B'

4.13 DESCRIPTION OF THE WORKFORCE AND LOCAL PROCUREMENT

Quarrying activities will employ up to 7 people during mining campaigns.

Activities will be conducted and supervised by a sub-contractor under the control and management of Kalkaroo Copper. Inductions and Training will be provided to workers in accordance with Kalkaroo Copper Policies and Procedures.

Local procurement of people, fuel and consumables will be sourced from the surrounding district and nearby population centres such as Broken Hill, Mildura and Port Augusta where practical.

5 Consultation

An effective, ongoing consultation program involving Havilah Resources and its operator, Kalkaroo Copper, State Government, nearby residents and communities, indigenous groups and other stakeholders is essential. Consultation has commenced and will continue during the remaining planning process and operational phases through to mine closure and lease relinquishment.

The applicant (Kalkaroo Copper) of this Mining proposal is also the landholder, both being wholly owned subsidiaries of Havilah Resources Limited.

There are no residences or landowners located on property adjacent to the mineral claim. The nearest homesteads are located approximately 17km away.

Table 7 details stakeholder consultation to date. The Information provided to local stakeholders in respect to all matters related to this proposal, including the project size and project description has not changed since December 2021.

Table 7 Stakeholder Consultation Summary

Date		Stakeholder	Discussion Item	Issues Raised	Solution
2008		DME	ML Form 10		
2014		DPTI	Discussion of Road diversion and Site Assessment by DPTI	Follow approved design process as directed by DPTI.	
November 2020		DIT	Update to Road Diversion requirements	Process has changed since 2014. New Process outlined by DIT to Havilah Resources.	Follow new design process.
August 2021		Local Pastoralists	Project briefing and discussion of impacts to the Pastoralist		No issues or concerns raised.
August 2021		Traditional Owners	Kalkaroo Project briefing and discussion of impacts during clearance surveys		
August 2021		Traditional Owners	Clearance Survey	Kalkaroo Project Road diversion and Mineral Claim MC3828 clearance survey of proposed activities on the claim	Exclusion zone identified and documented. No other concerns raised.
Jan 2025		DME	Mining Proposal	Submission of Mining Tenement Proposal	Written response provided to Kalkaroo Copper requesting further information
Jan 2026		DME	Mining Proposal	Written response provided to Kalkaroo Copper requesting further information in revised proposal Doc ID:2025D013524	
March 2026		DME	Mining Proposal	Revised Mining proposal submitted to DEM addressing DEM's request for further information	DEMs requirements have been addressed in the updated document.

6 Environmental, social and economic aspects

6.1 INTRODUCTION

The Mineral Claim is located in a remote area. Using the context and information provided in Sections 3 and 4, the proponent has identified the following potential environmental impacts from the proposed activity on the EMLP area:

- Public Safety,
- Traffic,
- Heritage,
- Weeds and Pests,
- Soil,
- Waste disposal,
- Native Vegetation,
- Fauna,
- Surface Water
- Air quality and,
- Land use.

6.2 ENVIRONMENTAL ASPECTS, RISK ASSESSMENT, MANAGEMENT AND OUTCOMES

Environmental Aspects Identification, Risk Assessment, Management and Outcomes are presented in Table 11 Mineral *Claim Environmental Risk Assessment*. Table 11 identifies and includes:

- The environmental components, context and interests of any affected parties.
- Applicable legislation, and non-legislated standards and guidelines applicable to each environmental component.
- The potential environmental impacts that may be associated with the mining activity.
- The potential environmental risk associated with the impact.
- The control and management strategies that will be applied to manage the risk.
- The residual risk after controls are applied.
- The justification for acceptance of residual risk.
- The proposed acceptable level of impact, and
- Proposed Outcome measurement criteria of the impact

6.3 RISK ASSESSMENT METHODOLOGY

It is generally accepted that the severity and likelihood of consequence together define the risk associated with a hazard.

The residual risk evaluation has been prepared in accordance with AS/NZS 4360:2004 Risk management, to consider any potential residual environmental risks to the environment,

which may remain following the implementation of environmental management strategies at the Site for each Environmental Impact Identifier defined in Table 11 - *Environmental Risk Assessment*.

The assessment of potential residual risk that has been adopted is a qualitative risk-based approach, designed to assess risk, based on:

- The likelihood of the impact or event occurring (refer to Table 7 for definition); and
- the consequences of the occurrence (refer to Table 8 for definition).

The risk matrix shown in Table 8 has been used to subjectively assign a risk value the impact events identified in the Environmental Risk Assessment (Table 11).

Table 8 Risk assessment matrix

			Likelihood of Consequences (LH)				
			1	**2**	**3**	**4**	**5**
			Rare	Unlikely	Possible	Likely	Almost Certain
Severity of Consequence (CQ)	**A**	Insignificant	low	low	low	low	low
	B	Minor	low	low	moderate	moderate	moderate
	C	Moderate	moderate	moderate	high	high	high
	D	Major	high	high	extreme	extreme	extreme
	E	Extreme	high	extreme	extreme	extreme	extreme

Table 9 Definitions of Likelihood used

Level	Description	Criteria
1	Rare	Consequence may occur in exceptional circumstances. Consequence has rarely occurred in the industry and is not expected in the life of the Mining Lease
2	Unlikely	Could occur but doubtful. Consequence could occur within a 1-10 year timeframe
3	Possible	Might occur at some time in the future Likely occurrence/consequence within a 1-3 year period
4	Likely	Will probably occur. Likely consequence within a six month period
5	Almost Certain	Consequence is expected to occur in most circumstances

Table 10 Definitions of Consequences

Level	Description	Criteria (either/or)
A	Insignificant	Impacts not requiring any treatment or management action
B	Minor	Low environmental or social impact contained within area impacted by operations requiring minor management action
C	Moderate	Serious environmental impacts, readily manageable at low cost
D	Major	Major environmental or social impact that may extend beyond the lease boundary. Substantial environmental impacts, manageable but at considerable cost and some disruption
E	Extreme	Severe environmental impact. Impact may be locally severe (e.g. local species destruction) or unconfined and/or on a regional scale and heavy cost.

Environmental Component	Context	Applicable Government Legislation	Applicable Non Legislated Standard	Mine Life Phase	Environmental Impact Event Identifier	Source	Pathway	Environmental Receptor	Potential Impact Events Considering views and Interests of Third Parties	Description of Uncertainty	Risk assessment LH = likelihood of consequence CQ = severity of consequence			Control and Management Strategies	Evaluation of Residual Risk LH = likelihood of consequence CQ = severity of consequence			Justification for Acceptance of Residual Risk	Proposed Outcome	Draft Measurement Criteria
											LH	CQ	RISK		LH	CQ	RISK			
Public Safety	Proximity to existing public road. Site may be at risk of tresspass	Work Health and Safety Act 2012 Mining Act 1971	Mine Closure Leading Practice Sustainable Development for the Mining Industry (DFAT, 2016).	**Operational**	PS1	Site Infrastructure and Landform	Unauthorised public access to borrow pit	Member of the Public	Public injury and/or death due to members of the public entering the Site and interacting with borrow pit development and infrastructure.	Nil level of Uncertainty	Possible	Moderate	High	Access to the tenement will be controlled through fencing and gates will be locked when not operational (Refer to Section 4.8.4)	Unlikely	Moderate	Moderate	It is reasonable to protect the Site with fencing and divert the current public access road away from the Tenement Area so that a reasonable person would be deterred from trespass and expose themselves to risk of injury.Where human interference is apparent with Site fencing, likelihood of unauthorised entry and resultant injury / death is increased hence immediate repairs and monitoring will be required	No public injuries and/or deaths resulting from unauthorised entry to the Land that could have been reasonably prevented	All public injuries and or details from unauthorised access to the mine site are recorded in the Mine Record Book and investigated by the Mine Manager within one calendar month (or other time as agreed with Mining Regulator) and the results of the investigation show that the incident could not have been reasonably prevented by the Tenement Holder
				Closure	PS2	Site Infrastructure and Rehabilitated Landform	Unauthorised public access to Closed borrow pit	Member of the Public	Public injury and/or death due to members of the public entering the Site and interacting with final landform of borrow pit development.	Nil level of Uncertainty	Unlikely	Minor	Low	Adherence with the Borrow pit Development and Rehabilitation Plan (Refer to section 4.12) Ensure the post-mining landform is constructed in accordance with approved rehabilitation plans designed to provide safe, stable, non-polluting landform and is suitable for the desired long-term land use.	Rare	Minor	Low	Rehabilitation plans designed to provide safe, stable final landform. Risk is reduced where landform is constructed in accordance to approved rehabilitation plans. It is reasonable to protect the Site with fencing so that a reasonable person would be deterred from trespass and expose themselves to risk of injury.	No public injuries and / or deaths resulting from the completed final landform post quarry completion.	Inspection and Mine records show that all areas of extraction are rehabilitated in accordance with approved rehabilitation plan and commitments to provide; - Landform rehabilitation to achieve 1V:3H batters; Inspection of the Site by a suitably qualified person (certified engineer) post mining completion confirms geotechnical stability of final landform (safe and stable);
Traffic	No traffic accidents involving members of the public and mine related traffic that could have been reasonably prevented by the Tenement Holder.	Work Health and Safety Act 2012 (SA) and Regulations Road Traffic Act 1961 (SA)		**Operational**	T1	Vehicles entering and exiting the site.	Mine entrance gate	Road users	Public safety risks such as collision between trucks and vehicles resulting from mine vehicles entering and exiting the Site at the access point.	Nil level of Uncertainty	Unlikely	Moderate	Moderate	Mine Manager must ensure that all employees operating vehicles are licenced to do so. • Site management are to ensure all personnel are aware of their responsibilities in relation to vehicle use through undertaking inductions, and implementing a Traffic Management Plan. • Two way radios must be readily accessible in all Site vehicles. • Vehicles must be in a roadworthy condition and fit for purpose. • Road trucks transporting materials are to be fitted with flashing lights. •Road signs will be displayed at mine entry and exit points, warning the public of the dangers of large trucks entering and exiting the tenement	Rare	Moderate	Moderate	The actions of other road users on public roads is out of the control of Site management; however, Site personnel are responsible for ensuring Site vehicles are operated in accordance with company policy and procedures and the road rules.	No traffic accidents involving members of the public and mine related traffic that could have been reasonably prevented by the Tenement Holder.	All traffic accidents involving the public at the mine access points are recorded in the Mine Record Book. All accidents will be investigated by the Mine manager within one calendar month (or other time as agreed with Mining Regulator) and the results of the investigation show that the accident could not have been reasonably prevented by the Tenement Holder.
Heritage	Potential of Aboriginal and/or European cultural heritage sites, objects or remains existing on undisturbed parts of the Site.	Heritage Places Act 1993 (SA) Mining Act 1971 (SA) Development Act 1993 (SA) Aboriginal Heritage Act 1988 (SA) Aboriginal and Torres Strait Island Heritage Protection Act 1987 (Cth)	Cultural Heritage Guidelines, A handbook for Staff and Contractors, (Transport SA1999) Guideline 2 Section 20 of the Aboriginal Heritage Act 1988: Discovery of sites, objects or remains (Department of the Premier and Cabinet)	**Operational**	H1	Plant and equipment disturbing areas of Aboriginal and/or European heritage sites	Plant and Equipment	Traditional Owners	Disturbance and/or destruction of Aboriginal and/or European heritage sites, objects or remains through development and operation of the Site.	The area of planned disturbance has been cleared. There is a low level of uncertainty.	Unlikely	Minor	Low	•Providing training to contractors and staff working at the site, enabling them to recognise sites of significance prior to disturbance; •Halting work in any area in which Aboriginal artifacts or sites are identified and where disturbance of them may occur due to mining related operations, followed by contact with appropriate authorities for advice on how to proceed; and •Ensuring all cleared areas are visibly demarcated on plans and in the field with exclusion zones greater than 25 metres in place; •Adhering to the requirements of the authorities post discovery.	Rare	Minor	Low	The Site has previously been cleared (see Section 3.15.1) and historical site disturbance activities have already taken place (refer to Section 3.17) hence the likelihood of occurrence of heritage artefacts onsite is low. A search of the cultural heritage register undertaken for the Mineral Claim at the commencement of the Survey did not identify known heritage sites or objects within tenement boundaries, however it is possible that heritage sites and objects may exist that are presently not recorded, which could be discovered in the course of quarrying.	No damage, disturbance or interference to Aboriginal or Non-Aboriginal heritage sites, objects or remains as a result of mining operations unless it is authorised under the relevant legislation.	An incident register will show no unauthorised disturbance to or destruction of identified Aboriginal or European artefacts or sites of significance during operation of the mine. Records demonstrate that work ceased in the immediate area of the discovery of Aboriginal artefacts or sites, appropriate authorities were advised, and work recommenced only after authorization under the Aboriginal Heritage Act 1998 (SA).

Environmental Component	Context	Applicable Government Legislation	Applicable Non Legislated Standard	Mine Life Phase	Environmental Impact Event Identifier	Source	Pathway	Environmental Receptor	Potential Impact Events Considering views and Interests of Third Parties	Description of Uncertainty	Risk assessment LH = likelihood of consequence CQ = severity of consequence			Control and Management Strategies	Evaluation of Residual Risk LH = likelihood of consequence CQ = severity of consequence			Justification for Acceptance of Residual Risk	Proposed Outcome	Draft Measurement Criteria
											LH	CQ	RISK		LH	CQ	RISK			
Weeds and Pests	Introduction of noxious plant species to site and adjacent land by quarrying activities. Control of pest fauna species.	Landscape South Australia Act 2019 Controlled Substances Act 1984 Controlled Substances (Pesticides) Regulations 2003 Agricultural and Veterinary Products Act (Control of Use) Act 2002: and Agricultural and Veterinary Products (Control of Use) Regulations 2004:	Weed control handbook for declared plants in South Australia (Primary Industries and Regions SA, 2015)	**Operational**	WP1	Plant and equipment, light vehicles. Areas of disturbance including tracks, bunds and stockpiles	Movement of plant and equipment, light vehicles on roads and tracks spreading weed seeds from existing weed seed bank within soils	Operational area and onsite vegetation	Introduction of new or declared weed species, or plant pathogens as a result of the mining activity. Spray drift and chemical trespass. Introduction of pest fauna species and use of toxic baiting programs that may impact on endemic wildlife.	Nil level of Uncertainty	Likely	Moderate	High	• Minimizing the areas of clearance and disturbance to provide less opportunity for weed seed growth; • The revegetation of disturbed areas with locally derived seed stock to act as competition against weeds; • The banning of domestic pets and plants from site; • Adhering to waste management policies including the deposition of all putrescible wastes in secured bins for off site waste disposal; • The spraying or removal of weeds and pest plants when identified; and • Appropriate control of rabbits, foxes, goat and pigs on annual / as needs basis (baiting, shooting, trapping).	Unlikely	Moderate	Moderate	It is unlikely that weed and feral animal numbers could increase both on the Mineral Claim and in nearby areas due to activities associated with the Mineral Claim. Control measures will be used to minimize weed, plant pathogen and feral animal impacts. The significant distance between the mine and residences means it is unlikely that local stakeholders will be affected by weed and feral animal populations or control measures at the site. The most significant risks from weed and feral animals are the potential reduction in loss of flora abundance or diversity and a reduction in indigenous fauna populations or diversity. With the control measures proposed, the residual risk is considered moderate.	The Tenement Holder must, during construction, operation and post-mine completion, ensure no introduction of new species of weeds, pests (including feral animals) or plant pathogens, nor sustained increase in abundance of existing weeds or pests in the Land.	Inspection and records demonstrate the following: • Inspection targeting declared weed, plant pathogens and pests undertaken annually by Site management, • Declared weed, plant pathogens and pests identified during annual Site inspections are managed in accordence with the requirements of the Landscape South Australia Act 2019 and specific actions plans developed for the SA Arid Lands Regional Landscape Plan Board
				Closure	WP2	Plant and equipment, light vehicles. Current rehabilitated areas.	Movement of plant and equipment, light vehicles on roads and tracks spreading weeds and existing weed seed bank within soils	Disturbed areas being rehabilitated and onsite vegetation	Introduction of new or declared weed species, or plant pathogens as a result of the mining activity. Spray drift and chemical trespass. Introduction of pest fauna species and use of toxic baiting programs that may impact on endemic wildlife.	Nil Level of Uncertainty	Likely	Moderate	High	Controlling weed infestations to prevent further spread of weeds. • Prioritising weed management according to the status of the weed. • using local endemic native seeds for rehabilitation. • Restrict vehicle traffic movement in rehabilitation areas. • Implementation of rehabilitation (as soon as practical). • Regular inspections of Site for evidence of rabbits/foxes (scats, burrows etc.) • Appropriate control of rabbits, foxes, goat and pigs on annual / as needs basis (baiting, shooting, trapping). • Ensuring general waste bins are fitted with lids and closed so not to attract vermin.	Unlikely	Moderate	Moderate	Rehabilitation activities by their nature result in the disturbance of land during, which is readily colonised by weed seed species occurring within the topsoil seed bank. The Mine Manager shall ensure all reasonable and practicable measures are taken to reduce the potential for introduction of new or declared weed and pest species at the Site.		Inspection and records demonstrate the following: - Inspection targeting declared weed, plant pathogens and pests undertaken annually by Site management, - Declared weed, plant pathogens and pests identified during annual Site inspections are managed in accordence with the requirements of the Landscape South Australia Act 2019 and specific actions plans developed for the SA Arid Lands Regional Landscape Plan Board

Environmental Component	Context	Applicable Government Legislation	Applicable Non Legislated Standard	Mine Life Phase	Environmental Impact Event Identifier	Source	Pathway	Environmental Receptor	Potential Impact Events Considering views and Interests of Third Parties	Description of Uncertainty	Risk assessment LH = likelihood of consequence CQ = severity of consequence			Control and Management Strategies	Evaluation of Residual Risk LH = likelihood of consequence CQ = severity of consequence			Justification for Acceptance of Residual Risk	Proposed Outcome	Draft Measurement Criteria
											LH	CQ	RISK		LH	CQ	RISK			
Soil	Inappropriate removal and handling of topsoils, storage and inadequate weed management. Effective management required in order to ensure successful rehabilitation and suitable post quarrying land use	Landscape South Australia Act 2019	Leading Practice Sustainable Development for the Mining Industry 2016, DFAT.	**Operational**	S1	Mining activity	Soil stripping activities	Landform	Failure to strip, stockpile and conserve topsoils and subsoils in an efficient and effective manner.	Nil Level of Uncertainty	Unlikely	Moderate	Moderate	•Minimizing the areas of clearance and disturbance to minimize the potential for soil erosion; •Utilising appropriate equipment to maximise soil recovery during clearing operations; •Stockpiling all removed topsoil for use in rehabilitation in mounds or heaps no more than 2.0 m high to retain seed viability; •Constructing small perimeter bunds to minimise erosion and loss of material from surface water run-off and to prevent heavy rainfall from discharging sediment laden water away from the stockpiles; and •The coarseness of the crushed rock to be produced (-50mm aggregate) will result in a high degree of permeability and corresponding water infiltration from heavy rainfall through the rock stockpiles. This will mitigate sedimentation issues due to rainfall from occurring from these stockpiles.	Rare	Moderate	Moderate	Residual risk sufficiently controlled where topsoil stripping, maintenance of stockpiles and recovery is undertaken with sufficient care and attention.	The Tenement Holder must, during construction, operation and post-mine completion ensure that the existing (pre-mining) soil quantity and quality is maintained.	Annual inspection records in the Mine Logbook of all soil stockpiles will demonstrate that all stockpiles are less than 2 metres high and are maintained at the height when established.and to assess soil stability, vegetation establishment and the presence and removal of weeds.
				Closure	S2	Disturbed land	Rehablilitation activities	Post mining Landform, onsite vegetation	Insufficient application of topsoil on progressively rehabilitated landforms resulting in failed rehabilitation.	Nil Level of Uncertainty	Unlikely	Moderate	Moderate	•Mine closure and completion plan drawings will be adhered to. •Using appropriate equipment to maximise use of stored topsoil for rehabilitation activities	Rare	Moderate	Moderate	It is proposed to re-spread topsoil thinly over the disturbed areas of the site including the rock area. There may not be sufficient topsoil available to complete this intention adequately over the entire area worked due to the scarcity of the topsoil available on the actual outcrop to be mined. Existing pastoral productivity of this work area is already low given the scarcity of topsoil and corresponding vegetative cover over this outcrop. The probability of a loss of pastoral viability to soils during the period is low, given the control measures proposed, the small footprint of disturbance proposed and the context surrounding the existing environment.		Inspection of the topsoil application is undertaken by a suitably qualified person at end of quarry life confirming topsoil is of a suitable depth and sufficient to ensure long term establishment and success of vegetation.

Environmental Component	Context	Applicable Government Legislation	Applicable Non Legislated Standard	Mine Life Phase	Environmental Impact Event Identifier	Source	Pathway	Environmental Receptor	Potential Impact Events Considering views and Interests of Third Parties	Description of Uncertainty	Risk assessment LH = likelihood of consequence CQ = severity of consequence			Control and Management Strategies	Evaluation of Residual Risk LH = likelihood of consequence CQ = severity of consequence			Justification for Acceptance of Residual Risk	Proposed Outcome	Draft Measurement Criteria
											LH	CQ	RISK		LH	CQ	RISK			
Waste Disposal	Inappropriate storage, handling and disposal of wastes may result in environmental pollution	Green Industries SA Act, 2004. Environmental Protection Act SA, 1993. Environmental Protection Waste to Resources Policy 2010 South Australian Public Health Act 2011	EPA Guideline: Site contamination—what is site contamination? (EPA, 2009) EPA Guideline: EPA080/12 Liquid storage Bunding and spill management (EPA, 2012) EPA Guideline for stockpile management: Waste and waste derived products for recycling and reuse (Updated April 2017)	**Operational**	WD1	Domestic and Industrial Waste; AMD and Heavy metal contamination	Land and Soil	Land and Soil	Soil and water contamination. Contaminated land legacy for future land users, and Local and State authorities.	Nil Level of Uncertainty	Possible	Minor	Moderate	All storage and handling of hydrocarbons contained and installed in accordance with Australian Standard AS 1940 - The storage and handling of flammable and combustible liquids and EPA Guideline: EPA080/16 Bunding and spill management, May 2016. • Undertake quarterly inspections of bulk fuel and oil storages and bunds for integrity and cleanliness. Shall be maintained in a liquid tight and clean condition. • The operator shall ensure appropriate spill kits are available at all times. • Any spill of potential contaminants shall be cleaned up immediately. • Dispose of contaminated containment and/or absorbent material and any impacted surface soils in accordance with EPA Guideline: EPA 378/13 Disposal of used hydrocarbon absorbent materials, August 2013. •Sewage disposed of in accordance with Department of Health requirements.	Unlikely	Minor	Low	Risk reduced through ensuring that materials capable of resulting in contaminated land are appropriately handled, stored and disposed of. Extraction of materials does not require the application of chemicals and the material extracted has a low risk to ARD through being classified as NAF	No contamination of land or soils either on or off site. stored/used in borrow pit mining operations.	Records of waste disposal maintained by the Mine Manager show that domestic and industrial wastes have been disposed of prior to mine closure) to appropriate (licensed) repositories in accordance with EPA requirements. • quarterly inspections of bunding and fuel, oil and chemical storage management demonstrate that facilities are designed, constructed and operated in accordance with EPA Bunding Guidelines;
			Australian Standard AS 1940 - The storage and handling of flammable and combustible liquids and EPA Guideline: EPA080/16 Bunding and spill management, May 2016. EPA Guideline: EPA 378/13 Disposal of used hydrocarbon absorbent materials, August 2013. SA Health On-site Wastewater Systems Code April 2013	**Closure**	WD2	Domestic and Industrial Waste and remnant equipment and pipelines	Land and Soil	Land, soil and post mining Land users	Land or Soil contamination. Contaminated land legacy for future land users, and Local and State authorities.	Nil Level of Uncertainty	Possible	Minor	Moderate	• Remove all items of infrastructure at the cessation of the operation (i.e. crushing plant and equipment, pipelines, demountable buildings, pumps and graveyard items (e.g. scrap metal, parts, tyres, bearings etc.) • Where required, remediate land confirmed as contaminated through preliminary or detailed Site investigations.	Unlikely	Minor	Low	Risk reduced through ensuring that infrastructure and/or materials capable of resulting in contaminated land are appropriately disposed of or removed offsite and contaminated land is remediated. The material extracted has a low risk to ARD and land contamination through being classified as NAF	Post Mine Completion, there is no contamination of land or soils either on or off site.	Photos will demonstrate that all equipment and infrastructure is removed from site and records will demonstrate that all waste has been disposed of to appropriate (licensed) repositories.

Environmental Component	Context	Applicable Government Legislation	Applicable Non Legislated Standard	Mine Life Phase	Environmental Impact Event Identifier	Source	Pathway	Environmental Receptor	Potential Impact Events Considering views and Interests of Third Parties	Description of Uncertainty	Risk assessment LH = likelihood of consequence CQ = severity of consequence			Control and Management Strategies	Evaluation of Residual Risk LH = likelihood of consequence CQ = severity of consequence			Justification for Acceptance of Residual Risk	Proposed Outcome	Draft Measurement Criteria
											LH	CQ	RISK		LH	CQ	RISK			
Native Vegetation	Land clearance, dust or other damage to native vegetation.	Mining Act, 1971, the Environment Protection Act, 1993, the Native Vegetation Act, 1991 and the Federal Environment Protection and Biodiversity Conservation Act, 1999.		**Operational**	NV1	Vehicles and Machinery Entering and Leaaving the Site, and disturbed Land	Land and Soil	Native Vegetation	Permanent loss of Native vegetation abundance or diversity	Nil Level of Uncertainty	Possible	Moderate	High	Refer to: •Control and Managements strategies for Impact even identifier S1. • Control and Management Strategies relating to Ipmact Identifier WP1. • Control and Management Strategies for Impact event WD1 • The use of dust suppression measures (eg water cart/sprays) during periods of significant dust generation to reduce dust effects to vegetation on shared access roads and within the Mineral Claim; •Restricting vehicle speeds to reduce the potential for dust generation within the Mineral Claim. • Native vegetation areas for clearance will be identified and flagged as per the Native Vegetation Management Plan (NVMP) and all operators will be made aware of areas for clearance based on NVMP prior to commencement of mining.	Unlikely	Moderate	Moderate	Given the control measures proposed, it is expected that impacts to the abundance and diversity of native vegetation will be kept as low as reasonably possible.	The Tenement Holder must, during construction, operation and post-mine completion, ensure no loss of abundance or diversity of native vegetation on or off the Land through; •clearance; •dust; •fire; or •other damage; unless a significant environmental benefit has been approved in accordance with the relevant legislation.	Annual review of native vegetation clearance records demonstrate that vegetation clearance does not extend beyond the approved clearance area. Clearance will be undertaken in accordance with the Native Vegetation Management Plan.
				Closure	NV2		Rehabilitated Landforms	Native Vegetation	Permanent loss of Native vegetation abundance or diversity on rehabilitated landforms	Owing to the extreme climate and the thin topsoils which exist over the current outcrop area some doubt exists over which endemic species will be best suited to enable rehabilitation of the disturbed areas in an appropriate time frame.	Possible	Moderate	High	Refer to : •Control and Managements strategies for Impact event identifier S2. • Control and Management Strategies relating to Impact Identifier WP2. • Control and Management Strategies for Impact event WD2 • Revegetating disturbed areas as soon as practicable on completion of operations	Unlikely	Moderate	Moderate	Given the control measures proposed, it is expected that impacts to the abundance and diversity of native vegetation will be kept as low as reasonably possible.	No permanent loss of abundance or diversity to native vegetation on or off the lease area through clearance or dust contaminant deposition unless prior approval is obtained under the Native Vegetation Act.	Post Mine Completion: Audit at mine closure by a suitably qualified and experienced independent consultant(s) of native vegetation monitoring using Before-After Control-Impact Paired Series (BACIPS) at impact locations (shown in Figure 69) demonstrates no statistical decrease in abundance or diversity of native vegetation compared to control sites.
Fauna	Operations impact native fauna abundance or diversity in the EMLP area and in adjacent areas.	Environment Protection and Biodiversity Conservation Act 1999 Mining Act 1971; Native Vegetation Act 1991; and Landscape South Australia Act 2019.		**Operational**	NF1	Vehicles and Machinery Entering and Leaving the Site, and Land disturbance	Land Clearance and Traffic Movement	Native Fauna	Reduced abundance or diversity of Native Fauna due to : •the clearance of vegetation (habitat); •death or injury by collision with vehicles; •the introduction or proliferation of feral animal populations	Nil Level of Uncertainty	Possible	Moderate	Moderate	•Minimizing the areas of clearance and disturbance to reduce habitat loss; •Restricting vehicle access to designated roads and tracks to reduce habitat loss; •Restricting vehicle speeds to reduce the potential for collisions with fauna; •Refer to Control and Management Strategies for event identifier WP1 and WP2 for the management of feral animal populations	Unlikely	Moderate	Moderate	It is unlikely that adverse impacts to native fauna abundance and diversity in the Mineral Claim and in adjacent areas with the control measures in place. Land clearance and loss of habitat (through either clearance or drought conditions), would be the main pathway too a reduction in native fauna abundance at the site. Given the abundance of similar vegetation and habitat nearby and the small area of proposed clearance the residual risk to Native Fauna is sufficiently controlled.	The Tenement Holder must ensure during construction, operation and post-mine completion, that there are no native fauna injuries or deaths due to mining operations that could have been reasonably prevented.	An incident register is to be maintained of native fauna species found visiting or trapped on/by site infrastructure and subsequently released. The register will be reviewed monthly and results will be presented in monthly site management reports prepared by the Mine Manager. The review will include the identification of any procedural changes required.
				Closure	NF2	Land disturbance	Rehabilitated Landform	Native Fauna	Permanaent loss of abundance or diversity of Native Vegetation	Nil Level of Uncertainty	Possible	Moderate	High	Control and Management Strategies listed for impact event identifier NV2	Unlikely	Moderate	Moderate	It is unlikely that adverse impacts to native fauna abundance and diversity in the Mineral Claim and in adjacent areas with the control measures in place. Land clearance and loss of habitat (through either clearance or drought conditions), would be the main pathway too a reduction in native fauna abundance at the site. Given the abundance of similar vegetation and habitat nearby and the small area of proposed clearance the residual risk to Native Fauna is sufficiently controlled.	The Tenement Holder must ensure during construction, operation and post-mine completion, that there are no native fauna injuries or deaths due to mining operations that could have been reasonably prevented.	A post mine closure native fauna survey will be undertaken by a suitably qualified ecologist that indicates no significant decreases in abundance or diversity of native fauna attributed to mining operations when compared to baseline control sites.

Environmental Component	Context	Applicable Government Legislation	Applicable Non Legislated Standard	Mine Life Phase	Environmental Impact Event Identifier	Source	Pathway	Environmental Receptor	Potential Impact Events Considering views and Interests of Third Parties	Description of Uncertainty	Risk assessment LH = likelihood of consequence CQ = severity of consequence			Control and Management Strategies	Evaluation of Residual Risk LH = likelihood of consequence CQ = severity of consequence			Justification for Acceptance of Residual Risk	Proposed Outcome	Draft Measurement Criteria
											LH	CQ	RISK		LH	CQ	RISK			
Surface Water	Proximity to existing ephemeral creek.	Environment Protection Act 1993; Mining Act 1971; and Landscape South Australia Act 2019 (Water Affecting Activities Control Policy).		**Operational**	SW1	Borrow pit development	Mining operations	Ephemeral Creek	Impact to surface water quality on or off the Land as a result of contamination and sedimentation caused by mining operations	Nil level of uncertainty	Unlikely	Minor	Low	• Control and Management Strategies for Event Identifier WD1. • Maintaining a minimum separation distance of 40 metres from the closest edge of the drainage channel to the mining operations. • The diversion of clean surface water runoff around the working area. • Constructing small perimeter bunds to minimise erosion and loss of material from surface water run-off and to prevent heavy rainfall from discharging sediment laden water away from the stockpiles. • Ensuring surface water is captured and held within the borrow pit • Minimizing the areas of clearance and disturbance during Mining Operations	Rare	Minor	Low	The probability of operations negatively affecting the quality of surface water and environmental values would be **rare and** likely to occur only in very unusual circumstances with minor consequences and will be further reduced by the implementation of the control strategies outlined to have a low residual risk for the project during operations	The Tenement holder must ensure during construction, operation and post-mine completion there is no adverse impact on surface water quality and water dependent ecosystems as a result of contamination and sedimentation from mining operations.	• Following rainfall events, resulting in run-off, photographic records will demonstrate that water or sediment from the Mining Lease rehabilitation has not entered the ephemeral creek system. • quarterly inspections of bunding and fuel, oil and chemical storage management demonstrate that facilities are designed, constructed and operated in accordance with EPA Bunding Guidelines; • annual visual inspections of windrows and bunds are in place and maintained;
				Closure	SW2	Rehabilitated Landforms	Rehabilitation activities	Post Mining Landform	Impact to surface water quality on or off the Land as a result of contamination and sedimentation from rehabilitated landforms	Nil level of Uncertainty	Unlikely	Minor	Low	• Control and Management Strategies for Event identifier S2 • Control and Management Strategies for Event Identifier WD2. • Control and Management Strategies for Impact event Identifier NV2.	Rare	Minor	Low	The probability of operations negatively affecting the quality of surface water and environmental values is likely to occur only in very unusual circumstances (rare) with minor consequences. This risk will be reduced by the implementation of the control strategies outlined above to have a low residual risk for the project on closure		Following rainfall events, resulting in run-off, photographic records will demonstrate that water or sediment from the Mining Lease rehabilitation has not entered the ephemeral creek system;
Air Quality	The EMLP is located in an area of marginal pastoral agricultural activities separated from sensitive receptors such as other pastoralists by 15 km or more. Subsequently air quality concerns are predominantly related to the visual impacts of dust and impacts to local flora and fauna from particulate matter (dust) and the potential for odours from the operation. Natural dust levels generated from wind events will be far more significant than dust created from the proposed operations.	Environment Protection Act 1993; Mining Act 1971; Landscape South Australia Act 2019; Environment Protection (Air Quality) Policy 1994; and Environment Protection (National Pollutant Inventory) Policy 2008		**Operational**	AQ1	Borrow pit development	Mining operations	Existing users and Environmental Values	impact to existing users (public health) and environmental values (public amenity) as a result of dust caused by minig operations	Nil level of Uncertainty	Possible	Moderate	High	• Establishing a complaints register, that records the frequency of occurrence, intensity, duration, and location of public complaints regarding dust • Using speed limits on roads used by mine traffic • Mingary to Kalkaroo road will be maintained to levels complying with DPTI guidelines • Water trucks will regularly spray all haul and transport roads • Where practical, limiting high dust-generating activities during adverse wind conditions	Unlikely	Moderate	Moderate	The probability of operations negatively affecting air quality for existing users and environmental values is possible (with a moderate consequence), but this will be reduced by the implementation of the control strategies outlined above to have a moderate residual risk.	The Tenement Holder must, during construction, operation and post-mine completion, ensure that there are no adverse impacts to: • public health; and/or • public amenity; from air emissions and/or dust generated by mining operations.	• A register is to be maintained of complaints received, that records the frequency of occurrence, intensity, duration, offensiveness, and location of public complaints regarding dust. The register will be reviewed weekly and results will be presented in monthly site management reports prepared by the Mine Manager; • All complaints acknowledged within 48 hours and closed out within 7 days.
				Closure	AQ2		Rehabilitated Landforms	Existing users and Environmental Values	impacts to existing users (public health) and environmental values (public amenity) as a result of dust from rehabilitated landforms	Nil level of Uncertainty	Unlikely	Minor	Low	Refer to: • Control and Management Strategies for Event Impact Identifier PS2. • Control and Management Strategies for Event Impact Identifier NV2 • Establishing a complaints register, that records the frequency of occurrence, intensity, duration, and location of public complaints regarding dust	Rare	Minor	Low	The probability of negatively affecting air quality for existing users and environmental values post Closure as a result of rehabilitated Landforms is Low.		An audit by a suitably qualified and experienced independent consultant of the final landform profile and revegetation at closure demonstrates that the tenement area is remediated in accordance with closure strategies.

Environmental Component	Context	Applicable Government Legislation	Applicable Non Legislated Standard	Mine Life Phase	Environmental Impact Event Identifier	Source	Pathway	Environmental Receptor	Potential Impact Events Considering views and Interests of Third Parties	Description of Uncertainty	Risk assessment LH = likelihood of consequence CQ = severity of consequence			Control and Management Strategies	Evaluation of Residual Risk LH = likelihood of consequence CQ = severity of consequence			Justification for Acceptance of Residual Risk	Proposed Outcome	Draft Measurement Criteria
											LH	CQ	RISK		LH	CQ	RISK			
Ground Water	Groundwater exists on the Mineral Claim but quanitity and quality unreliable.	Environment Protection Act 1993; Mining Act 1971; and Landscape South Australia Act 2019 (Water Affecting Activities Control Policy).		**Operational**	GW1	Borrow pit development	Mining operations	Existing Basement Rock Aquifer	Impact to ground water quality on or off the Land as a result of contamination caused by mining operations	Nil level of uncertainty	Rare	Minor	Low	• Control and Management Strategies for Event Identifier WD1. • The buffer between groundwater and the floor of the borrow pit is estimated at 75m • No existing users of this aquifer.	Rare	Minor	Low	The probability of operations negatively affecting the quality of ground water and environmental values would be **rare** with minor consequences due to the high separation distance from the depth of workings to the water tabland the fact that the water table will not be intersected during mining and will be further reduced by the implementation of the control strategies outlined to have a low residual risk for the project during operations	The Tenement holder must ensure during construction, operation and post-mine completion there is no adverse impact on ground water quality as a result of contamination from mining operations.	• Refer to WD1 Measurement Criteria
				Closure	GW2	Rehabilitated Landforms	Rehabilitation activities	Post Mining Landform	Impact to Ground water quality on or off the Land as a result of contamination from rehabilitated landforms	Nil level of uncertainty	Rare	Minor	Low	• Control and Management Strategies for Event Identifier WD2. • The buffer between groundwater and the floor of the borrow pit is estimated at 75m • No existing users of this aquifer. • Water abstraction not planned from aquifer	Rare	Minor	Low	The probability of operations negatively affecting the quality of ground water and environmental values is rare with minor consequences owing to the separation distance from the pit floor to the water table being in excess of 75metres. This risk will be reduced by the implementation of the control strategies outlined above to have a low residual risk for the project on closure		• Refer to WD2 Measurement Criteria
Visual Amenity	The Mineral Claim is located in an area of marginal pastoral agricultural activities separated from sensitive receptors such as other pastoralists by 15 km or more. Subsequently viaual amenity concerns are predominantly related to the visual impacts of a change to the landscape. .	Environment Protection Act 1993; Mining Act 1971; Landscape South Australia Act 2019;		**Operational**	VA1	Borrow pit development	Mining operations	Existing users and Environmental Values	impact to existing users (visual amenity) as a result of a changed surface topography caused by mining operations	Nil level of Uncertainty	Possible	Minor	Moderate	• Maintianing Temporary Product stockpile heights to no more than 5m in height • Ensuring Topsoil stockpiles do not exceed 2.0m in height • Mining the borrow pit to design to ensure gentle slopes of 18 degrees are maintained at all times and that the depth of the excavation does not exceed 5m. • Nearest Homesteads are 10-15km away • Control and Management Strategies for Event Impact Identifier WD1	Unlikely	Minor	Low	The probability of operations negatively affecting the visual amenity for existing users is possible (with a moderate consequence), but this will be reduced by the implementation of the control strategies outlined to have a low residual risk.	The Tenement Holder must, during construction, operation and post-mine completion, ensure that there are no adverse impacts to visual amenity;	•A register is to be maintained of complaints received, that records the frequency of occurrence, intensity, duration, offensiveness, and location of public complaints regarding visual amenity. The register will be reviewed weekly and results will be presented in monthly site management reports prepared by the Mine Manager; •All complaints acknowledged within 48 hours and closed out within 7 days.
				Closure	VA2		Rehabilitated Landforms	Existing users and Environmental Values	impact to existing users (visual amenity) as a result of a changed surface topography on completion on closure	Nil level of Uncertainty	Unlikely	Minor	Low	Refer to: • Control and Management Strategies for Event Impact Identifier PS2. • Control and Management Strategies for Event Impact Identifier WD2	Rare	Minor	Low	The probability of negatively affecting visual amenity for existing users post Closure as a result of rehabilitated Landforms is Low.		An audit by a suitably qualified and experienced independent consultant of the final landform profile and revegetation at closure demonstrates that the tenement area is remediated in accordance with closure strategies.

Environmental Component	Context	Applicable Government Legislation	Applicable Non Legislated Standard	Mine Life Phase	Environmental Impact Event Identifier	Source	Pathway	Environmental Receptor	Potential Impact Events Considering views and Interests of Third Parties	Description of Uncertainty	Risk assessment LH = likelihood of consequence CQ = severity of consequence			Control and Management Strategies	Evaluation of Residual Risk LH = likelihood of consequence CQ = severity of consequence			Justification for Acceptance of Residual Risk	Proposed Outcome	Draft Measurement Criteria
											LH	CQ	RISK		LH	CQ	RISK			
Land use	Proximity to existing ephemeral creek.	Environment Protection Act 1993; Mining Act 1971; and Landscape South Australia Act 2019		**Operational**	LU1	Borrow pit development	Mining operations	Existing Land	•Contamination of soil. •Soil erosion. •Decrease in available pastoral grazing area.	Nil level of uncertainty	Unlikely	Minor	Low	•Monitoring of impacts to native vegetation shows soil stabilisation techniques and revegetation to be effective in reducing erosion. •Constructing bunds, catch drains and diversion drains for surface water collection and treatment around high velocity run-off areas has been completed. •Establishing weed management measures to minimise soil erosion •Control and Management Stratgies associated with Impact Event Identifier WD1 •Ensuring areas to be disturbed are minimised and clearing complies with relevant requirements to minimise soil erosion.	Rare	Minor	Low	The probability of the activity on the MIneral Claim negatively affecting land use during operations would be **rare** because the pastoral lease is currently de-stocked. With appropriate management of Surface Water, Top Soil and Wastes the consequences to Land use would be minor given the context of the proposed operation.	The Tenement holder must ensure during construction, operation and post-mine completion there is no limitation to potential land uses (beyond project footprint) due to soil contamination or soil erosion.	• Refer to WD1 Measurement Criteria • Refer to NV1 Measurement Criteria • Refer to SW1 Measurement Criteria
				Closure	LU2	Rehabilitated Landforms	Rehabilitated Site	Post Mining Landform	Impact to surface water quality on or off the Land as a result of contamination and sedimentation from rehabilitated landforms •Ensuring that the structural integrity and stability of the open pit is maintained on a sustainable basis •Avoiding adverse effects to public, livestock and terrestrial fauna.	Nil level of uncertainty	Unlikely	Minor	Low	Remediation of contaminated soil within the Project footprint prior to closure. •Batters of the Borrow pit 18 degree slopes •Maximum batter height is no more than 5.0 metres. • Control and Management Strategies for Impact Event Identifier S2	Rare	Minor	Low	The probability of operations negatively affecting the ability to return the use of this land to Pastoral Grazing activities is considered Unlikely and the risk will be reduced by the implementation of the control strategies outlined to ensure a low residual risk for the project on closure		• Refer to Event Identifier WD2 Measurement Criteria • During or after significant rain, visual inspections will be conducted to assess: Visual evidence of erosion of the surrounding terrain and condition and effectiveness of drainage, bunds and sediment controls will be checked.• Refer to Event Identifier S2 Measurement Criteria

7 Operator Capability

7.1 PREVIOUS EXPERIENCE OF THE OPERATOR

Kalkaroo Copper is a wholly owned subsidiary of Havilah Resources Limited. Havilah has been an active explorer in this region of South Australia since 1996 and has successfully conducted exploration programs at Portia, Kalkaroo, Mutooroo, Maldorky, and Lilydale as well as a mining operation at Portia Gold Mine.

Kalkaroo Copper will be able to carry out the proposed mining operations using in house and external technical expertise including Mining Engineers, Environmental and Mining Managers and Geologists, as well as having sufficient funding in place prior to commencement of mining operations to support this Mining proposal. Quarrying operations at Deep Well will be conducted using short-listed mining contractors experienced with similar size operations and which are aware of the environmental and health and safety legislative requirements pertaining to open pit mining operations in South Australia.

In the last 5 years, a related body corporate or Kalkaroo Copper Pty Ltd has not failed to comply with a provision of a corresponding Australian law or designated Australian Act in connection with authorised operations that resulted in:

- The revocation or suspension of an authority to carry out authorised operations; or
- A prosecution for an offence; or
- The imposition of a penalty by a court; or
- The issuing of a notice, direction or order that required the suspension or discontinuance of any authorised operations; or
- the rectification of any harm to the environment or the rehabilitation of any land, place or other aspect of the environment.

7.2 ORGANISATION, RESOURCES AND DOCUMENTATION

The following resources will be made available to ensure that the environmental compliance system operates effectively:

- The Kalkaroo Copper General Manager, reporting to the Havilah Board of directors, will be accountable for ensuring compliance with lease conditions, management plans and environmental policies and objectives.
- The Registered Mine Manager for the Kalkaroo Copper-Gold Project, reporting to the General Manager, will be directly responsible for ensuring that all project activities are undertaken in full compliance with statutory regulations and are consistent with Kalkaroo Copper's policies, procedures, and management systems; and
- The Kalkaroo Copper Health, Safety and Environment manager for the Kalkaroo Copper-Gold Project will coordinate all environmental management and reporting activities on the Mineral Claim.

8 References

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www.nationalparks.nsw.gov.au

www.deh.gov.au/erin/ert/epbc/

www.deh.gov.au/erin/nvis/

9 Appendices

9.1 APPENDIX 1: NATIVE VEGETATION MANAGEMENT PLAN

Native Vegetation Management Plan

Mineral Claim MC3828

Data Report

Clearance under the *Native Vegetation Regulations 2017*

02/12/2024

Prepared by Ecosphere Ecological Solutions

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1 Application Information

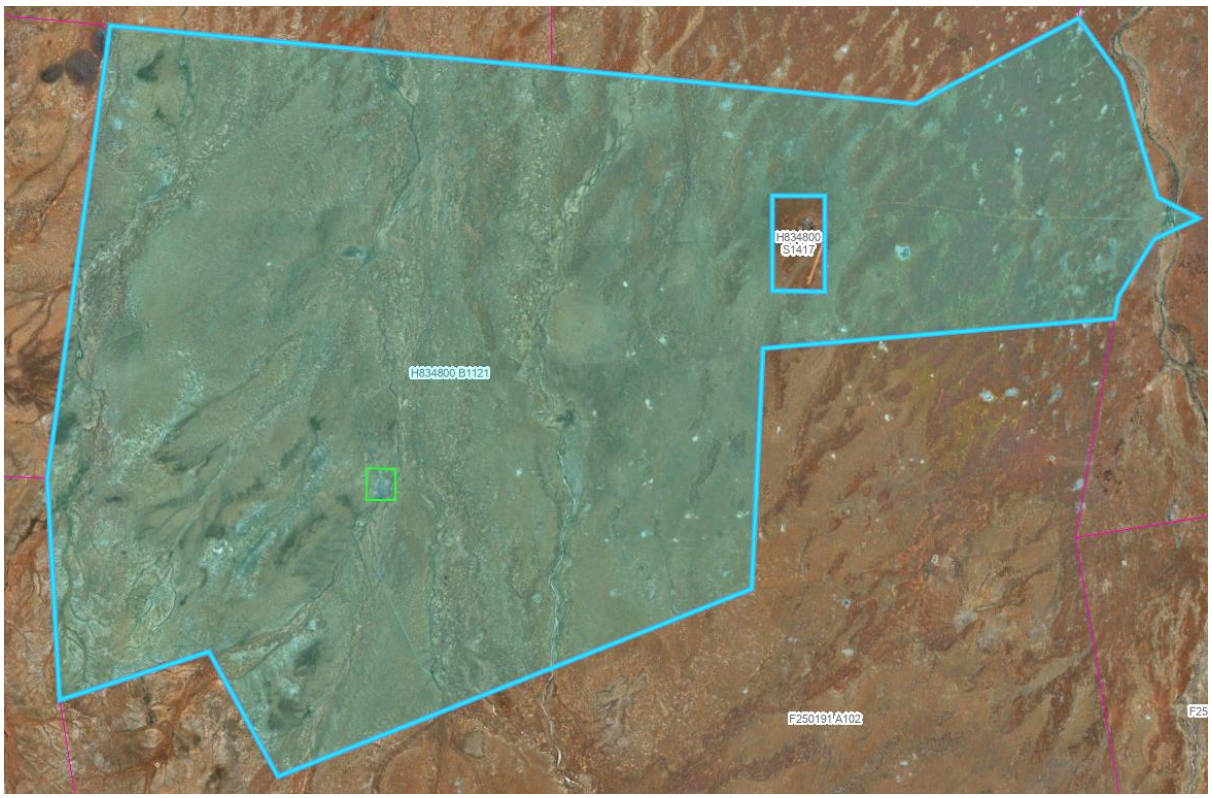
Table 1. Application details

Applicant:	Kalkaroo Copper Pty Ltd as a subsidiary of Havilah Resources Ltd.		
Key contact:	Geoff Borg Principal Environmental Advisor 107 Rundle Street, Kent Town M: 0478 007 902 E: Geoff.borg@havilah-resources.com.au		
Landowner:	Kalkaroo Copper Pty Ltd (Havilah Resources Ltd)		
Site Address:	Mooleulooloo Road, Kalkaroo		
Local Government Area:	Pastoral Unincorporated Area	**Hundred:**	OH(Curnamona)
Title ID:	CL6162/839	**Parcel ID:**	H834800 B1121

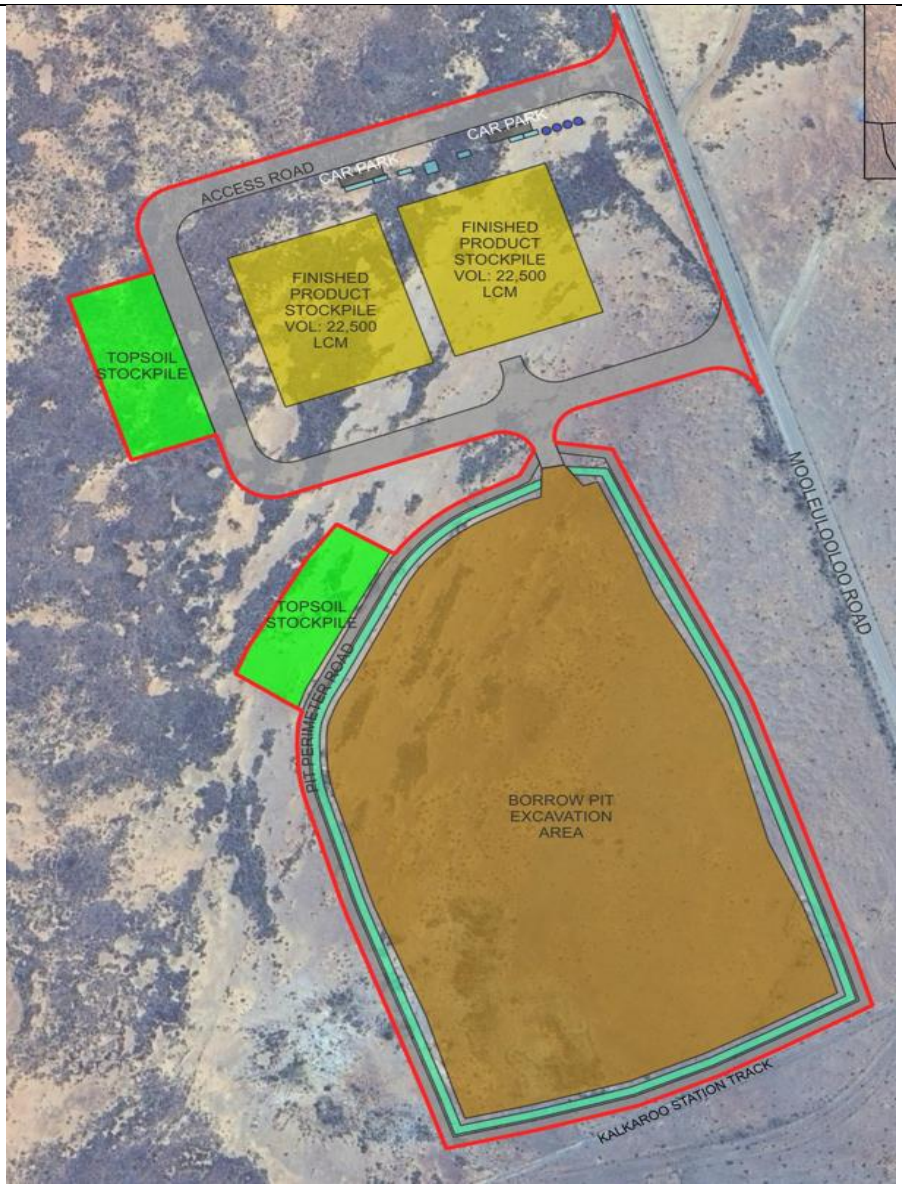
Table 2. Summary of proposed clearance

Purpose of Clearance	Clearance required for the intent to construct a quarry and associated infrastructure to produce crushed rock aggregate that is suitable for road sheeting and other civil engineering purposes.
Native Vegetation Regulation	Schedule 1, Regulation 12(28) - Operations. To allow the clearance of native vegetation for operations authorised under a Mining Act or the *Petroleum and Geothermal Energy Act 2000*.
Description of the vegetation under application	90 ha of *Maireana* (Bluebush), *Atriplex* (Saltbush), *Sclerolaena* (Bindyi) and *Acacia* (Wattle) species chenopod shrubland with open areas of native grasses.
Total proposed clearance - area (ha)	10.50 ha
Level of clearance	Level 4
Overlay (Planning and Design Code)	Native Vegetation Overlay

Map of proposed clearance area (show as a minimum; property boundary and proposed clearance area)



Kalkaroo Property Boundary



Clearance Area

Mitigation hierarchy	The avoidance of vegetation clearance is challenging in mining projects. The location of the quarry and associated infrastructure has been micro-sited to avoid higher value vegetation in the general area, with clearance being minimized where possible. Mitigation measures will be employed during the construction and operation of the quarry (e.g., dust suppression and run-off control measures) to ensure no further disturbance to the surrounding area.
SEB Offset proposal	Payment of $48,433.64 into the Native Vegetation Fund.

2 Purpose of Clearance

2.1 Description

Mineral Claim (MC) 3828 (i.e., the Project area) is located at Kalkaroo Pastoral Lease (PL) in north-eastern South Australia, approximately 390 km north-east of the Adelaide Central Business District (CBD), and approximately 90 km north-west of Broken Hill, New South Wales (Figure 2).

The purpose of clearance is to construct a quarry and crushing plant to produce crushed rock aggregate suitable for road sheeting and other civil engineering purposes (Figure 4).

2.2 Background

2.2.1 Interim Biogeographic Regionalisation for Australia

The Interim Biogeographical Regionalisation of Australia (IBRA) identifies geographically distinct bioregions based on common climate, geology, landform, native vegetation and species information. The bioregions are further refined into subregions and environmental associations.

The Project area is located within the Broken Hill Complex IBRA bioregion and the Barrier Range subregion. Within the Barrier Range subregion 100% native vegetation cover remains, although none is formally protected in reserves or heritage agreements.

2.2.2 Native Vegetation Information System

The National Vegetation Information System (NVIS) is a comprehensive data system that provides information on the extent and distribution of vegetation types in Australian landscapes. The NVIS broadly maps the Project area as *Casuarina pauper* (Black Oak) (mixed) low open woodland over *Senna artemisioides* spp. x *coriacea* (Senna) mid open shrubland and *Maireana sedifolia* (Pearl Bluebush) low open shrubland and *Schismus barbatus* (Arabian Grass) (mixed) low sparse shrubland.

2.2.3 Roadside Significant Site Database

No Roadside Significant Sites were present within the Project area or in near proximity.

2.2.4 Climate

The nearest reliable rainfall records are from Strathearn Homestead (Station Number: 020055), located approximately 19 km north-west of Kalkaroo. The Project area receives an average of 195.6 mm of rainfall each year, with much of that rainfall falling from September to December (Figure 1). Below average rainfall of 150.2 mm was recorded for 2023; however, 2022 was an above average year with 296.2 mm of rainfall. The Project area has an arid climate with hot, dry summers and mild, dry winters, that are too dry to support field crops. Soil moisture tends to be greatest in winter, with annual evaporation rates exceeding average rainfall.

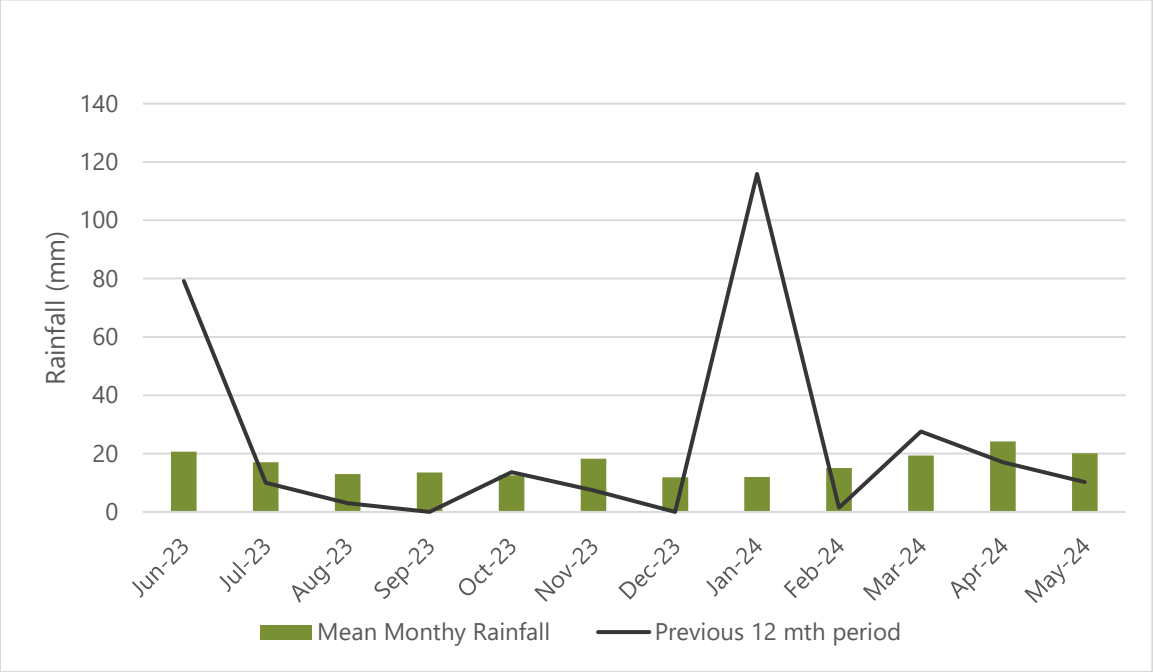


Figure 1. Rainfall in previous 12-month period at Strathearn Homestead

2.3 General Location

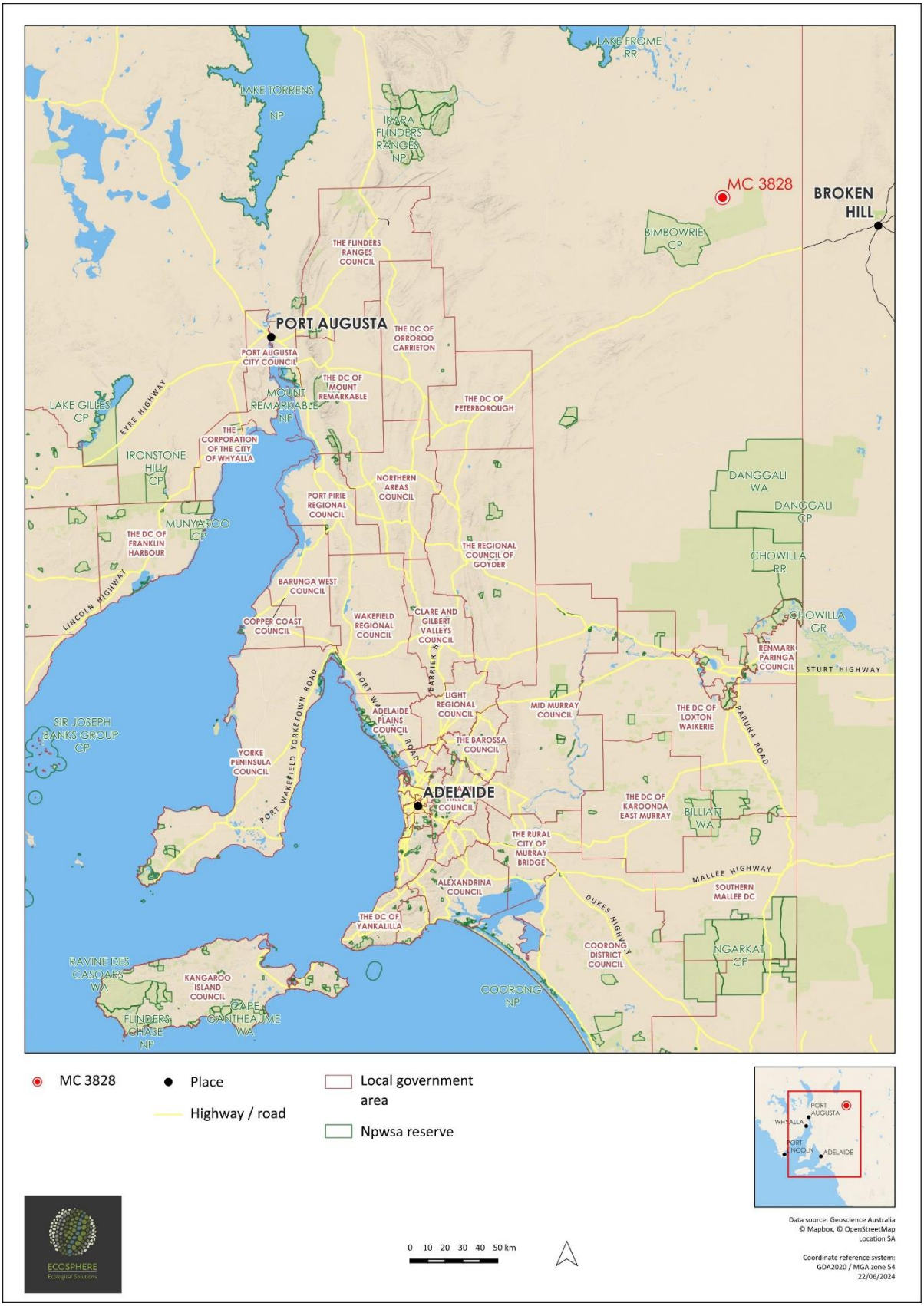


Figure 2. Location of Project area in relation to Adelaide and Broken Hill

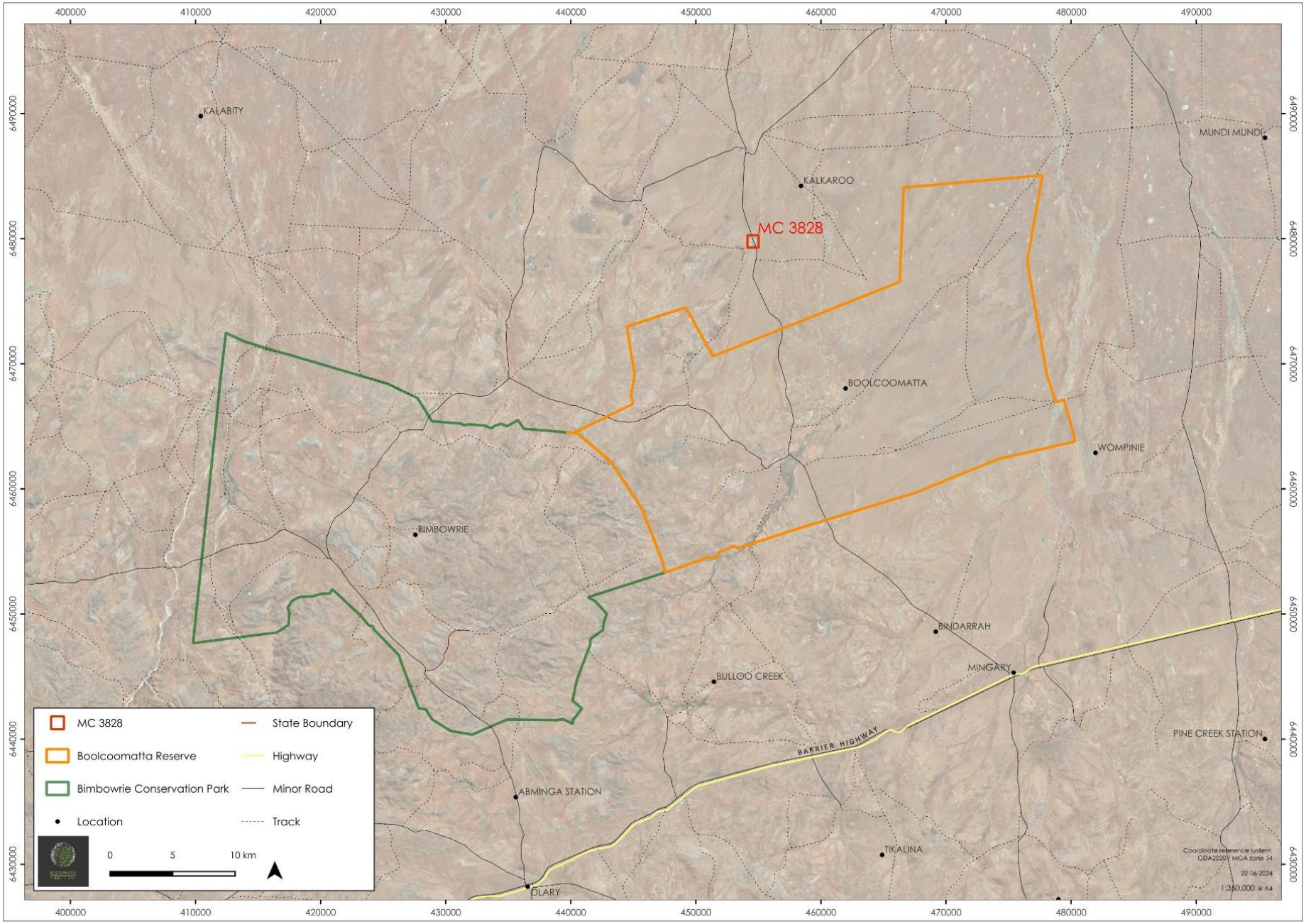


Figure 3. Project area in relation to Boolcoomatta Reserve and Bimbowrie Conservation Park

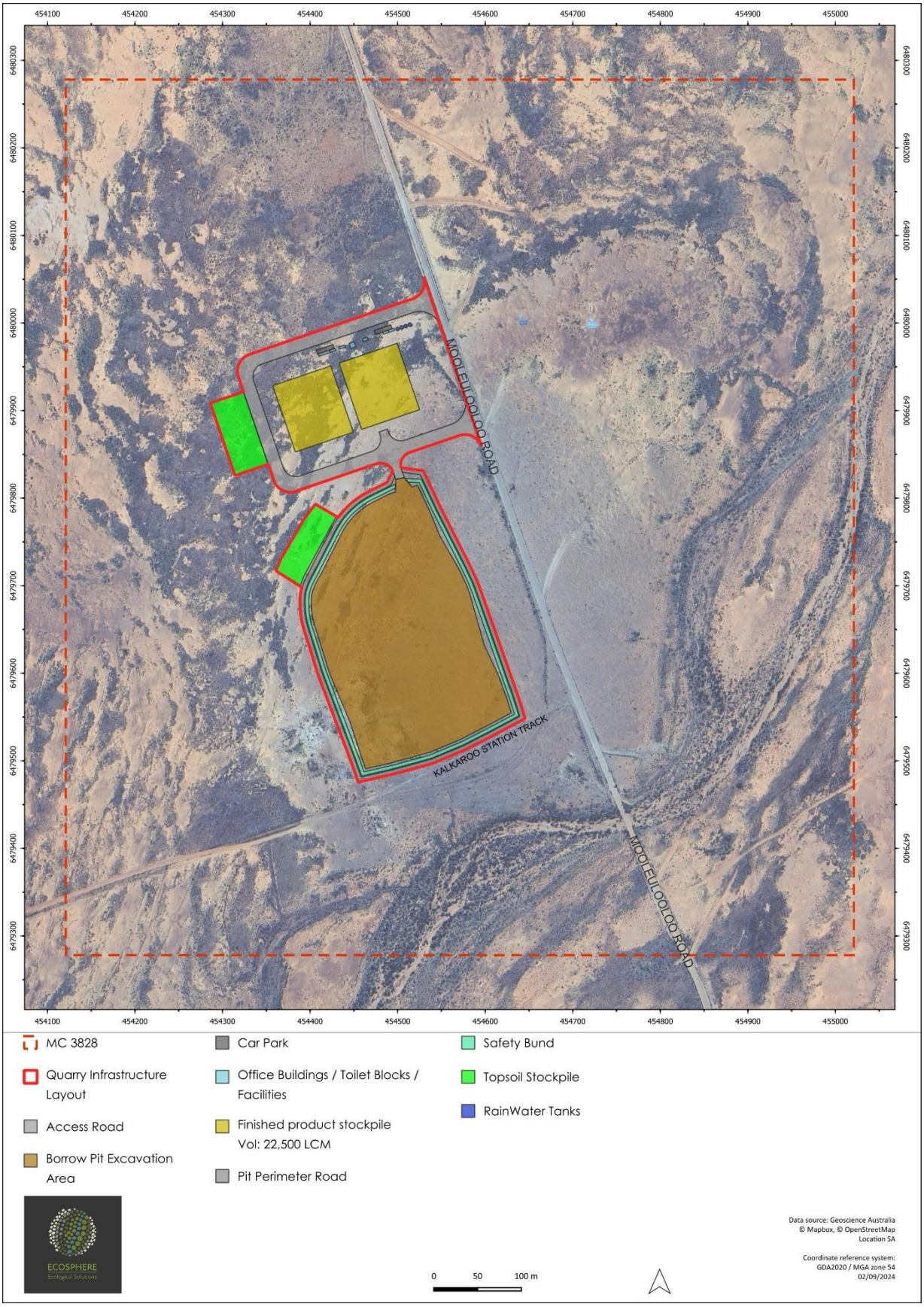


Figure 4. Proposed project layout footprint within MC 3828

2.4 Details of the Proposal

MC3828 is the proposed area for an Extractive Minerals Lease with the intent to produce crushed rock aggregate that is suitable for the sheeting of 35 km of access/diversion roads, up to 20 ha of hardstand areas, and other civil engineering purposes. The Project area has been micro-sited to avoid the areas of highest ecological value in the area.

2.4.1 Land Use

The current generalised land use is listed as pastoral, being a part of the Kalkaroo PL (Pastoral lessee Kalkaroo Pastoral Pty Ltd).

2.4.2 Mining Tenements

Mining tenements are an integral part of the local land use. Nearby mineral leases include Portia, Honeymoon, and White Dam projects. The Kalkaroo PL has five tenements, summarised in Table 3 below.

Table 3. Mining Tenements located on Kalkaroo

Number/ID/Area	Tenement Type	Purpose/Category	Status
ML 6498 (497.5 ha)	Mineral Lease	Construction Materials; Metallic Minerals	Active
ML 6499 (974.9 ha)	Mineral Lease	Construction Materials; Metallic Minerals	Active
ML 6500 (138 ha)	Mineral Lease	Construction Materials; Metallic Minerals	Active
MPL 158 (248.8 ha)	Miscellaneous purposes licences	Mining Related Infrastructure	Active
MPL 159 (51.68 ha)	Miscellaneous purposes licences	Accommodation, campsite, and associated infrastructure	Active

2.4.3 Native Title

Since December 2018 the Adnyamathanha, Ngadjuri and Wilyakali Overlap Claim Native Title Claim has been in effect and encompasses the Kalkaroo Pastoral Lease.

2.5 Approvals Required or Obtained

Legislation	Summary / Relevance
Commonwealth	
Mining Act 1971	The Mining Act regulates a wide range of activities, from the initial exploration to locate potentially economic mineral deposits, through to the extraction of the mineral and its production into a useable commodity. It also includes the rehabilitation of the mine site once mining ends. When determining conditions to attach to a mineral exploration or production licence, the Minister may consider any factors appropriate to a particular case but must consider the protection of the natural beauty of the area that will be affected by the proposed lease or licence, and the flora and fauna of any natural environment or habitat in the area.
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Provides for the protection of the environment and the conservation of biodiversity. Any action that has, will have, or is likely to have a significant impact on a Matter of National Environmental Significance (MNES) requires referral under the EPBC Act. Assessments are undertaken with reference to Significant Impact Guidelines 1.1 Matters of National Environmental Significance (2013) (SIG 1.1) and Significant Impact Guidelines 1.2 Actions on, or impacting upon, Commonwealth land, and actions by Commonwealth agencies (2013) (SIG 1.2).

Native Title Act 1993	Recognises the existence of Indigenous land ownership traditions, where connections to country have been maintained and where acts of government have not extinguished this connection.
State	
National Parks and Wildlife Act 1972 (NPW Act)	Provides for the establishment and management of reserves for public benefit, enjoyment and to provide for the conservation of flora and fauna in a natural environment. In particular, identifies flora and fauna species considered to be of conservation significance and provides for the use of approved wildlife through a system of permits allowing certain actions.
Native Vegetation Act 1991 (NV Act)	To preserve, enhance and manage the State's native vegetation and provide a regulatory framework to control clearance of vegetation. Also provide incentives and assistance to landowners to encourage them to preserve and enhance native vegetation. Approval is required for the clearance of native vegetation. Clearance is defined as: • The killing or destruction of native vegetation. • The removal of native vegetation. • The severing of branches, limbs, stems or the trunks of native vegetation. • The burning, poisoning and slashing of native vegetation. • Any other substantial damage to native vegetation, including activities such as draining for the reclamation of wetlands or flooding of land, and grazing land where stock have been excluded for more than ten years. Persons wanting to clear native vegetation must apply for a permit from the Native Vegetation Council (NVC), unless exempt under the regulations. The NVC will consider the impacts of the proposed clearance and may grant consent, refuse consent or grant consent subject to certain conditions.
Landscape South Australia Act 2019 (LSA Act)	From 1st July 2020 the LSA Act replaced the *Natural Resources Management Act 2004* as the key framework for managing the state's land, water, pest plants and animals, and biodiversity across the state. In particular, under the LSA Act, landholders have a legal responsibility to manage declared pest plants and animals and prevent land and water degradation.
Planning, Development and Infrastructure Act 2016 (PDI Act)	The primary objectives are to support and enhance the State's liveability and prosperity in ways that are ecologically sustainable, meet the needs and expectations and reflect the diversity of the State's communities. In particular, any proposed development involving the clearance of native vegetation requires separate approvals: (1) A development approval under the *Planning, Development and Infrastructure Act 2016*. (2) A native vegetation clearance approval under the *Native Vegetation Act 1991*. To achieve better alignment, the Planning and Design Code introduces two new Overlays for native vegetation. The Overlays map out locations where the clearance of native vegetation should be avoided or minimised. Under the new planning system, two approvals will still be required but native vegetation considerations will also now be 'up-front' in the development application process. This change will better align the two approval processes, use the same information reports and ensure that the design and siting / micro-siting to avoid and minimise the clearance of native vegetation is a fundamental part of the planning process.

2.6 Native Vegetation Regulation

Schedule 1, Regulation 12(28) – Operations. To allow the clearance of native vegetation for operations authorised under a Mining Act or the *Petroleum and Geothermal Energy Act 2000*.

Proponent must comply with the following additional requirements:

1.) Clearance incidental to operations authorised under a Mining Act or the *Petroleum and Geothermal Energy Act 2000*.

2.7 Development Application Information

Under the PDI Act the site is zoned as Remote Areas.

3 Methods

3.1 Desktop Assessment

3.1.1 Protected Matters Search Tool (PMST)

A PMST report was generated on 3rd June 2024 to identify MNES under the EPBC Act relevant to the Project area (DCCEEW 2024a) (see Section 4.4 for results summary and Section 8.1 for full PMST report results). The PMST is maintained by the Department of Climate Change, Energy the Environment and Water (DCCEEW) and was used to identify flora and fauna species or ecological communities (and wetlands) of national environmental significance that may occur or are likely to have suitable habitat within 50 km of the Project area.

3.1.2 Biological Database of South Australia (BDBSA)

Records for threatened species listed under the EPBC Act and NPW Act were assessed using the BDBSA Supertable (DEW 2024), obtained through the general query tool on NatureMaps (NatureMaps 2024). The dataset was obtained on 3rd June 2024 and was used to identify threatened species that have been recorded within 50 km of the Project area, have a spatial reliability of < 1 km, and were recorded during or after 1995, as per the Rangeland Assessment Method (NVC 2020). However, denatured records (i.e., records that have had their coordinates denatured to 1 decimal due to sensitivity concerns) of threatened species were also considered.

The BDBSA is comprised of an integrated collection of corporate databases which meet DEW standards for data quality, integrity and maintenance. In addition to DEW biological data the BDBSA also includes data from partner organisations (Birds Australia, Birds SA, Australasian Wader Study Group, SA Museum, and other State Government Agencies). This data is included under agreement with the partner organisation for ease of distribution, but they remain owners of the data and should be contacted directly for further information.

3.2 Assessment of the Likelihood of Occurrence

A likelihood of occurrence assessment for each threatened flora and fauna species highlighted by the PMST report and BDBSA search as potentially occurring in the Project area was conducted. This assessment was used to filter the outputs of the PMST report and BDBSA search results to derive a subset of species with potential to occur in the Project area for consideration during the field survey. The assessment was subsequently updated with habitat suitability information obtained during the field survey.

A likelihood of occurrence rating (Highly Likely / Known, Likely, Possible and Unlikely) was assigned to each threatened species identified in the desktop PMST report and BDBSA search based on the combination of records existing within 50 km of the Project area and knowledge of suitable habitat occurring in the Project area (Table 4). See Section 4.4 for the outcomes of this assessment.

Table 4. Criteria for the likelihood of occurrence of species within the Project area

Likelihood	Criteria
Highly Likely / Known	Recorded in the last 10 years, the species does not have highly specific niche requirements, the habitat is largely intact and falls within the known species distribution. The species was recorded as part of field surveys.
Likely	Recorded within the previous 20 years, the area falls within the known distribution of the species and the area provides species habitat which is largely intact.
Possible	Recorded within the previous 20 years, the area falls inside the known distribution of the species, but the area does not provide species habitat which is largely intact. Recorded within 20-40 years, survey effort is considered adequate, habitat is present and intact, and species of similar habitat needs have been recorded in the area.

Likelihood	Criteria
Unlikely	Recorded within 20-40 years; however, suitable habitat does not occur, and species of similar habitat requirements have not been recorded in the area. No records within the previous 40 years despite suitable habitat being known to occur in the area. No records despite adequate survey effort.

3.3 Field Survey

A field survey was undertaken by ecologists Alex Blackall and Nina Maurovic with help from NVC accredited ecologist Andrew Sinel from Ecosphere Ecological Solutions on 26th June 2024.

A reconnaissance search around the general footprint was undertaken to become familiarised with the area, noting the general topography, vegetation structures and stratums present and any other features likely to be of high habitat value.

Opportunistic fauna observations were carried out during the survey.

3.4 Vegetation Survey

Methodology was conducted in accordance with the NVC requirements, as outlined in the Rangelands Assessment Manual (NVC 2020). The NVC's Rangelands Assessment Method (RAM) has been developed for vegetation assessments undertaken for the NVC, including clearance and regulation application areas, potential and established SEB offset areas, and Heritage Agreements. The method aligns the assessment of vegetation and land condition with the RAM developed by the Natural Resources South Australian Arid Lands for the rapid assessment of pastoral properties in sheep and cattle country but is adapted for native vegetation assessments in arid rangelands throughout South Australia (NVC 2020).

Given the scale of activities that occur in the rangelands, stratifying the landscape into homogeneous units is often difficult and time consuming. Vegetation compositions in the arid zone are largely driven by landform features, such as ridges, slopes, and flats, which influence water redistributions in the landscape. Vegetation condition, however, is mainly driven by pastoral use (history of stock grazing). Information, such as pastoral grazing gradients (NatureMaps 2024), is available to assist with the division of the landscape based on these features before going into the field (NVC 2020). However, given the destocking of Kalkaroo station in 2009, the impact of grazing gradients on vegetation condition are not of particular concern within the Project area.

3.5 Desktop Study Limitations

The content of the desktop study was derived from existing datasets and references from a range of sources. Flora and fauna records were sourced from the Protected Matters Database via the PMST and the BDBSA via NatureMaps. The BDBSA only includes verified flora and fauna records submitted to Department for Environment and Wildlife (DEW) or partner organisations. It is recognised that drawing conclusions can be unreliable within areas that have been underrepresented in terms of biological studies. It is possible, therefore, that significant species occur within the Project area that were not reflected by database records. As such, protected species of flora and fauna highlighted by the PMST report but without BDBSA records within the 50 km buffer of the Project area may still be classified as Possible, Likely, or Highly Likely to occur within the Project area based on suitable habitat alone.

4 Assessment Outcomes

4.1 Vegetation Assessment

The Broken Hill Complex subregion lies to the north of the Olary Spur and is part of a large internal drainage basin, the centre of which is occupied by Lake Frome. The plain consists of highly calcareous loamy earths, crusty loamy soils with red clayey subsoils and hard setting loamy soils with red clayey subsoil. The dominant vegetation communities are various low chenopod shrublands occurring as either communities dominated by a single species or as mosaics of several species on plains and low rises. Smaller areas of grasslands are also found on the plains. The vegetation structure and composition has been altered as a result of past land-use practices (i.e., stock grazing); however, the destocking of the property has allowed highly palatable short-lived perennial species such as *Maireana integra* (Entire-wing Bluebush) and *Solanum lanceolatum* (Orangeberry Nightshade) to grow unhindered, indicating that the vegetation is regenerating in the absence of grazing pressures.

The Project area consisted of level plain with extremely low relief, with a shale rise centred within the area. The soils were generally heavy clay flats with minor gilgais and flood out areas occupied by larger perennial shrubs. Low chenopod shrubland occupied much of the Project area, and the area was almost entirely devoid of trees.

4.2 Vegetation Associations

Five vegetation associations were recorded within MC3828 (Table 5 and Figure 5) covering an area of almost 90 ha. Of this, 10.5 ha comprising of vegetation associations 1, 3 and 5 will be cleared for the construction of the quarry and associated infrastructure (Figure 6).

None of the vegetation associations recorded were associated with a Threatened Ecological Community listed under the EPBC Act or the Provisional List of Threatened Ecosystems of South Australia.

Table 5. Vegetation association summary.

Association #	Description	Total Area (ha)	Clearance Area (ha)
1	*Maireana pyramidata* (Black Bluebush) low very open shrubland over *Sclerolaena* spp. with scattered shrubs of *Acacia victoriae* (Elegant Wattle).	11.96	2.92
2	*Maireana pyramidata* (Black Bluebush), *Atriplex vesicaria* (Bladder Saltbush) low open shrubland over *Leiocarpa* sp. and *Brachyscome* sp.	20.06	-
3	*Acacia victoriae* (Elegant Wattle), *Rhagodia spinescens* (Spiny Saltbush) riparian shrubland +/- *Santalum lanceolatum* (Plumbush).	10.09	-
4	*Maireana pyramidata* (Black Bluebush), *Maireana integra* (Entire-wing Bluebush), *Atriplex vesicaria* (Bladder Saltbush) low open shrubland over *Sclerolaena* spp. with scattered shrubs of *Acacia victoriae* (Elegant Wattle).	8.93	5.59
5	*Maireana pyramidata* (Black Bluebush), *Maireana aphylla* (Leafless Bluebush) low open shrubland over tussock grasses.	37.97	1.99
	Total	**89.01 ha**	**10.5 ha**

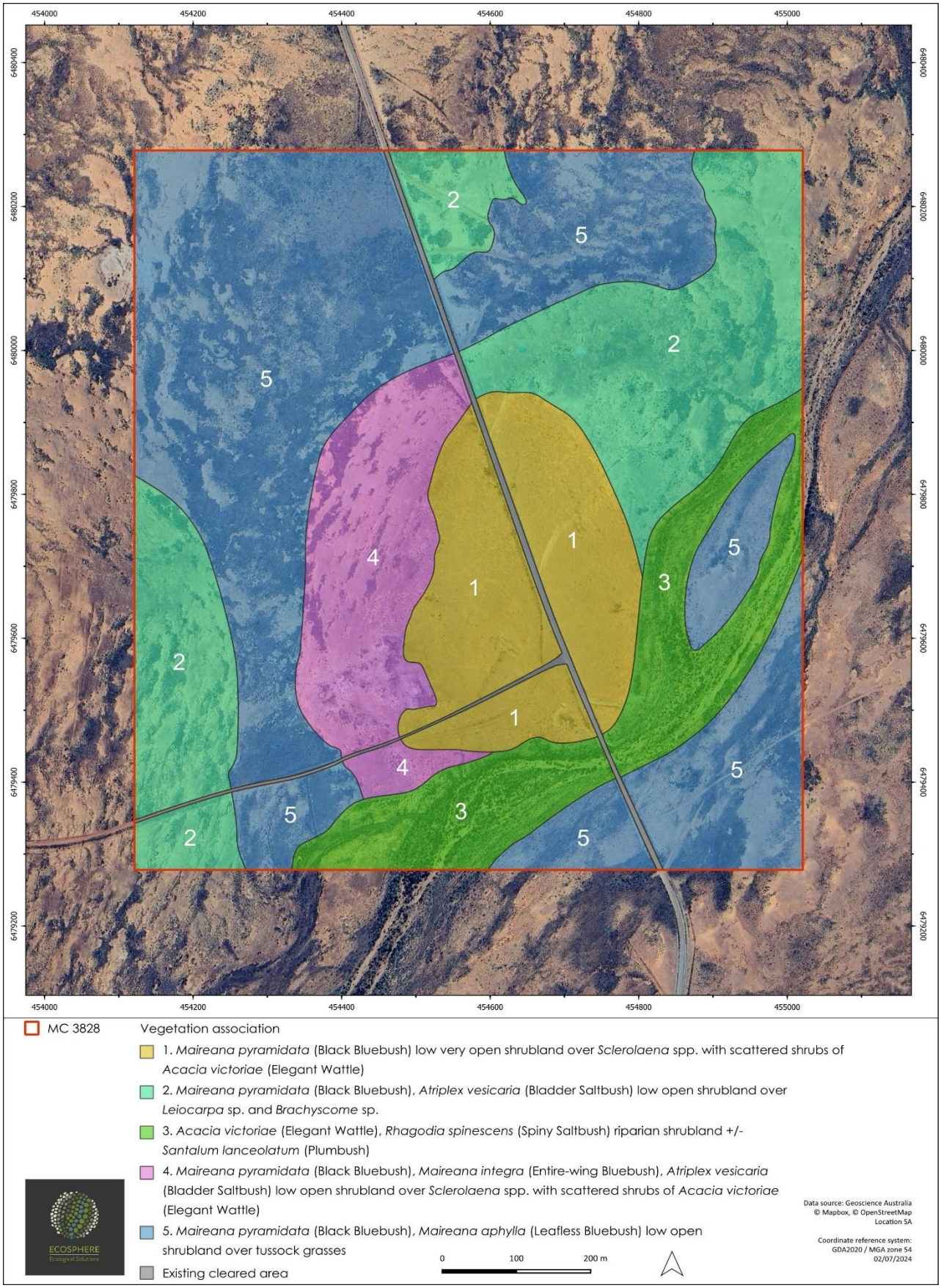


Figure 5. Vegetation mapping for the entirety of MC3828

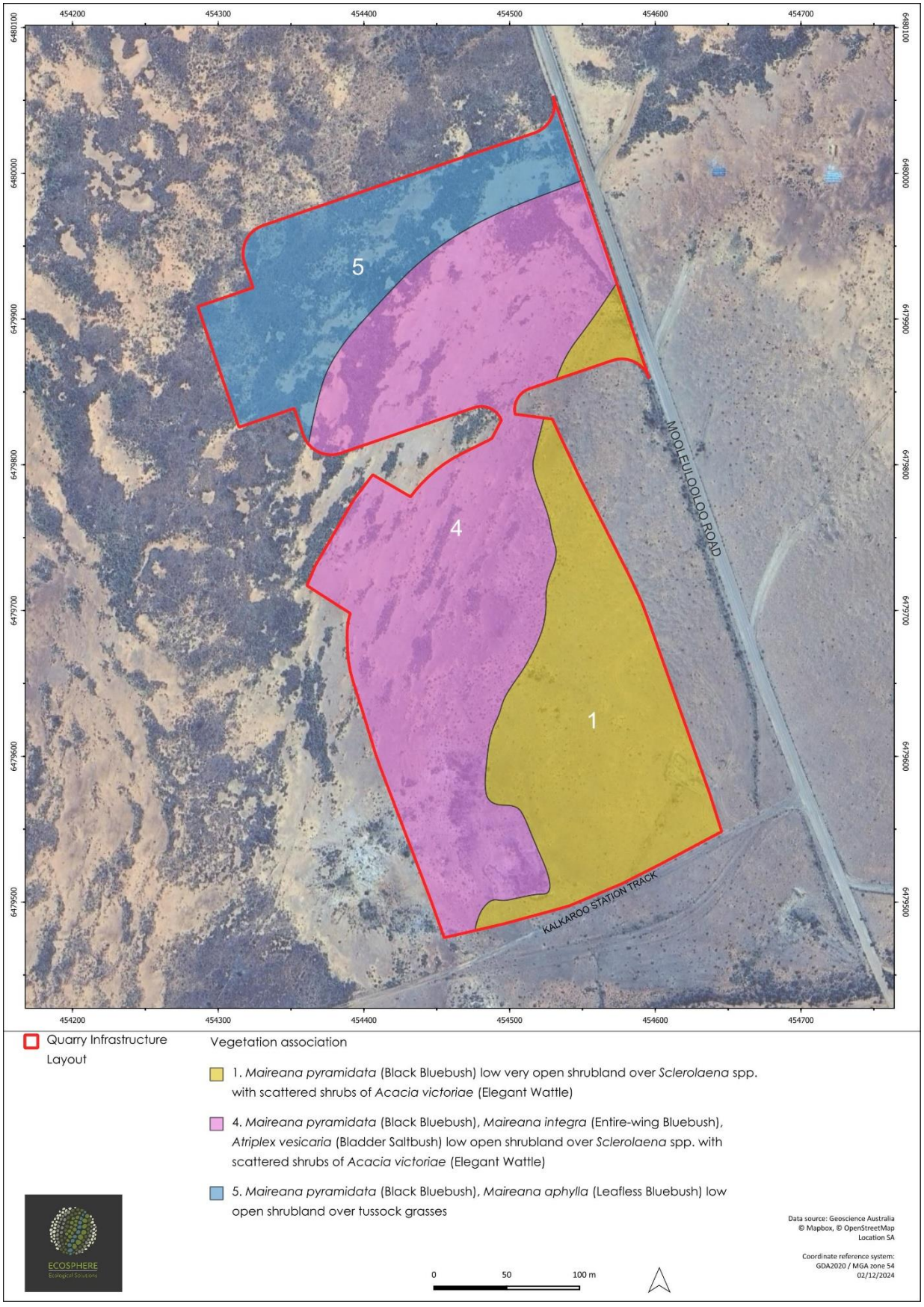


Figure 6. Vegetation mapping for the quarry project layout within MC3828.

Vegetation Association 1	***Maireana pyramidata* (Black Bluebush) low very open shrubland over *Sclerolaena* spp. with scattered shrubs of *Acacia victoriae* (Elegant Wattle).**

General description	Low very open shrubland of *Maireana pyramidata* (Black Bluebush) over smaller forbs of *Sclerolaena obliquicuspis* (Oblique-spined Bindyi), *Sclerolaena ventricosa* (Salt Bindyi), and *Sclerolaena intricata* (Tangled Bindyi). Young, sub-adult and adult plants of *Maireana pyramidata* (Black Bluebush) were present, along with scattered adult shrubs of *Acacia victoriae* (Elegant Wattle) and *Ptilotus obovatus* (Silver Mulla Mulla). Short-lived annual / perennial tussock grasses occur within the site (e.g., *Enneapogon* sp. (Bottle-washers / Nineawn)). Vegetation association 1 occurs on the summit of a low hill within the Block, consisting of a stony surface and a thin layer of sandy-clayey soil. Minor physical disturbance from vehicle tracks are present within the site. Plants were observed to be intact with no obvious evidence of grazing impacts.
Threatened species or community	The vegetation association potentially provides habitat for the following threatened fauna: • Australian Bustard (*Ardeotis australis* - NPW: V) • Letter-winged Kite (*Elanus scriptus* - NPW: V) • Plains-wanderer (*Pedionomus torquatus* - EPBC: CR, NPW: E) • Flock Bronzewing (*Phaps histrionica* - NPW: R)

Landscape context score	1.17	Vegetation Condition Score	46.50	Conservation significance score	1.10
Unit biodiversity Score	59.85	Area (ha)	11.96	Total biodiversity Score	716.24

Vegetation Association 2	***Maireana pyramidata* (Black Bluebush), *Atriplex vesicaria* (Bladder Saltbush) low open shrubland over *Leiocarpa* sp. and *Brachyscome* sp.**

General description	Low open shrubland of *Maireana pyramidata* (Black Bluebush) and *Atriplex vesicaria* (Bladder Saltbush) over smaller forbs of *Leiocarpa* sp. (Plover-daisy) and *Brachyscome* sp. (Native Daisy). Other forbs present included *Atriplex angulata* (Fan Saltbush), *Atriplex lindleyi* ssp. *inflata* (Corky Saltbush), *Dissocarpus paradoxus* (Ball Bindyi), *Sclerolaena obliquicuspis* (Oblique-spined Bindyi), *Sclerolaena ventricosa* (Salt Bindyi), and *Sclerolaena intricata* (Tangled Bindyi). Young, sub-adult and adult plants of *Atriplex vesicaria* (Bladder Saltbush) were present, along with scattered young, sub-adult and adult shrubs of *Acacia victoriae* (Elegant Wattle). Short-lived annual / perennial tussock grasses occur within the site (e.g., *Enneapogon* sp. (Bottle-washers / Nineawn) and *Panicum decompositum* var. *decompositum* (Native Millet)). Vegetation association 2 occurs on a mostly level plain within the Block, consisting of a stony surface with a layer of sandy-clayey soil. Vegetation within the site is interrupted by relatively large (> 5 x 5 m) occurrences of stony, gibber fields lacking in vegetation. However, these bare areas are likely to host ephemeral pockets of vegetation following suitable levels of rain. Plants were observed to be intact with no obvious evidence of grazing impacts.
Threatened species or community	The vegetation association potentially provides habitat for the following threatened fauna: • Southern Whiteface (*Aphelocephala leucopsis leucopsis* - EPBC: VU) • Australian Bustard (*Ardeotis australis* - NPW: V) • Woma (*Aspidites ramsayi* - NPW: R) • Letter-winged Kite (*Elanus scriptus* - NPW: V) • Elegant Parrot (*Neophema elegans elegans* - NPW: R) • Plains-wanderer (*Pedionomus torquatus* - EPBC: CR, NPW: E) • Flock Bronzewing (*Phaps histrionica* - NPW: R)

Landscape context score	1.17	Vegetation Condition Score	51.67	Conservation significance score	1.10
Unit biodiversity Score	66.50	Area (ha)	20.06	Total biodiversity Score	1334.26

Vegetation Association 3	***Acacia victoriae* (Elegant Wattle), *Rhagodia spinescens* (Spiny Saltbush) riparian shrubland +/- *Santalum lanceolatum* (Plumbush).**

General description	Low very open shrubland of *Maireana pyramidata* (Black Bluebush) over smaller forbs of *Sclerolaena obliquicuspis* (Oblique-spined Bindyi), *Sclerolaena ventricosa* (Salt Bindyi) and *Sclerolaena intricata* (Tangled Bindyi). Young, sub-adult and adult plants of *Maireana pyramidata* (Black Bluebush) were present, along with scattered adult shrubs of *Acacia victoriae* (Elegant Wattle) and *Ptilotus obovatus* (Silver Mulla Mulla). Short lived annual/perennial tussock grasses occur within the site (e.g., *Enneapogon* sp. (Bottle-washers/Nineawn)). Vegetation association 3 occurs on the summit of a low hill within the Project area consisting of a stony surface and a thin layer of sandy-clayey soil. Minor physical disturbances from vehicle tracks are present within the site. Plants were observed to be intact with no obvious evidence of grazing impacts.
Threatened species or community	The vegetation association potentially provides habitat for the following threatened fauna: • Southern Whiteface (*Aphelocephala leucopsis leucopsis* - EPBC: VU) • Letter-winged Kite (*Elanus scriptus* - NPW: V) • Elegant Parrot (*Neophema elegans elegans* - NPW: R) • Flock Bronzewing (*Phaps histrionica* - NPW: R) The State threatened flora species *Orobanche cernua* var. *australiana* (Australian Boomrape – NPW: R) was considered likely to occur within Vegetation Association 3.

Landscape context score	1.17	Vegetation Condition Score	53.43	Conservation significance score	1.12
Unit biodiversity Score	70.01	Area (ha)	10.09	Total biodiversity Score	706.54

Vegetation Association 4	***Maireana pyramidata* (Black Bluebush), *Maireana integra* (Entire-wing Bluebush), *Atriplex vesicaria* (Bladder Saltbush) low open shrubland over *Sclerolaena* spp. with scattered shrubs of *Acacia victoriae* (Elegant Wattle).**

General description	Low open shrubland consisting of adult plants of *Maireana pyramidata* (Black Bluebush), *Maireana integra* (Entire-wing Bluebush), and *Atriplex vesicaria* (Bladder Saltbush) over smaller forbs of *Sclerolaena obliquicuspis* (Oblique-spined Bindyi), *Sclerolaena ventricosa* (Salt Bindyi), and *Sclerolaena intricata* (Tangled Bindyi). Scattered adult shrubs of *Acacia victoriae* (Elegant Wattle) also occur. Short-lived annual / perennial tussock grasses occur within the site (e.g., *Enneapogon* sp. (Bottle-washers / Nineawn)). Vegetation association 4 occurs on the slope of a low hill within the Block, consisting of a stony surface and a layer of sandy-clayey soil. Minor physical disturbances from vehicle tracks and past use associated with mining activities are present within the site. Plants were observed to be intact with no obvious evidence of grazing impacts.
Threatened species or community	The vegetation association potentially provides habitat for the following threatened fauna: • Southern Whiteface (*Aphelocephala leucopsis leucopsis* - EPBC: VU) • Australian Bustard (*Ardeotis australis* - NPW: V) • Woma (*Aspidites ramsayi* - NPW: R) • Letter-winged Kite (*Elanus scriptus* - NPW: V) • Elegant Parrot (*Neophema elegans elegans* - NPW: R) • Plains-wanderer (*Pedionomus torquatus* - EPBC: CR, NPW: E) • Flock Bronzewing (*Phaps histrionica* - NPW: R)

Landscape context score	1.17	Vegetation Condition Score	44.20	Conservation significance score	1.10
Unit biodiversity Score	56.89	Area (ha)	8.93	Total biodiversity Score	508.20

Vegetation Association 5	***Maireana pyramidata* (Black Bluebush), *Maireana aphylla* (Leafless Bluebush) low open shrubland over tussock grasses.**

General description	Low open shrubland of *Maireana pyramidata* (Black Bluebush) and *Maireana aphylla* (Leafless Bluebush) over short-lived annual / perennial tussock grasses (e.g., *Austrostipa* sp. (Spear-grass), *Enneapogon* sp. (Bottle-washers / Nineawn), and *Panicum decompositum* var. *decompositum* (Native Millet)). Forbs present included *Atriplex angulata* (Fan Saltbush), *Atriplex lindleyi* ssp. *inflata* (Corky Saltbush), *Dissocarpus paradoxus* (Ball Bindyi), *Sclerolaena obliquicuspis* (Oblique-spined Bindyi), *Sclerolaena ventricosa* (Salt Bindyi), *Sclerolaena intricata* (Tangled Bindyi), and *Salsola australis* (Buckbush). Vegetation association 1 occurs on a mostly level plain within the Project area, consisting of a stony surface and a relatively thicker layer of sandy-clayey soil. In particular, the soils within this vegetation association appear to have a greater capacity for water retention.
Threatened species or community	The vegetation association potentially provides habitat for the following threatened fauna: • Southern Whiteface (*Aphelocephala leucopsis leucopsis* - EPBC: VU) • Australian Bustard (*Ardeotis australis* - NPW: V) • Woma (*Aspidites ramsayi* - NPW: R) • Letter-winged Kite (*Elanus scriptus* - NPW: V) • Elegant Parrot (*Neophema elegans elegans* - NPW: R) • Plains-wanderer (*Pedionomus torquatus* - EPBC: CR, NPW: E) • Flock Bronzewing (*Phaps histrionica* - NPW: R)

Landscape context score	1.17	Vegetation Condition Score	54.00	Conservation significance score	1.10
Unit biodiversity Score	69.50	Area (ha)	1.99	Total biodiversity Score	138.30

4.3 Fauna Species Observations

Nine fauna species were recorded within and surrounding the Project area during the survey and are presented in Table 6. No EPBC or State rated fauna species were observed; however, the vegetation community homogeneity means that many species are likely to move through the wider area in response to habitat resource availability. The species seen during the survey are not representative of the total species richness for the area and at the times of year when there are better conditions, threatened species such as the Southern Whiteface (*Aphelocephala leucopsis leucopsis)*, Australian Bustard (*Ardeotis australis*) and Elegant Parrot (*Neophema elegans elegans)* would be more likely to be observed within the Project area.

Threatened species that are possibly or likely to be using the Project area are discussed further below in Section 4.4.5.

Table 6. Fauna species observations

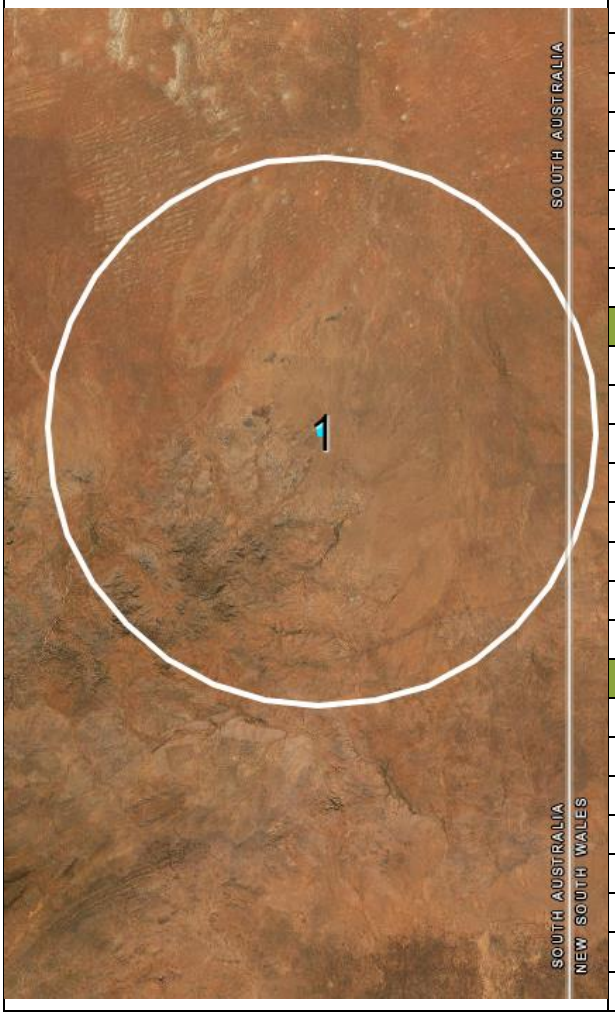
Species Name	**Common Name**
Acanthagenys rufogularis	Spiny-cheeked Honeyeater
Anthus australis	Australian Pipit
Elanus axillaris	Black-shouldered Kite
Falco cenchroides	Australian Kestrel
Gavicalis virescens sonorus	Singing Honey-eater
Macropus (Osphranter) rufus	Red Kangaroo
Malurus leucopterus	White-winged Fairy-wren
Psophodes cristatus	Chirruping Wedgebill
Taeniopygia guttata castanotis	Zebra Finch

4.4 Threatened Species Assessment

4.4.1 EPBC PMST Report Summary

A total of 23 listed threatened species and 8 migratory species were identified by the EPBC Act PMST report as potentially occurring or having suitable habitat potentially occurring within 50 km of the Project area (DCCEEW 2024a) (see Section 8.1 for full PMST report results). The ecological MNES protected under the EPBC Act relevant to this report are discussed in detail below.

Table 7. PMST report summary

Search area (50 km buffer)	Matters of National Environmental Significance	Identified in search area
	World Heritage Properties	0
	National Heritage Places	0
	Wetlands of International Importance (RAMSAR)	0
	Great Barrier Reef Marine Park	0
	Commonwealth Marine Area	0
	Listed Threatened Ecological Communities	0
	Listed Threatened Species	23
	Listed Migratory Species	8
	Other Matters Protected by the EPBC	
	Commonwealth Lands	8
	Commonwealth Heritage Places	0
	Listed Marine Species	13
	Whales and Other Cetaceans	0
	Critical Habitats	0
	Commonwealth Reserves Terrestrial	0
	Australian Marine Parks	0
	Habitat Critical to the Survival of Marine Turtles	0
	Extra Information	
	State and Territory Reserves	3
	Regional Forest Agreements	0
	Nationally Important Wetlands	0
	EPBC Act Referrals	2
	Key Ecological Features	0
	Biologically Important Areas	0
	Bioregional Assessments	0
	Geological and Bioregional Assessments	0

4.4.2 Threatened Ecological Communities

No Threatened Ecological Communities (TECs) were identified in the PMST report as potentially occurring within 50 km of the Project area.

4.4.3 Nationally Threatened Flora

Six flora species listed as threatened under the EPBC Act were identified in the PMST report as potentially occurring or having suitable habitat within 50 km of the Project area (Table 8 and Figure 7). Two species listed

as threatened under the EPBC Act had historical records identified via the BDBSA search within 50 km of the Project area and were considered to possibly occur within the Project area:

- ***Acacia carneorum*** **(Needle Wattle - EPBC: VU, NPW: V)** was considered possible to occur within the Project area. This species was added to the threated flora list under the EPBC Act on 16th July 2000 due to continued population decline (DCCEEW 2024b). *Acacia carneorum* is known from the far south-east of Central Australia with a scattered distribution from south-west of Lake Frome in South Australia to western New South Wales. It is a straggly, spreading, prickly shrub or small tree to 5 m high and several metres in diameter and grows on sand ridges or sandy flats or in alluvium along watercourses. Key threats are a lack of regeneration due to overgrazing from kangaroos, goats (*Capra hircus)* and rabbits (*Oryctolagus cuniculus*), destabilisation of stands by rabbits, and low seed viability. A distinctive woody perennial this species was not observed during the field survey however is known from sandy rises that occur across the level plain areas in proximity to the site. A highly conspicuous species, all population locations in the area are well known and do not interact with the Project area.

- ***Codonocarpus pyramidalis*** **(Slender Bell-fruit - EPBC: VU, NPW: E)** was considered to possibly occur within the Project area. This species was added to the threatened flora list under the EPBC Act on 16th July 2000 due to continued population decline (DCCEEW 2024c). *Codonocarpus pyramidalis* occurs in the Northern Lofty Ranges, Flinders Ranges and eastern regions of South Australia. It is a shrub or small tree up to 8 m tall. Populations occur as scattered individuals or in small, localised stands, and grow on the crests and slopes of low ridges, hills and along creeks in loamy sand or sandy clay loam. In particular, the species is short-lived and is more common after fire. The key threat to this species is seedling grazing by rabbits and goats. A distinctive woody perennial this species was not observed during the field survey.

4.4.4 State Threatened Flora

Seven flora species of State conservation significance, as listed under the NPW Act, but not of national significance were identified in the BDBSA search as being previously recorded within 50 km of the Project area (Table 8 and Figure 7). Of these, four species were considered to possibly occur within the Project area:

- *Malacocera gracilis* (Slender Soft-horns - NPW: V)
- *Rytidosperma laeve* (Smooth Wallaby Grass - NPW: R)
- *Senecio gawlerensis* (Gawler Ranges Groundsel - NPW: R)
- *Swainsona fuscoviridis* (Dark Green Swainson-pea - NPW: R)

Two additional species with denatured records within 50 km of the Project area were also considered to possibly occur within the Project area (Table 8):

- *Dianella porracea* (Pale Flax-lily - NPW: V)
- *Swainsona procumbens* (Broughton Pea - NPW: V)

One species was considered unlikely to occur within the Project area, however likely to occur in close proximity to the Project area within the creek line:

- *Orobanche cernua* var. *australiana* (Australian Boomrape - NPW: R)

None of these species were observed during the field survey, although the herbaceous species *Malacocera gracilis* (Slender Soft-horns), *Orobanche cernua* var. *australiana* (Australian Broomrape), *Rytidosperma laeve* (Smooth Wallaby Grass), *Swainsona fuscoviridis* (Dark Green Swainson-pea), and *Swainsona procumbens* (Broughton Pea) may not have been visible at the time of the field survey.

Table 8. EPBC and State listed threatened flora species potentially occurring in the Project area identified in the PMST (Source 1) and BDBSA (Source 2) database searches.

Scientific Name	Common Name	EPBC Act	NP&W Act	Data Source	Date of last record	Species known habitat preferences	Likelihood of occurrence
Acacia carneorum	Needle Wattle	VU	V	1,2	1/03/2023	Mulga communities, *Callitris glaucophylla* woodland, *Eucalyptus socialis* woodland, grassland and chenopod low shrubland.	Possible
Codonocarpus pyramidalis	Slender Bell-fruit	VU	E	1,2	26/02/2019	Preference for shaley hill slopes and crests, associated with shrublands of *Senna, Eremophila* or *Dodonaea*. Short-lived, common after fire.	Possible
Dianella porracea	Pale Flax-lily		V	2	22/10/2008	Two disjunction populations occur in South Australia. One west of Broken Hill and one around the upper reaches of the Murray River. Grows on sandy soils near water. Denatured record occurred within 50 km (not mapped).	Possible
Frankenia plicata	Sea Heath	EN	V	1	None	Lower slopes of hills and small run-off channels. This species is known from well drained soils and a wide variety of landforms.	Unlikely
Lepidium pseudotasmanicum	Shade Peppercress		V	2	29/03/1997	Bare ground in grassland and grassy woodland.	Unlikely
Malacocera gracilis	Slender Soft-horns		V	2	2/09/1996	Saline clay soils, gypseous mounds, low-lying calcareous soils.	Possible
Orobanche cernua var. australiana	Australian Broomrape		R	2	17/10/2010	Dry sandy creek beds, sand cliffs and sand dunes. Parasitic on *Senecio* spp. Likely occurring within the ephemeral creek line of the Project area.	Likely
Podolepis muelleri	Button Podolepis		V	2	18/07/1995	Grows on coastal cliffs and on stony sites of woodlands and grasslands further inland. Mainly found in the Flinders Ranges and the Mount Lofty Ranges. Denatured record occurred within 50 km (not mapped).	Unlikely
Pterostylis xerophila	Desert Greenhood	VU		1	None	Dry woodland on fertile loamy soils on and around rocky outcrops.	Unlikely
Rytidosperma laeve	Smooth Wallaby-grass		R	2	8/09/2007	Open woodland and grassland, stony soils.	Possible
Senecio gawlerensis	Gawler Ranges Groundsel		R	2	27/08/2008	Rocky outcrops, usually towards the summit of hills, occasionally on lower slopes among rocks or near watercourses.	Possible
Swainsona fuscoviridis	Dark Green Swainson-pea		R	2	15/09/2010	Arid tussock grasslands. Known only from north of Adelaide and West of Broken Hill.	Possible
Swainsona murrayana	Slender Darling-pea, Slender Swainson	VU	V	1,2	13/09/2010	*Eucalyptus largiflorens* woodland and grassland communities, frequently associated with *Maireana* species. Denatured record occurred within 50 km (not mapped).	Unlikely
Swainsona procumbens	Broughton Pea		V	2	26/08/2008	Grows in heavy soil prone to waterlogging. Denatured record occurred within 50 km (not mapped).	Possible

Scientific Name	Common Name	EPBC Act	NP&W Act	Data Source	Date of last record	Species known habitat preferences	Likelihood of occurrence
Xerothamnella parvifolia	Small-Leaved Little Dry Shrub	VU		1	None	Stony ridges and lower slopes of rocky escarpments, often associated with Gidgee.	Unlikely

EPBC Act: EN = Endangered, VU = Vulnerable. NP&W Act: E = Endangered, V = Vulnerable, R = Rare.

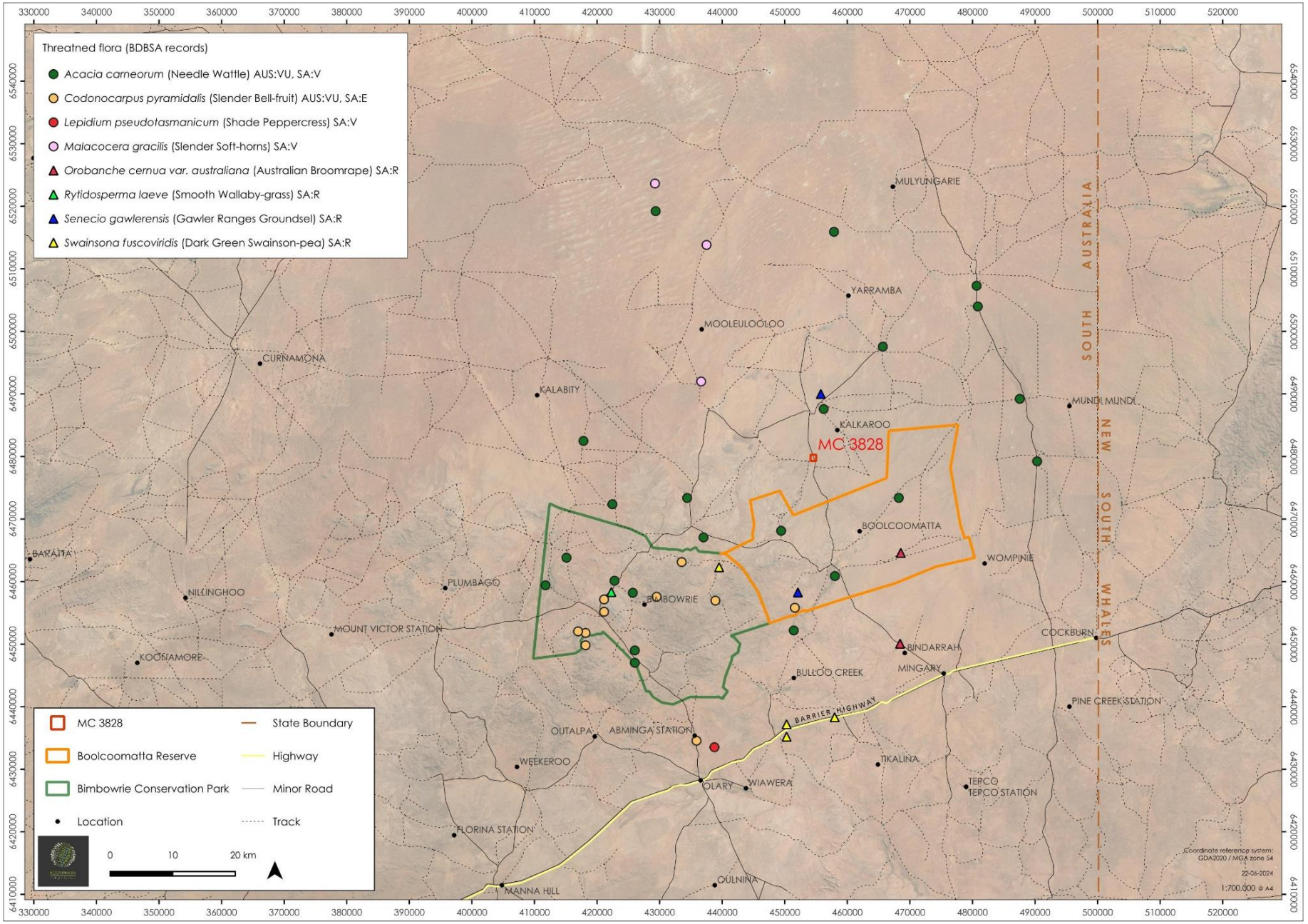


Figure 7. Historical records for National and State conservation significant flora species within 50 km of the Project area since 1995.

4.4.5 Nationally Threatened Fauna

A total of 17 fauna species listed as threatened under the EPBC Act were identified in the PMST report as having suitable habitat potentially occurring within 50 km of the Project area (Table 9). This included 12 bird species, four mammals and one fish. Of these, seven species had historical records within a 50 km radius of the Project area (Figure 8), and two species were considered to possibly use habitat within the Project area:

- **Southern Whiteface (*Aphelocephala leucopsis leucopsis*, EPBC: VU)** were considered to possibly occur within the Project area. This species was added to the threated fauna list under the EPBC Act on 31st March 2023 due to continued population decline (DCCEEW 2024d). The species occurs across most of mainland Australia south of the tropics in a wide range of open woodlands and shrublands where there is an understorey of grasses or shrubs, or both. The species prefers habitat with low tree densities and herbaceous understory litter cover which provides essential foraging habitat.

  The most recent record for this subspecies within 50 km of the Project area is from 2012. Although the subspecies may periodically move through the wider area, habitat within the Project area is not deemed critical for the species given the lack of trees with hollows/crevices required for breeding and roosting and the lack of *Acacia/Eucalypt* dominated woodland/shrubland (preferred habitat). Key threats for the species are broad landscape based and relate to pastoralism, loss of shrubs and grasses and predation. Southern Whiteface was not observed during the field survey. Vegetation clearance within the Project area is highly unlikely to negatively impact any important population(s) of the species as per the Significant impact criteria for a Vulnerable species listed in the Significant Impact Guidelines 1.1 Matters of National Environmental Significance (2013) (SIG 1.1).

- **Plains-wanderer (*Pedionomus torquatus,* EPBC: CR, NPW: E)** were considered to possibly occur within the Project area. This species was transferred from Vulnerable to Critically Endangered under the EPBC Act on 8th July 2015 (DCCEEW 2024e). Plains-wanderers occur across north-central Victoria, southern New South Wales around the Riverina regions, eastern South Australia and west-central Queensland. The species is thought to typically inhabit sparse, treeless grasslands of approximately 50 % bare ground with most vegetation less than 5 cm in height and some widely spaced plants up to 30 cm high. The main threat to the Plains-wanderer is the conversion of native grasslands to crops and dense pastures, which even if left to recover, remain unsuitable as habitat for decades (Garnett et al. 2011). Other factors include overgrazing reducing the grass to less than 2-3 cm in height and making the species more vulnerable to both introduced (Foxes and Cats) and native predators (Spotted Harrier and Black Falcon), inappropriate fire regimes, and pesticide use.

  One record for the Plains-wanderer from 2006 was located 3.5 km south of the Project area, and there are several records from within Boolcoomatta Reserve (approximately 16 km south of Kalkaroo). While it is possible that the species could utilise habitat within the Project area, more suitable habitat occurs outside of the Project area (Bellchambers and Baker-Gabb 2006; Pers. Obs.). Plains-wanderer was not observed during the field survey. Nevertheless, this does not mean that the Project area may not become more suitable habitat in the future, particularly given the dynamic nature of vegetation structure in arid environments. A recent study also provides evidence that Plains-wanderer utilise a broader range of vegetation densities than previously thought (Nugent et al. 2022). While it is here considered that vegetation clearance within the Project area is unlikely to significantly negatively impact any population(s) of the species as per the Significant impact criteria for a Critically endangered species listed in the Significant Impact Guidelines 1.1 Matters of National Environmental Significance (2013) (SIG 1.1); a significant impact assessment and possible referral may be required.

4.4.6 State Threatened Fauna

A total of 11 fauna species of State conservation significance but not national significance had historical records from the NatureMaps BDBSA search within 50 km of the Project area (Table 9 and Figure 8). Of these, four were considered to possibly utilise habitat within the Project area:

- Australian Bustard (*Ardeotis australis* - NPW: V)
- Elegant Parrot (*Neophema elegans elegans* - NPW: R)
- Flock Bronzewing (*Phaps histrionica* - NPW: R)
- Woma (*Aspidites ramsayi* - NPW: R)

An additional species of State conservation significance with denatured records within 50 km of the Project area was considered to possibly occur within the Project area (Table 9):

- *Elanus scriptus* (Letter-winged Kite - NPW: V)

None of these species were observed during the field survey.

4.4.7 Migratory Species

Eight listed migratory species were identified in the PMST report as having suitable habitat potentially occurring within 50 km of the Project area. Most of these species are unlikely to utilise the Project area other than as a brief flyover considering the lack of suitable habitat and existing land use. Migratory species are largely associated with waterbodies necessary for feeding and or refuge areas which are not present within the Project area.

4.4.8 Marine Species

Thirteen marine species listed under the EPBC Act were identified in the PMST report as potentially occurring or having suitable habitat potentially occurring within 50 km of the Project Area. These were not considered as part of the desktop assessment with the Project area being entirely terrestrial in nature.

Table 9. EPBC and State listed threatened fauna and migratory species identified in the PMST (Source 1) and BDBSA (Source 2) database searches.

Scientific Name	Common Name	EPBC Act	NP&W Act	Data Source	Date of last record	Species known habitat preferences	Likelihood of occurrence
AVES							
Actitis hypoleucos	Common Sandpiper	Mi	R	1	None	Migratory shorebird. Occurs in a variety of coastal and inland wetland habitats with varying levels of salinity.	Unlikely
Amytornis modestus	Thick-billed Grasswren	VU		1,2	14/04/2008	Chenopod shrublands, especially those dominated by saltbush and bluebush, may favour areas along drainage lines where vegetation is taller and thicker.	Unlikely
Aphelocephala leucopsis leucopsis	Southern Whiteface	VU		1,2	06/11/2012	Occurs across most of mainland Australia south of the tropics in a wide range of open woodlands and shrublands where there is an understorey of grasses or shrubs, or both. Prefers habitat with low tree densities and herbaceous understory litter cover which provides essential foraging habitat.	Possible
Apus pacificus	Fork-tailed Swift	Mi		1	None	Aerial migratory species. Rarely recorded on the ground.	Unlikely
Ardeotis australis	Australian Bustard		V	2	27/06/2018	Dry plains, grasslands, and open woodlands. Favour tussock and hummock grasslands.	Possible
Calidris acuminata	Sharp-tailed Sandpiper	VU, Mi		1	None	Migratory wetland species. Does not breed in Australia. Inhabits Intertidal mudflats, freshwater swamps, and saltwater lakes.	Unlikely
Calidris ferruginea	Curlew Sandpiper	CR, Mi	E	1	None	Migratory wetland species. Does not breed in Australia. Prefers coastal or inland mudflats but will also visit artificial dams and inland water habitats, freshwater and brackish wetlands.	Unlikely
Calidris melanotos	Pectoral Sandpiper	Mi	R	1	None	Migratory wetland species. Inhabits freshwater or brackish wetlands, grassy or lightly vegetated coastal and inland swamps.	Unlikely
Elanus scriptus	Letter-winged Kite		V	2	04/03/2011	Predominantly nocturnal species, inhabiting open/sparsely wooded areas. Denatured record occurred within 50 km (not mapped).	Possible
Emblema pictum	Painted Finch		R	2	01/03/2011	Arid and semi-arid, in rocky areas or sandplains with a ground cover of spinifex grass with water available.	Unlikely

Scientific Name	Common Name	EPBC Act	NP&W Act	Data Source	Date of last record	Species known habitat preferences	Likelihood of occurrence
Falco hypoleucos	Grey Falcon	VU	R	1,2	15/10/2019	Inhabits shrubland, grassland and wooded watercourses in arid/semi-arid regions of inland areas. Widespread, but sparse distribution across Australia. Denatured record occurred within 50 km (not mapped).	Unlikely
Falco peregrinus macropus	Peregrine Falcon		R	2	19/10/2010	Requires abundant prey and secure nest sites situated in coastal and inland cliffs and open woodlands, particularly near water. Denatured record occurred within 50 km (not mapped).	Unlikely
Falco subniger	Black Falcon		R	2	09/12/2011	Usually found near watercourses or utilizing patches of isolated trees. Hunts over open wooded grassland and other low vegetation.	Unlikely
Gallinago hardwickii	Latham's Snipe	VU, Mi	R	1	None	Migratory wetland species. Inhabits tussock grass and low dense sedges surrounding freshwater, permanent and ephemeral wetlands. Can also occur in habitats with saline or brackish water.	Unlikely
Grantiella picta	Painted Honeyeater	VU	R	1	None	Associated with mistletoe in woodlands which contain a high number of mature trees.	Unlikely
Hieraaetus morphnoides	Little Eagle		V	2	23/09/2006	Open eucalypt forest, woodland or open woodland.	Unlikely
Lophochroa leadbeateri leadbeateri	Pink Cockatoo (eastern)	EN		1	None	Arid and semi-arid areas in open woodland, timbered grasslands and Mulga, mallee, *Callitris* and *Casuarina* woodlands.	Unlikely
Motacilla cinerea	Grey Wagtail	Mi		1	None	Uncommon terrestrial migratory species. Prefers fast-flowing streams and rivers often in forested areas, in addition to lowland watercourses.	Unlikely
Motacilla flava	Yellow Wagtail	Mi		1	None	Uncommon terrestrial migratory species. Inhabits a variety of damp or wet habitats including marshes and bogs. Forages in damp grassland or on bare ground at the edge of rivers, lakes and other wetlands.	Unlikely
Myiagra inquieta	Restless Flycatcher		R	2	12/05/2006	Open forests and woodlands and frequently seen in farmland.	Unlikely

Scientific Name	Common Name	EPBC Act	NP&W Act	Data Source	Date of last record	Species known habitat preferences	Likelihood of occurrence
Neophema chrysostoma	Blue-winged Parrot	VU	V	1	None	Inhabits a range of habitats from coastal, sub-coastal and inland areas, through to semi-arid zones. Favours grasslands and grassy woodlands and are often found near wetlands both near the coast and in semi-arid zones. Also occurs in altered environments such as airfields, golf-courses and paddocks. Will forage on saltmarsh.	Unlikely
Neophema elegans elegans	Elegant Parrot		R	2	05/02/2021	Coastal dunes wooded or shrubby grasslands, mallee and eucalypt woodland.	Possible
Oxyura australis	Blue-billed Duck		R	2	12/05/2006	Natural inland wetlands and artificial wetlands such as sewage ponds.	Unlikely
Pedionomus torquatus	Plains-wanderer	CR	E	1,2	09/05/2006	Inhabits semi-arid, native grasslands with a diversity of plant species, which usually occur on red-brown soils.	Possible
Petroica boodang boodang	Scarlet Robin		R	2	8/11/2012	Open woodlands and paddocks with scattered trees.	Unlikely
Phaps histrionica	Flock Bronzewing		R	2	1/12/2020	Highly nomadic, open woodland and treeless open grass plains with clumped grasses and small shrubs.	Possible
Rostratula australis	Australian Painted Snipe	EN	E	1	None	Shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and clay pans.	Unlikely
Stagonopleura guttata	Diamond Firetail	VU		1	None	Eucalypt, *Acacia* or *Casuarina* woodlands, open forests and other lightly timbered habitats including farmland and grassland. Prefer areas with relatively low tree density, little litter cover but high grass cover.	Unlikely
Mammalia							
Notomys fuscus	Dusky Hopping-mouse	VU	V	1,2	1/07/2017	Inhabits a variety of soft sandy habitats, preferring sand dunes, hills, and ridges with Cane Grass (*Zygochloa paradoxa*), Sandhill Wattle (*Acacia ligulata*), Nitre-bush (*Nitraria billardierei*), Sticky Hopbush (*Dodonaea viscosa*) and other annual and perennial shrubs.	Unlikely
Nyctophilus corbeni	Corben's Long-eared Bat	VU		1	None	Mallee, Buloke, Box eucalypt dominated communities.	Unlikely
Petrogale xanthopus xanthopus	Yellow-footed Rock-wallaby	VU		1,2	20/09/2021	Rocky outcrops, cliffs and ridges in semi-arid areas consisting of Mulga scrub as the dominant vegetation.	Unlikely

Scientific Name	Common Name	EPBC Act	NP&W Act	Data Source	Date of last record	Species known habitat preferences	Likelihood of occurrence
Pseudomys australis	Plains Mouse	VU		1	None	Inhabit a range of vegetation communities on large open gypseous cracking clay areas associated with minor drainage features, and depressions within gibber stony plains.	Unlikely
Reptilia							
Aspidites ramsayi	Woma		R	2	1/02/1997	Desert dune fields and on sandy plains, usually within hummock grasses.	Possible
Lucasium steindachneri	Map Gecko		R	2	20/03/2017	Arid and semi-arid areas in dry open woodlands and mallee country with heavy or stony soils.	Unlikely
Fish							
Galaxias rostratus	Flathead Galaxias	CR		1	None	Still or slow-moving freshwater wetlands or lowland streams.	Unlikely

EPBC Act: CR = Critically Endangered, EN = Endangered, VU = Vulnerable, Mi = Migratory. NP&W Act: E = Endangered, V = Vulnerable, R = Rare.

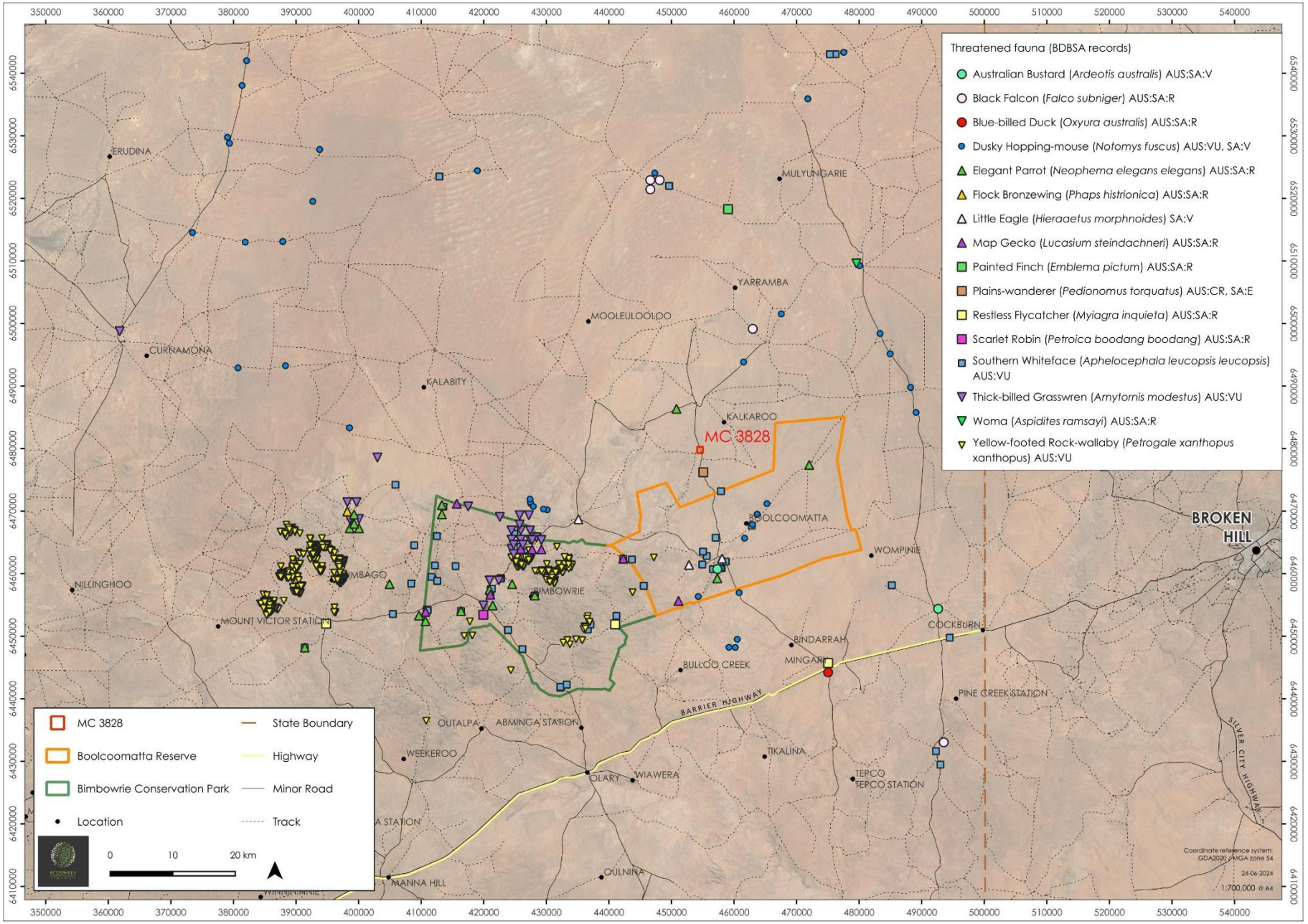


Figure 8. Historical records for National and State conservation significant fauna species within 50 km of the Project area since 1995.

4.5 Exotic species

4.5.1 Exotic Flora

Declared plants are weeds that are regulated under the *Landscape South Australia Act 2019* due to their threat to primary industry, the natural environment and public safety. Eight declared weed species had historical records from the NatureMaps BDBSA search within 50 km of the Project area. Four of these were also Weeds of National Significance (in bold):

- *Cenchrus ciliaris* (Buffel Grass)
- *Echium plantagineum* (Salvation Jane)
- ***Lycium ferocissimum*** **(African Boxthorn)**
- *Marrubium vulgare* (Horehound)
- ***Parkinsonia aculeata*** **(Jerusalem Thorn)**
- ***Solanum elaeagnifolium*** **(Silver-leaf Nightshade)**
- ***Tamarix aphylla*** **(Athel Pine)**
- *Xanthium spinosum* (Bathurst Burr)

The declared weeds *Echium plantagineum* (Salvation Jane) and *Xanthium strumarium* (Noogoora burr) were identified in the creek line within vegetation association 3. Control measures for Noogoora burr are currently implemented along the creek line.

4.5.2 Exotic Fauna

Exotic fauna species have been recorded as they are a listed threat to several MNES. Fourteen exotic fauna species had historical records from the NatureMaps BDBSA search within 50 km of the Project area. These were:

- European Cattle (*Bos taurus*)
- Dingo (*Canis lupus*)
- Goat (Feral Goat) (*Capra hircus*)
- European Goldfinch (*Carduelis carduelis britannica*)
- Feral Pigeon (*Columba livia*)
- Horse (Brumby) (*Equus caballus*)
- Feral Cat (*Felis catus*)
- House Mouse *(Mus musculus*)
- Rabbit (European Rabbit) (*Oryctolagus cuniculus*)
- Sheep (Feral Sheep) (*Ovis aries*)
- House Sparrow (*Passer domesticus domesticus*)
- Common Starling (*Sturnus vulgaris vulgaris*)
- Pig (Feral Pig) (*Sus scrofa*)
- Fox (Red Fox) (*Vulpes vulpes)*

Signs of European rabbits were identified within the Project area (one older warren, droppings and remains), and pigs have been seen in the wider area using muddy dam edges as wallows.

4.6 Cumulative Impact

There are no additional areas expected to be impacted as a part of this project. Access is available from the existing Mooleulooloo Road that runs through the Project area and other minor vehicle access tracks.

4.7 Address the Mitigation Hierarchy

When exercising a power or making a decision under Division 5 of the Native Vegetation Regulations 2017, the NVC must have regard to the mitigation hierarchy. The NVC will also consider, with the aim to minimize, impacts on biological diversity, soil, water and other natural resources, threatened species or ecological communities under the EPBC Act or listed species under the NP&W Act.

a) Avoidance – outline measures taken to avoid clearance of native vegetation

The avoidance of vegetation clearance is challenging in mining projects. The location of the quarry and associated infrastructure has been micro-sited to avoid higher value vegetation in the general area (e.g., the creek line) in preference of areas of lower diversity.

b) Minimization – if clearance cannot be avoided, outline measures taken to minimize the extent, duration and intensity of impacts of the clearance on biodiversity to the fullest possible extent (whether the impact is direct, indirect or cumulative).

Kalkaroo Copper Pty Ltd (Havilah Resources Ltd) will minimise clearance wherever possible. In order to manage indirect risks to vegetation from the project a series of mitigation measures will be employed. The minimisation and mitigation of risks to vegetation and the environment in general include the following:

- Management of storm water run-off from the site to prevent discharge of sediment laden water into the creek line by construction and maintenance of storm water cut-off bunds.
- Conserve topsoil for later site rehabilitation/regeneration.
- Dust suppression measures for operational and disturbed areas such as stockpiles utilising water trucks.
- Maintenance of roads to minimise the build-up of fine particles that are susceptible to wind erosion.
- Using speed limits on roads used by mine traffic.
- Erosion and sediment control in accordance with best practice guidelines.
- Weed and pest management.
- Offsite vehicle hygiene measures.

c) Rehabilitation or restoration – outline measures taken to rehabilitate ecosystems that have been degraded, and to restore ecosystems that have been degraded, or destroyed by the impact of clearance that cannot be avoided or further minimized, such as allowing for the re-establishment of the vegetation.

The vegetation has been allowed to naturally re-establish since 2009 when the property was destocked of sheep and/or cattle. The vegetation within the pastoral lease has improved despite high numbers of kangaroos which have also been managed through shooting for meat on lease.

The key environmental outcomes and associated benefits provided since the removal of sheep and/or cattle at Kalkaroo are:

- Increase in the soil cover with soil surface disturbance reductions creating a more stable landscape through exclusion of domestic stock.
- Reduction in loss of flora species and increased resource accumulation around shrubs etc. trapping seed resources through decreased herbivory and hoof erosion.
- Increased fauna species richness and abundance through retention of seed and food resources as well as increased cover values from lack of herbivory and trampling of the soil profile.
- Increase in understory litter cover, and resources accumulation under woodlands where sheep / cattle tend to congregate and rest.
- Increase in understorey of perennial shrub cover and diversity through reduced herbivory of higher palatability new growth.
- Increased seed production during growth periods with tips of shrubs and trees which produce flowers not being grazed off before maturation.

- Potential reduced new weed outbreaks from cattle / sheep new to the area from other regions.

Large areas of Kalkaroo Station will continue to benefit from the cessation of grazing activities.

Other environmental benefits have been provided through active management including:

1.) Feral Animal Control

Cats, foxes and pigs are controlled through targeted shooting and baiting programs. As an ongoing management practice Kalkaroo Copper Pty Ltd (Havilah Resources Ltd) are invested in region wide control programs participating in landscape management board control programs.

2.) Woody and Targeted Weed Management

Weed species such as *Lycium ferocissimum* (African Boxthorn) have been controlled in the area. Other weeds considered naturalised, or ephemeral are more difficult to control; however, programs reducing the influence of species such as *Xanthium spinosum* (Bathurst Burr) and *X. strumarium* (Noogoora Burr) and ensuring no establishment of species such as *Cenchrus ciliaris* (Buffel Grass) are ongoing.

These activities will be ongoing throughout the life of the mining project.

d) Offset – any adverse impact on native vegetation that cannot be avoided or further minimized should be offset by the achievement of a significant environmental benefit that outweighs that impact.

The NVC will only consider an offset once avoidance, minimization and restoration have been documented and fulfilled. The SEB Policy explains the biodiversity offsetting principles that must be met.

4.5 Principles of Clearance (Schedule 1, *Native Vegetation Act 1991*)

The Native Vegetation Council will consider Principles 1(b), 1(c) and 1(d) when assigning a level of Risk under Regulation 16 of the Native Vegetation Regulations. The Native Vegetation Council will consider all the Principles of clearance of the Act as relevant, when considering an application referred under the *Planning, Development and Infrastructure Act 2016*.

Table 10. Principles of clearance summary.

Principle of clearance	Considerations
Principle 1a - it comprises a high level of diversity of plant species	Relevant information • The vegetation present is not considered to be overly diverse for an arid environment and is probably reflective of a history of past overgrazing in the Kalkaroo area.
	Assessment against the principles • Not at Variance.
	Moderating factors that may be considered by the NVC N/A
Principle 1b - significance as a habitat for wildlife	Relevant information The Project area potentially provides habitat for the following threatened fauna species: • Southern Whiteface (*Aphelocephala leucopsis leucopsis* - EPBC: VU) • Australian Bustard (*Ardeotis australis* - NPW: V) • Woma (*Aspidites ramsayi* - NPW: R) • Letter-winged Kite (*Elanus scriptus* - NPW: V) • Elegant Parrot (*Neophema elegans elegans* - NPW: R) • Plains-wanderer (*Pedionomus torquatus* - EPBC: CR, NPW: E) • Flock Bronzewing (*Phaps histrionica* - NPW: R) Patches • Threatened Fauna Score - 0.1 for all associations

	Unit biodiversity Score • Association 1: 59.85 • Association 2: 66.50 • Association 3: 70.01 • Association 4: 56.89 • Association 5: 70.16
	Assessment against the principles Seriously at Variance • All three vegetation associations.
	Moderating factors that may be considered by the NVC • The vegetation does not provide habitat critical to the survival of any threatened species. • In arid regions, many species travel long distances to take advantage of resources following favorable rainfall. These resources can be exhausted quickly either due to being consumed, drying out or dying, driving animals to move on to the next location. Thus, many fauna species interact with their environment on a landscape scale, and although suitable habitat may be ephemerally available within the Project area, the small area of clearance relative to the scale of landscape use and intactness of native vegetation within the overall region means clearance is unlikely to significantly impact such animal species.
Principle 1c - plants of a rare, vulnerable or endangered species	Relevant information • No species of conservation significance were observed within the Project area during the field survey.
	Assessment against the principles • Not at Variance.
	Moderating factors that may be considered by the NVC • N/A
Principle 1d - the vegetation comprises the whole or part of a plant community that is Rare, Vulnerable or Endangered.	Relevant information • No conservation significant vegetation associations were present within the Project area.
	Assessment against the principles • Not at Variance.
	Moderating factors that may be considered by the NVC N/A
Principle 1e - it is significant as a remnant of vegetation in an area which has been extensively cleared.	Relevant information • The vegetation is not significant as a remnant with the subregion having 100 % remnancy. • Total Biodiversity score: 631.08
	Assessment against the principles • At Variance - Biodiversity score >500
	Moderating factors that may be considered by the NVC N/A
Principle 1f - it is growing in, or in association with, a	Relevant information • The vegetation in the Project area is not associated with a wetland environment.
	Assessment against the principles • Not at variance.

wetland environment.	Moderating factors that may be considered by the NVC N/A
Principle 1g - it contributes significantly to the amenity of the area in which it is growing or is situated.	Relevant information • The vegetation within the Project area is primarily a flat plain with large areas of bare / rocky ground. While all vegetation contributes to the amenity of the area the vegetation within the Project area is not theoretically of high amenity value, being very consistent with the surrounding area and very well represented within the region.
	N/A
	Moderating factors that may be considered by the NVC N/A

4.8 Risk Assessment

Determine the level of risk associated with the application

Total clearance	No. of trees	No scattered trees assessed.
	Area (ha)	10.5
	Total biodiversity Score	631.09
Seriously at variance with principle 1(b), 1(c) or 1 (d)		1(b)
Risk assessment outcome		Level 4

5 Clearance Summary

5.1 Clearance Areas Summary Table

Block	Site	Threatened Ecological community Score	Threatened plant score	Threatened fauna score	UBS	Area (ha)	Total Biodiversity score	Loss factor	Loadings	Reductions	SEB Points required	SEB payment	Admin Fee
1	1	1	0	0.1	59.85	2.92	174.76	1	-	-	183.50	$12,713.23	$699.23
1	4	1	0	0.1	56.89	5.59	318.02	1	-	-	333.92	$23,134.31	$1,272.39
1	5	1	0	0.1	69.50	1.99	138.31	1	-	-	145.322	$10,061.13	$553.36
					Total	**10.50**	**631.09**				**662.64**	**$45,908.67**	**$2,524.98**

5.2 Totals Summary Table

	Total Biodiversity score	Total SEB points required	SEB Payment	Admin Fee	Total Payment
Application	631.09	662.64	$45,908.67	$2,524.98	$48,433.64

Economies of Scale Factor	0.11
Rainfall (mm)	211

6 Significant Environmental Benefit

A Significant Environmental Benefit (SEB) is required for approval to clear under Division 5 of the *Native Vegetation Regulations 2017*. The NVC must be satisfied that as a result of the loss of vegetation from the clearance that an SEB will result in a positive impact on the environment that is over and above the negative impact of the clearance.

ACHIEVING AN SEB

Indicate how the SEB will be achieved by ticking the appropriate box and providing the associated information:

☐ Establish a new SEB Area on land owned by the proponent.

☐ Use SEB Credit that the proponent has established. Provide the SEB Credit Ref. No. _____

☐ Apply to have SEB Credit assigned from another person or body. The application form needs to be submitted with this Data Report.

☐ Apply to have an SEB to be delivered by a Third Party. The application form needs to be submitted with this Data Report.

☒ Pay into the Native Vegetation Fund.

PAYMENT SEB

If a proponent proposes to achieve the SEB by paying into the Native Vegetation Fund, summary information must be provided on the amount required to be paid and the manner of payment:

- The payment required to satisfy the SEB offset requirement is $45,908.66 with an additional admin fee of $2,524.98 totalling $48,433.64

7 References

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Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2024a) Protected Matters Search Tool. Accessed: 3rd June 2024. Available at: http://www.environment.gov.au/epbc/protected-matters-search-tool

Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2024b) Species Profile and Threats Database, *Acacia carneorum* (Needle Wattle).

Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2024c) Species Profile and Threats Database, *Codonocarpus pyramidalis* (Slender Bell-fruit, Camel Poison).

Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2024d) Species Profile and Threats Database, *Aphelocephala leucopsis* (Southern Whiteface).

Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2024e) Species Profile and Threats Database, *Pedionomus torquatus* (Plains-wanderer).

Garnett ST, Szabo JK, Dutson G. (2011) The Action Plan for Australian Birds 2010. CSIRO Publishing, Collingwood, Victoria.

NatureMaps (2024) EnviroData SA. Government of South Australia, Department of Environment and Water (DEW). Available at: http://spatialwebapps.environment.sa.gov.au/naturemaps/?locale=en-us&viewer=naturemaps

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Nugent DT, Baker-Gabb DJ, Green P, Ostendorf B, Dawlings F, Clarke RH, Morgan JW. (2022) Multi-scale habitat selection by a cryptic, critically endangered grassland bird - The Plains-wanderer (*Pedionomus torquatus*): Implications for habitat management and conservation. *Austral Ecology*, 47(3):698-712.

8 Appendices

8.1 PMST Report Results.

Department of Climate Change, Energy, the Environment and Water

Protected Matters Search Tool

Report Generated - 5:05PM - 03 June 2024

Matters of National Environment Significance	Count
World Heritage Properties	0
National Heritage Places	0
Wetlands of International Importance (Ramsar Wetlands)	0
Great Barrier Reef Marine Park	0
Commonwealth Marine Area	0
Listed Threatened Ecological Communities	0
Listed Threatened Species	23
Listed Migratory Species	8

Other Matters Protected by the EPBC Act	Count
Commonwealth Lands	8
Commonwealth Heritage Places	0
Listed Marine Species	13
Whales and Other Cetaceans	0
Critical Habitats	0
Commonwealth Reserves Terrestrial	0
Australian Marine Parks	0
Habitat Critical to the Survival of Marine Turtles	0

Extra Information	Count
State and Territory Reserves	3
Regional Forest Agreements	0
Nationally Important Wetlands	0
EPBC Act Referrals	2
Key Ecological Features	0
Biologically Important Areas	0
Bioregional Assessments	0
Geological and Bioregional Assessments	0

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected and is accurate at the time of generation.
Please see the caveat for interpretation of information provided here.
Consider carefully the age of information for decision making.

Report Metadata	Caveat

Listed Threatened Species [Resource Information]

Species ID	Scientific Name	Common Name	Class	Simple Presence	Presence Text	Threatened Category
906	*Pedionomus torquatus*	Plains-wanderer	Bird	Known	Species or species	Critically Endangered
856	*Calidris ferruginea*	Curlew Sandpiper	Bird	May	Species or species	Critically Endangered
77037	*Rostratula australis*	Australian Painted	Bird	May	Species or species	Endangered
82926	*Lophochroa*	Major Mitchell's	Bird	May	Species or species	Endangered
84121	*Amytornis modestus*	Thick-billed Grasswren	Bird	Known	Species or species	Vulnerable
59398	*Stagonopleura guttata*	Diamond Firetail	Bird	May	Species or species	Vulnerable
863	*Gallinago hardwickii*	Latham's Snipe,	Bird	May	Species or species	Vulnerable
726	*Neophema*	Blue-winged Parrot	Bird	Known	Species or species	Vulnerable
929	*Falco hypoleucos*	Grey Falcon	Bird	Known	Species or species	Vulnerable
470	*Grantiella picta*	Painted Honeyeater	Bird	May	Species or species	Vulnerable
874	*Calidris acuminata*	Sharp-tailed Sandpiper	Bird	May	Species or species	Vulnerable
529	*Aphelocephala*	Southern Whiteface	Bird	Known	Species or species	Vulnerable
84745	*Galaxias rostratus*	Flathead Galaxias,	Fish	May	Species or species	Critically Endangered
125	*Notomys fuscus*	Dusky Hopping-mouse,	Mammal	Known	Species or species	Vulnerable
108	*Pseudomys australis*	Plains Rat, Palyoora,	Mammal	Likely	Species or species	Vulnerable
66646	*Petrogale xanthopus*	Yellow-footed Rock-	Mammal	Known	Species or species	Vulnerable
83395	*Nyctophilus corbeni*	Corben's Long-eared	Mammal	May	Species or species	Vulnerable
4225	*Frankenia plicata*	null	Plant	Likely	Species or species	Endangered
7997	*Pterostylis xerophila*	Desert Greenhood	Plant	May	Species or species	Vulnerable
66685	*Acacia carneorum*	Needle Wattle, Dead	Plant	Known	Species or species	Vulnerable
3141	*Xerothamnella*	null	Plant	May	Species or species	Vulnerable
19507	*Codonocarpus*	Slender Bell-fruit,	Plant	Known	Species or species	Vulnerable
6765	*Swainsona murrayana*	Slender Darling-pea,	Plant	Known	Species or species	Vulnerable

Listed Migratory Species [Resource Information]

				Presence		
Species ID	Scientific Name	Common Name	Class	Rank	Text	Threatened Category
678	*Apus pacificus*	Fork-tailed Swift	Bird	Likely	Species or species	
863	*Gallinago hardwickii*	Latham's Snipe,	Bird	May	Species or species	Vulnerable
642	*Motacilla cinerea*	Grey Wagtail	Bird	May	Species or species	
644	*Motacilla flava*	Yellow Wagtail	Bird	May	Species or species	
856	*Calidris ferruginea*	Curlew Sandpiper	Bird	May	Species or species	Critically Endangered
858	*Calidris melanotos*	Pectoral Sandpiper	Bird	May	Species or species	
874	*Calidris acuminata*	Sharp-tailed Sandpiper	Bird	May	Species or species	Vulnerable
59309	*Actitis hypoleucos*	Common Sandpiper	Bird	May	Species or species	

Commonwealth Lands [Resource Information]

Commonwealth	Commonwealth Land Name	Agency	State	Buffer Status
41554	Commonwealth Land - Australian National Railways Commission	Transport and Regional	SA	In buffer area only
40756	Commonwealth Land - Australian National Railways Commission	Transport and Regional	SA	In buffer area only
40754	Commonwealth Land - Australian National Railways Commission	Transport and Regional	SA	In buffer area only
40755	Commonwealth Land - Australian National Railways Commission	Transport and Regional	SA	In buffer area only
40753	Commonwealth Land - Australian National Railways Commission	Transport and Regional	SA	In buffer area only
40752	Commonwealth Land - Australian National Railways Commission	Transport and Regional	SA	In buffer area only
40750	Commonwealth Land - Australian National Railways Commission	Transport and Regional	SA	In buffer area only
40757	Commonwealth Land - Australian National Railways Commission	Transport and Regional	SA	In buffer area only

Listed Marine Species [Resource Information]

				Presence		
Species ID	Scientific Name	Common Name	Class	Rank	Text	Threatened Category
77037	*Rostratula australis*	Australian Painted	Bird	May	Species or species	Endangered
66521	*Bubulcus ibis*	Cattle Egret	Bird	May	Species or species	
678	*Apus pacificus*	Fork-tailed Swift	Bird	Likely	Species or species	
670	*Merops ornatus*	Rainbow Bee-eater	Bird	May	Species or species	
863	*Gallinago hardwickii*	Latham's Snipe,	Bird	May	Species or species	Vulnerable
726	*Neophema*	Blue-winged Parrot	Bird	Known	Species or species	Vulnerable
642	*Motacilla cinerea*	Grey Wagtail	Bird	May	Species or species	
644	*Motacilla flava*	Yellow Wagtail	Bird	May	Species or species	
856	*Calidris ferruginea*	Curlew Sandpiper	Bird	May	Species or species	Critically Endangered
858	*Calidris melanotos*	Pectoral Sandpiper	Bird	May	Species or species	
874	*Calidris acuminata*	Sharp-tailed Sandpiper	Bird	May	Species or species	Vulnerable
83425	*Chalcites osculans*	Black-eared Cuckoo	Bird	Known	Species or species	
59309	*Actitis hypoleucos*	Common Sandpiper	Bird	May	Species or species	

State and Territory Reserves [Resource Information]

Protected Area ID	Protected Area	Reserve Type	State	Jurisdiction	Environment	Buffer Status
SA_0762	Bimbowrie	Conservation Park	SA	State	Terrestrial	In buffer area only
SA_1369	Unnamed (No.HA1369)	Heritage Agreement	SA	State	Terrestrial	In buffer area only
BHA_24	Boolcoomatta	Conservation Reserve	SA	Private	Terrestrial	In buffer area only

EPBC Act Referrals [Resource Information]

Reference Number	Title of referral	Jurisdiction	Industry Type	Stage	Stage Description	Referral Outcome
2022/09261	Construction and operation of	SA	Agriculture and	Completed	Referral Decision Made	
2015/7522	Improving rabbit biocontrol:	NSW	Natural Resources	Completed	Referral Decision Made	Not Controlled Action

8.2 BDBSA Flora Species Records within 50 km of the Project area.

Scientific Name	Common Name	Date of Last Record
Abutilon fraseri (NC)	Dwarf Lantern-bush	27/08/1996
Abutilon halophilum	Plains Lantern-bush	20/09/2006
Abutilon leucopetalum	Desert Lantern-bush	25/09/2006
Abutilon otocarpum	Desert Lantern-bush	17/11/2011
Abutilon sp.	Lantern-bush	24/09/2006
Acacia aneura complex	Mulga	3/11/2010
Acacia aneura var. (NC)	Mulga	3/03/2011
Acacia aneura var. aneura	Mulga	26/02/2019
Acacia aneura var. aneura (NC)	Mulga	26/09/2006
Acacia ayersiana var. latifolia (NC)	Broad-leaf Mulga	27/08/1996
Acacia beckleri (NC)	Beckler's Rock Wattle	27/08/1996
Acacia beckleri ssp.	Beckler's Rock Wattle	21/09/2006
Acacia beckleri ssp. beckleri	Beckler's Rock Wattle	14/09/2010
Acacia calamifolia	Wallowa	21/04/2005
Acacia carneorum	Needle Wattle	1/03/2023
Acacia colletioides	Veined Wait-a-while	26/11/2004
Acacia continua	Thorn Wattle	24/02/2019
Acacia oswaldii	Umbrella Wattle	19/10/2010
Acacia tetragonophylla	Dead Finish	26/02/2019
Acacia victoriae ssp.	Elegant Wattle	17/10/2014
Acacia victoriae ssp. victoriae	Elegant Wattle	8/09/2007
Actinobole uliginosum	Flannel Cudweed	19/10/2010
Ajuga australis	Australian Bugle	26/08/1996
Alectryon oleifolius ssp. canescens	Bullock Bush	23/02/2019
Alyogyne huegelii (NC)	Native Hibiscus	3/03/2011
Alyssum linifolium	Flax-leaf Alyssum	28/08/2008
Amaranthus cuspidifolius	Boggabri Weed	29/03/1997
Amaranthus grandiflorus	Large-flower Amaranth	29/03/1997
Amyema gibberula var. gibberula	Twin-flower Mistletoe	19/09/2006
Amyema linophylla ssp. orientalis	Casuarina Mistletoe	22/04/2005
Amyema maidenii ssp. maidenii	Pale-leaf Mistletoe	19/09/1995
Amyema miquelii	Box Mistletoe	18/04/2005
Angianthus brachypappus	Spreading Angianthus	30/03/1997
Angianthus tomentosus	Hairy Angianthus	10/09/2008
Anthosachne scabra	Native Wheat-grass	24/09/2006
Arabidella glaucescens		10/09/2008
Arabidella nasturtium	Yellow Cress	10/09/2008
Arabidella procumbens	Creeping Cress	9/09/2008
Arabidella trisecta	Shrubby Cress	10/09/2008
Argemone ochroleuca ssp. ochroleuca	Mexican Poppy	30/10/2015

Scientific Name	Common Name	Date of Last Record
Aristida contorta	Curly Wire-grass	12/11/2012
Aristida holathera var. holathera	Tall Kerosene Grass	21/04/2005
Aristida nitidula	Brush Three-awn	12/11/2012
Aristida obscura	Brush Three-awn	18/10/2010
Aristida sp.	Three-awn/Wire-grass	4/07/1995
Arthropodium minus	Small Vanilla-lily	1/10/1995
Arthropodium strictum	Common Vanilla-lily	5/07/1995
Asphodelus fistulosus	Onion Weed	24/05/2007
Asplenium subglandulosum	Blanket Fern	5/07/1995
Astrebla pectinata	Barley Mitchell-grass	3/03/2011
Atriplex acutibractea ssp. acutibractea	Pointed Saltbush	19/04/2005
Atriplex angulata	Fan Saltbush	24/09/2014
Atriplex eardleyae	Eardley's Saltbush	15/10/2010
Atriplex holocarpa	Pop Saltbush	7/11/2012
Atriplex intermedia		23/09/2014
Atriplex limbata	Spreading Saltbush	23/09/2014
Atriplex lindleyi ssp.	Baldoo	12/11/2012
Atriplex lindleyi ssp. conduplicata	Baldoo	22/09/2014
Atriplex lindleyi ssp. inflata	Corky Saltbush	24/09/2006
Atriplex lindleyi ssp. lindleyi	Baldoo	7/11/2012
Atriplex lindleyi ssp. quadripartita	Baldoo	22/09/2014
Atriplex nummularia ssp. (NC)	Old-man Saltbush	4/08/1995
Atriplex pseudocampanulata	Spreading Saltbush	4/08/1995
Atriplex semibaccata	Berry Saltbush	19/04/2005
Atriplex sp.	Saltbush	13/10/2010
Atriplex spongiosa	Pop Saltbush	17/10/2010
Atriplex stipitata (NC)	Bitter Saltbush	18/10/2010
Atriplex velutinella	Sandhill Saltbush	29/08/2008
Atriplex vesicaria	Bladder Saltbush	7/11/2019
Atriplex vesicaria ssp. (NC)	Bladder Saltbush	17/03/2001
Austrostipa acrociliata	Graceful Spear-grass	26/08/1996
Austrostipa elegantissima	Feather Spear-grass	25/09/2006
Austrostipa nitida	Balcarra Spear-grass	12/11/2012
Austrostipa nodosa	Tall Spear-grass	8/09/2007
Austrostipa scabra ssp. falcata	Slender Spear-grass	21/09/2006
Austrostipa scabra ssp. scabra	Rough Spear-grass	23/09/2006
Austrostipa sp.	Spear-grass	21/10/2010
Austrostipa trichophylla		21/09/2006
Blennodia canescens	Native Stock	15/10/2010
Blennodia pterosperma	Wild Stock	20/10/2010
Boerhavia dominii (NC)	Tar-vine	7/11/2012
Boerhavia schomburgkiana (NC)	Schomburgk's Tar-vine	24/09/2006
Boerhavia sp.	Tar-vine	13/10/2010
Brachyscome ciliaris var. ciliaris	Variable Daisy	5/08/1995
Brachyscome ciliaris var. lanuginosa	Woolly Variable Daisy	12/11/2012
Brachyscome dentata	Lobe-seed Daisy	10/09/2008
Brachyscome lineariloba	Hard-head Daisy	22/04/2005
Brachyscome sp.	Native Daisy	10/11/2012
Brassica tournefortii	Wild Turnip	21/05/2007
Bromus arenarius	Sand Brome	18/10/2010
Bromus rubens	Red Brome	19/09/1995
Bulbine alata	Winged Bulbine-lily	20/04/2005

Scientific Name	Common Name	Date of Last Record
Bulbine bulbosa	Bulbine-lily	28/08/1996
Bulbine semibarbata	Small Leek-lily	18/10/2010
Bulbine sp.	Bulbine-lily	21/10/2010
Calandrinia calyptrata	Pink Purslane	19/10/2010
Calandrinia eremaea	Dryland Purslane	19/09/2006
Callitris glaucophylla	White Cypress-pine	21/04/2005
Callitris sp.	Native Pine	7/04/2005
Calocephalus platycephalus	Western Beauty-heads	26/09/1995
Calostemma purpureum	Pink Garland-lily	5/07/1995
Calotis cymbacantha	Showy Burr-daisy	2/09/1996
Calotis hispidula	Hairy Burr-daisy	21/10/2010
Calotis plumulifera	Woolly-headed Burr-daisy	10/09/2008
Calotis sp.	Burr-daisy	10/11/2012
Carrichtera annua	Ward's Weed	7/11/2019
Carthamus lanatus	Saffron Thistle	7/11/2012
Cassinia laevis ssp. laevis	Curry Bush	6/08/2008
Casuarina pauper	Black Oak	22/02/2019
Cenchrus ciliaris	Buffel Grass	22/04/2013
Cenchrus clandestinus	Kikuyu	21/05/2007
Centaurea melitensis	Malta Thistle	13/10/2007
Centaurea sp.	Centaury	13/10/2010
Centipeda cunninghamii	Common Sneezeweed	18/10/2010
Centipeda minima (NC)	Spreading Sneezeweed	5/08/1995
Centipeda sp.	Sneezeweed	26/08/1996
Centipeda thespidioides (NC)	Desert Sneezeweed	28/08/1996
Chamaesyce drummondii (NC)	Caustic Weed	22/04/2005
Cheilanthes austrotenuifolia	Annual Rock-fern	21/04/2005
Cheilanthes lasiophylla	Woolly Cloak-fern	21/04/2005
Cheilanthes sieberi ssp.	Narrow Rock-fern	20/04/2005
Cheilanthes sieberi ssp. sieberi	Narrow Rock-fern	20/04/2005
Chenopodium auricomum	Golden Goosefoot	26/09/2006
Chenopodium curvispicatum	Cottony Goosefoot	22/04/2005
Chenopodium desertorum ssp.	Desert Goosefoot	19/10/2010
Chenopodium murale	Nettle-leaf Goosefoot	23/05/2007
Chenopodium nitrariaceum	Nitre Goosefoot	23/09/2006
Chloris pectinata	Comb Windmill Grass	3/03/2011
Chrysocephalum apiculatum	Common Everlasting	14/09/2010
Chrysocephalum apiculatum (NC)	Common Everlasting	8/09/2007
Chrysocephalum semipapposum	Clustered Everlasting	6/08/2008
Citrullus amarus	Bitter Melon	23/05/2007
Citrullus colocynthis	Colocynth	23/05/2007
Codonocarpus pyramidalis	Slender Bell-fruit	26/02/2019
Compositae sp.	Daisy Family	13/10/2010
Convolvulaceae sp.	Bindweed Family	10/11/2012
Convolvulus clementii (NC)		20/09/2006
Convolvulus erubescens (NC)	Australian Bindweed	2/09/1996
Convolvulus microsepalus	Small-flower Bindweed	23/09/2006
Convolvulus remotus	Grassy Bindweed	7/11/2012
Convolvulus sp.	Bindweed	2/09/1996
Crassula colorata var.	Dense Crassula	5/08/1995
Crassula colorata var. acuminata	Dense Crassula	18/09/2006
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop	28/08/1996

Scientific Name	Common Name	Date of Last Record
Crassula sp.	Crassula/Stonecrop	19/09/1995
Crassula tetramera	Australian Stonecrop	18/09/2006
Cucumis myriocarpus ssp. myriocarpus	Paddy Melon	23/05/2007
Cucurbitaceae sp.	Melon Family	7/11/2019
Cullen australasicum	Tall Scurf-pea	26/08/1996
Cullen cinereum	Annual Scurf-pea	20/09/2006
Cullen graveolens	Native Lucerne	28/08/1996
Cymbopogon ambiguus	Lemon-grass	12/11/2012
Cymbopogon sp.	Lemon Grass	26/09/2006
Cynanchum viminale ssp. australe	Caustic Bush	26/09/2006
Cyperus alterniflorus	Umbrella Flat-sedge	11/11/2012
Cyperus gymnocaulos	Spiny Flat-sedge	20/04/2005
Cyperus pygmaeus	Pygmy Flat-sedge	26/09/1995
Dactyloctenium radulans	Button-grass	3/03/2011
Datura ferox	Long-spine Thorn-apple	23/05/2007
Daucus glochidiatus	Native Carrot	20/10/2010
'dead Acacia' stenophylla		8/09/2007
'dead Eucalyptus' camaldulensis var. camaldulensis		7/04/2005
Dichanthium sericeum ssp.	Silky Blue-grass	28/08/1996
Dichanthium sericeum ssp. sericeum	Silky Blue-grass	29/07/2010
Digitaria brownii	Cotton Panic-grass	25/09/2006
Dissocarpus biflorus var.	Two-horn Saltbush	18/10/2010
Dissocarpus biflorus var. biflorus	Two-horn Saltbush	22/04/2005
Dissocarpus fontinalis		28/08/2008
Dissocarpus paradoxus	Ball Bindyi	21/10/2010
Dissocarpus sp.		7/11/2019
Dittrichia graveolens	Stinkweed	7/06/2007
Dodonaea lobulata	Lobed-leaf Hop-bush	12/11/2012
Dodonaea viscosa ssp.	Sticky Hop-bush	7/04/2005
Dodonaea viscosa ssp. angustissima	Narrow-leaf Hop-bush	6/11/2019
Duma florulenta	Lignum	22/09/2006
Dysphania cristata	Crested Crumbweed	24/09/2014
Dysphania pumilio	Small Crumbweed	21/04/2005
Echium plantagineum	Salvation Jane	21/10/2010
Einadia nutans ssp.	Climbing Saltbush	19/10/2010
Einadia nutans ssp. nutans	Climbing Saltbush	22/09/2006
Enchylaena tomentosa var.	Ruby Saltbush	8/11/2018
Enchylaena tomentosa var. tomentosa	Ruby Saltbush	12/11/2012
Enneapogon avenaceus	Common Bottle-washers	12/11/2012
Enneapogon cylindricus	Jointed Bottle-washers	12/11/2012
Enneapogon nigricans	Black-head Grass	21/10/2010
Enneapogon polyphyllus	Leafy Bottle-washers	26/06/2011
Enneapogon sp.	Bottle-washers/Nineawn	17/10/2010
Enteropogon acicularis	Umbrella Grass	21/09/2006
Enteropogon ramosus	Umbrella Grass	12/11/2012
Enteropogon sp.	Umbrella Grass	8/11/2012
Eragrostis australasica	Cane-grass	26/06/2011
Eragrostis barrelieri	Pitted Love-grass	29/07/2010
Eragrostis dielsii	Mulka	7/11/2012
Eragrostis falcata	Sickle Love-grass	26/08/2008
Eragrostis leptocarpa	Drooping Love-grass	30/03/1997
Eragrostis setifolia	Bristly Love-grass	7/11/2018

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Eragrostis sp.	Love-grass	7/11/2012
Eragrostis trichophora	Hairyflower Lovegrass	22/04/2013
Eragrostis xerophila	Knotty-butt Neverfail	28/08/1996
Eremophila alternifolia	Narrow-leaf Emubush	21/09/2006
Eremophila deserti	Turkey-bush	7/11/2012
Eremophila duttonii	Harlequin Emubush	12/11/2012
Eremophila freelingii	Rock Emubush	21/04/2005
Eremophila glabra ssp.	Tar Bush	8/09/2007
Eremophila latrobei ssp.	Crimson Emubush	4/07/1995
Eremophila longifolia	Weeping Emubush	22/02/2019
Eremophila maculata ssp.	Spotted Emubush	7/04/2005
Eremophila maculata ssp. maculata	Spotted Emubush	26/09/2006
Eremophila oppositifolia ssp.	Opposite-leaved Emubush	4/07/1995
Eremophila sp.	Emubush/Turkey-bush	21/09/2006
Eremophila sturtii	Turpentine Bush	12/11/2012
Eriochiton sclerolaenoides	Woolly-fruit Bluebush	9/11/2012
Eriochloa australiensis	Australian Cupgrass	29/03/1997
Erodium aureum		29/08/2008
Erodium cicutarium	Cut-leaf Heron's-bill	29/08/2008
Erodium crinitum	Blue Heron's-bill	18/10/2010
Erodium cygnorum	Blue Heron's-bill	18/10/2010
Erodium cygnorum ssp. cygnorum (NC)	Blue Heron's-bill	27/08/1996
Erodium cygnorum ssp. glandulosum (NC)	Clammy Heron's-bill	2/09/1996
Erodium janszii	Clammy Heron's-bill	29/08/2008
Eucalyptus camaldulensis ssp.	River Red Gum	7/04/2005
Eucalyptus camaldulensis ssp. camaldulensis	River Red Gum	25/09/2006
Eucalyptus camaldulensis ssp. minima	River Red Gum	23/09/2006
Eucalyptus camaldulensis var. camaldulensis (NC)	River Red Gum	21/04/2005
Eucalyptus largiflorens	River Box	23/09/2006
Eucalyptus porosa	Mallee Box	20/04/2005
Eucalyptus socialis ssp.	Beaked Red Mallee	22/04/2005
Euchiton sphaericus	Annual Cudweed	2/10/1995
Euphorbia drummondii (NC)		12/11/2012
Euphorbia parvicaruncula	Rough-seeded Spurge	28/08/2008
Euphorbia sp.	Spurge	16/10/2010
Euphorbia stevenii	Bottletree Spurge	10/09/2008
Euphorbia tannensis ssp. eremophila	Desert Spurge	19/04/2005
Exocarpos aphyllus	Leafless Cherry	19/09/2006
Exocarpos sparteus	Slender Cherry	25/09/2006
Frankenia crispa	Hoary Sea-heath	28/08/1996
Frankenia serpyllifolia	Thyme Sea-heath	18/11/2011
Frankenia sp.	Sea-heath	12/11/2012
Fumaria densiflora	Dense Fumitory	20/09/2006
Fumaria indica	Indian Fumitory	29/08/2008
Galium murale	Small Bedstraw	26/08/1996
Geijera linearifolia	Sheep Bush	21/04/2005
Geococcus pusillus	Earth Cress	6/08/2008
Glaucium flavum	Horned Poppy	25/09/2006
Glinus oppositifolius	Slender Carpet-weed	26/09/1995
Glossostigma diandrum	Two-anther Mud-mat	23/10/2008
Glycine clandestina var. (NC)	Twining Glycine	27/08/1996
Glycine rubiginosa	Twining Glycine	20/04/2005

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Gnaphalium polycaulon	Indian Cudweed	26/09/1995
Gnephosis arachnoidea	Spidery Button-flower	7/11/2012
Gnephosis eriocarpa	Native Camomile	19/09/2006
Gnephosis sp.		21/10/2010
Gnephosis tenuissima	Dwarf Golden-tip	22/09/2006
Goodenia fascicularis	Silky Goodenia	10/09/2008
Goodenia fascicularis (NC)	Silky Goodenia	8/09/2007
Goodenia glauca	Pale Goodenia	13/10/2007
Goodenia havilandii	Hill Goodenia	2/10/1995
Goodenia pinnatifida	Cut-leaf Goodenia	20/09/2006
Goodenia pusilliflora	Small-flower Goodenia	2/09/1996
Goodenia sp.	Goodenia	13/10/2010
Gramineae sp.	Grass Family	21/04/2005
Gunniopsis quadrifida	Sturt's Pigface	7/11/2019
Gypsophila tubulosa	Annual Chalkwort	19/04/2005
Hakea leucoptera ssp. leucoptera	Silver Needlewood	3/03/2011
Haloragis sp.	Raspwort	4/08/1995
Harmsiodoxa blennodioides	Hairy-pod Cress	28/08/2008
Harmsiodoxa brevipes var.	Short Cress	2/09/1996
Harmsiodoxa brevipes var. brevipes	Short Cress	2/09/1996
Helianthus annuus	Sunflower	13/10/2007
Heliotropium europaeum	Common Heliotrope	19/04/2005
Heliotropium supinum	Creeping Heliotrope	26/09/1995
Herniaria cinerea	Rupturewort	20/10/2010
Hibiscus krichauffianus	Velvet-leaf Hibiscus	16/10/2010
Hordeum glaucum	Blue Barley-grass	23/09/2006
Hyalosperma demissum	Dwarf Sunray	2/09/1996
Hyalosperma semisterile	Orange Sunray	14/09/2010
Hypochaeris glabra	Smooth Cat's Ear	21/09/2006
Indigofera australis ssp. australis	Austral Indigo	24/02/2019
Indigofera helmsii	Helm's Indigo	27/08/1996
Isoetes muelleri	Mueller's Quillwort	19/10/2010
Isoetopsis graminifolia	Grass Cushion	28/08/1996
Isolepis marginata	Little Club-rush	2/10/1995
Isotoma petraea	Rock Isotome	26/09/2006
Juncus aridicola	Inland Rush	27/08/1996
Lamarckia aurea	Toothbrush Grass	20/09/1995
Leichhardtia australis	Native Pear	25/09/2006
Leiocarpa leptolepis	Pale Plover-daisy	6/08/2008
Leiocarpa semicalva ssp.	Hill Button-bush	4/07/1995
Leiocarpa semicalva ssp. semicalva	Scented Button-bush	28/08/2008
Leiocarpa tomentosa	Woolly Plover-daisy	3/03/2011
Leiocarpa websteri	Narrow Plover-daisy	12/11/2012
Lemooria burkittii	Wires-and-wool	11/09/2008
Lepidium africanum	Common Peppercress	8/04/1998
Lepidium fasciculatum	Bundled Peppercress	10/09/2008
Lepidium oxytrichum	Green Peppercress	2/09/1996
Lepidium papillosum	Warty Peppercress	10/09/2008
Lepidium phlebopetalum	Veined Peppercress	24/09/2006
Lepidium pseudotasmanicum	Shade Peppercress	29/03/1997
Lepidium rotundum	Veined Peppercress	4/08/1995
Lepidium sp.	Peppercress	19/09/1995

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Leptochloa digitata	Umbrella Cane-grass	30/03/1997
Leptorhynchos baileyi	Bailey's Buttons	19/09/1995
Leucochrysum molle	Hoary Sunray	20/09/1995
Leucochrysum stipitatum	Salt-spoon Daisy	15/09/2010
Limonium lobatum	Winged Sea-lavender	10/10/2007
Loranthaceae sp.	Mistletoe Family	19/09/1995
Lotus cruentus	Red-flower Lotus	21/10/2010
Lycium ferocissimum	African Boxthorn	4/06/2007
Lysiana exocarpi ssp. exocarpi	Harlequin Mistletoe	12/11/2012
Lysiana sp.	Mistletoe	5/08/1995
Lysiana subfalcata	Northern Mistletoe	23/09/2006
Lysimachia arvensis	Pimpernel	21/04/2005
Maireana aphylla	Cotton-bush	7/11/2019
Maireana appressa	Pale-fruit Bluebush	17/10/2014
Maireana astrotricha	Low Bluebush	7/11/2019
Maireana brevifolia	Short-leaf Bluebush	24/09/2014
Maireana ciliata	Hairy Fissure-plant	25/09/2014
Maireana eriantha	Woolly Bluebush	27/08/1996
Maireana georgei	Satiny Bluebush	17/10/2014
Maireana georgei/turbinata	Satiny Bluebush	27/08/1996
Maireana integra	Entire-wing Bluebush	7/11/2019
Maireana microcarpa	Swamp Bluebush	10/09/2008
Maireana pyramidata	Black Bluebush	7/11/2019
Maireana radiata	Radiate Bluebush	18/10/2010
Maireana sedifolia	Bluebush	16/10/2010
Maireana sp.	Bluebush/Fissure-plant	6/11/2019
Maireana trichoptera	Hairy-fruit Bluebush	25/06/2011
Maireana turbinata	Top-fruit Bluebush	20/10/2010
Maireana villosa	Silky Bluebush	28/08/2008
Malacocera albolanata	Woolly Soft-horns	20/09/2006
Malacocera biflora	Two-flower Soft-horns	2/09/1996
Malacocera gracilis	Slender Soft-horns	2/09/1996
Malacocera tricornis	Goat-head Soft-horns	7/11/2019
Malva parviflora	Small-flower Marshmallow	15/10/2010
Malva preissiana (NC)	Australian Hollyhock	21/09/2006
Malvastrum americanum var. americanum	Malvastrum	20/09/2006
Marrubium vulgare	Horehound	24/05/2007
Marsilea drummondii (NC)	Common Nardoo	4/08/1995
Marsilea sp.	Nardoo	28/08/1996
Medicago minima	Little Medic	20/09/2006
Medicago polymorpha	Burr-medic	23/09/2006
Medicago sativa	Lucerne	21/10/2008
Medicago sativa ssp. (NC)	Lucerne	16/03/2001
Medicago sp.	Medic	17/10/2014
Melaleuca lanceolata	Dryland Tea-tree	21/04/2005
Melilotus indicus	King Island Melilot	13/10/2007
Menkea crassa	Fat Spectacles	17/11/2011
Mesembryanthemum sp.	Iceplant	13/10/2010
Millotia greevesii ssp.		2/09/1996
Millotia greevesii ssp. greevesii var. greevesii (NC)	Creeping Millotia	19/09/1995
Minuria annua	Annual Minuria	28/08/1996
Minuria cunninghamii	Bush Minuria	7/11/2018

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Minuria denticulata	Woolly Minuria	10/09/2008
Minuria integerrima	Smooth Minuria	10/09/2008
Minuria leptophylla	Minnie Daisy	3/03/2011
Muehlenbeckia sp.	Lignum	4/08/1995
Myoporum montanum	Native Myrtle	19/09/2006
Myoporum platycarpum ssp.	False Sandalwood	8/11/2012
Myoporum platycarpum ssp. platycarpum	False Sandalwood	22/04/2005
Myriocephalus pluriflorus	Inland Woolly-heads	10/09/2008
Nicotiana glauca	Tree Tobacco	27/08/1996
Nicotiana velutina	Velvet Tobacco	21/04/2005
Nitraria billardierei	Nitre-bush	7/04/2005
Olearia pimeleoides	Pimelea Daisy-bush	12/11/2012
Olearia pimeleoides ssp. (NC)	Pimelea Daisy-bush	21/09/2006
Oligocarpus calendulaceus		21/10/2008
Omphalolappula concava	Burr Stickseed	21/10/2010
Onopordum acaulon	Horse Thistle	26/08/1996
Orobanche cernua var. australiana	Australian Broomrape	17/10/2010
Osteocarpum acropterum var.	Bonefruit	24/09/2014
Osteocarpum acropterum var. acropterum	Tuberculate Bonefruit	28/08/2008
Osteocarpum dipterocarpum	Two-wing Bonefruit	10/11/2012
Osteocarpum salsuginosum	Inland Bonefruit	20/04/2005
Oxalis perennans	Native Sorrel	29/08/2008
Oxalis perennans/exilis	Native Oxalis	20/09/2006
Panicum decompositum var. decompositum	Native Millet	1/03/2011
Panicum sp.	Panic/Millet	21/11/2011
Parietaria debilis (NC)	Smooth-nettle	5/07/1995
Parkinsonia aculeata	Jerusalem Thorn	10/09/2009
Paspalidium sp. (NC)	Summer-grass	4/07/1995
Philotheca linearis	Narrow-leaf Wax-flower	27/08/1996
Phlegmatospermum cochlearinum	Downy Cress	14/09/2010
Pimelea microcephala ssp.	Shrubby Riceflower	21/10/2010
Pimelea microcephala ssp. microcephala	Shrubby Riceflower	9/11/2012
Pimelea simplex ssp.	Desert Riceflower	16/10/2010
Pimelea simplex ssp. continua	Desert Riceflower	13/09/2010
Pimelea simplex ssp. simplex	Desert Riceflower	21/04/2005
Pimelea sp.	Riceflower	17/10/2010
Pimelea trichostachya	Spiked Riceflower	12/11/2012
Pittosporum angustifolium	Native Apricot	12/11/2012
Plagiobothrys plurisepaleus	White Rochelia	10/09/2008
Plantago bellardii	Hairy Plantain	20/04/2005
Plantago drummondii	Dark Plantain	16/10/2010
Plantago hispida	Hairy Plantain	19/04/2005
Plantago sp.	Plantain	20/10/2010
Podolepis aristata ssp. auriculata	Grey Copper-wire Daisy	26/08/2008
Podolepis capillaris	Wiry Podolepis	16/10/2010
Polycarpon tetraphyllum	Four-leaf Allseed	18/09/2006
Pomax umbellata	Pomax	21/09/2006
Portulaca oleracea	Common Purslane	13/10/2010
Prostanthera striatiflora	Striated Mintbush	26/02/2019
Pterocaulon sphacelatum	Apple-bush	10/11/2012
Ptilotus incanus/obovatus	Silver Mulla Mulla	20/09/1995
Ptilotus nobilis ssp.		13/10/2010

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Ptilotus nobilis var. (NC)	Yellow-tails	21/10/2010
Ptilotus obovatus	Silver Mulla Mulla	12/11/2012
Ptilotus obovatus (NC)	Silver Mulla Mulla	20/09/2006
Ptilotus sp.	Mulla Mulla	17/10/2014
Ptilotus spathulatus	Pussy-tails	19/10/2010
Pycnosorus pleiocephalus	Soft Billy-buttons	2/09/1996
Ranunculus pentandrus var. platycarpus	Smooth Buttercup	14/09/2010
Reichardia tingitana	False Sowthistle	12/11/2012
Rhagodia parabolica	Mealy Saltbush	18/09/2006
Rhagodia spinescens	Spiny Saltbush	7/11/2019
Rhagodia ulicina	Intricate Saltbush	28/08/2008
Rhodanthe corymbiflora	Paper Everlasting	15/10/2010
Rhodanthe floribunda	White Everlasting	24/09/2006
Rhodanthe microglossa	Clustered Everlasting	20/10/2010
Rhodanthe moschata	Musk Daisy	23/09/2006
Rhodanthe polygalifolia	Milkwort Everlasting	20/09/2006
Rhodanthe pygmaea	Pigmy Daisy	21/10/2010
Rhodanthe sp.	Everlasting	17/10/2010
Rhodanthe stricta	Slender Everlasting	10/09/2008
Rhodanthe uniflora	Woolly Daisy	22/10/2008
Ricinus communis	Castor Oil Plant	21/05/2007
Roepera crenata	Notched Twinleaf	4/07/1995
Roepera iodocarpa	Violet Twinleaf	24/09/2006
Rostraria pumila	Tiny Bristle-grass	18/10/2010
Rumex acetosella	Sorrel	27/08/1996
Rumex crispus	Curled Dock	16/03/2001
Rumex vesicarius	Rosy Dock	4/07/1995
Rytidosperma caespitosum (NC)	Common Wallaby-grass	24/09/2006
Rytidosperma laeve	Smooth Wallaby-grass	8/09/2007
Rytidosperma setaceum	Small-flower Wallaby-grass	12/11/2012
Rytidosperma sp.	Wallaby-grass	21/10/2010
Salsola australis	Buckbush	12/11/2012
Salvia verbenaca var.	Wild Sage	12/11/2012
Salvia verbenaca var. verbenaca	Wild Sage	7/06/2007
Salvia verbenaca var. vernalis	Wild Sage	7/11/2012
Santalum acuminatum	Quandong	10/11/2012
Sarcozona praecox	Sarcozona	7/11/2019
Schenkia australis	Spike Centaury	26/09/1995
Schinus molle	Pepper-tree	24/05/2007
Schismus arabicus	Arabian Grass	15/10/2010
Schismus barbatus	Arabian Grass	9/11/2012
Schismus sp.		17/10/2010
Schoenia ramosissima	Dainty Everlasting	2/09/1996
Scleranthus pungens	Prickly Knawel	14/09/2010
Scleroderma sp.		25/09/2006
Sclerolaena birchii	Galvanised Burr	3/03/2011
Sclerolaena brachyptera	Short-wing Bindyi	26/09/2014
Sclerolaena convexula	Tall Bindyi	19/04/2005
Sclerolaena cuneata	Tangled Bindyi	24/09/2006
Sclerolaena decurrens	Green Bindyi	22/09/2014
Sclerolaena deserticola	Desert Bindyi	25/09/2014
Sclerolaena diacantha	Grey Bindyi	17/10/2014

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Sclerolaena divaricata	Tangled Bindyi	7/11/2012
Sclerolaena eriacantha	Silky Bindyi	20/10/2010
Sclerolaena glabra	Smooth Bindyi	24/09/2006
Sclerolaena holtiana	Holt's Bindyi	22/09/2014
Sclerolaena intricata	Tangled Bindyi	20/10/2010
Sclerolaena lanicuspis	Spinach Bindyi	25/09/2014
Sclerolaena limbata	Pearl Bindyi	24/09/2014
Sclerolaena obliquicuspis	Oblique-spined Bindyi	25/09/2014
Sclerolaena patenticuspis	Spear-fruit Bindyi	24/09/2014
Sclerolaena sp.	Bindyi	19/10/2010
Sclerolaena tricuspis	Three-spine Bindyi	12/11/2012
Sclerolaena uniflora	Small-spine Bindyi	9/09/1995
Sclerolaena ventricosa	Salt Bindyi	22/09/2014
Sebaea ovata	Yellow Sebaea	2/10/1995
Senecio anethifolius (NC)	Feathery Groundsel	27/08/1996
Senecio anethifolius ssp.	Feathery Groundsel	10/11/2012
Senecio anethifolius ssp. anethifolius	Feathery Groundsel	9/11/2012
Senecio anethifolius ssp. brevibracteolatus	Feathery Groundsel	8/11/2012
Senecio gawlerensis	Gawler Ranges Groundsel	27/08/2008
Senecio glossanthus (NC)	Annual Groundsel	2/09/1996
Senecio gregorii	Fleshy Groundsel	2/09/1996
Senecio lanibracteus	Inland Shrubby Groundsel	23/10/2008
Senecio magnificus	Showy Groundsel	10/11/2012
Senecio pinnatifolius (NC)	Variable Groundsel	2/09/1996
Senecio quadridentatus	Cotton Groundsel	10/11/2012
Senecio sp.	Groundsel	7/11/2019
Senna artemisioides ssp.	Desert Senna	7/11/2019
Senna artemisioides ssp. filifolia	Fine-leaf Desert Senna	13/10/2010
Senna artemisioides ssp. petiolaris		7/11/2019
Senna artemisioides ssp. petiolaris (NC)	Flat-stalk Senna	22/04/2005
Senna artemisioides ssp. quadrifolia	Four-leaf Desert Senna	3/03/2011
Senna artemisioides ssp. X artemisioides	Silver Senna	7/11/2019
Senna artemisioides ssp. X coriacea	Broad-leaf Desert Senna	19/09/2006
Senna artemisioides ssp. X sturtii	Grey Senna	3/03/2011
Senna artemisioides ssp. zygophylla	Twin-leaf Desert Senna	23/03/2006
Setaria constricta	Knotty-butt Paspalidium	27/08/1996
Setaria jubiflora	Warrego Summer-grass	29/03/1997
Sida corrugata var.	Corrugated Sida	16/10/2010
Sida fibulifera	Pin Sida	8/11/2012
Sida intricata	Twiggy Sida	7/11/2019
Sida petrophila	Rock Sida	12/11/2012
Sida rohlenae ssp. rohlenae	Shrub Sida	18/11/2011
Sida sp.	Sida	17/10/2010
Sida trichopoda	High Sida	19/11/2011
Silene apetala	Sand Catchfly	21/04/2005
Sisymbrium erysimoides	Smooth Mustard	19/10/2010
Sisymbrium irio	London Mustard	6/08/2008
Solanum chenopodinum	Goosefoot Potato-bush	28/06/2007
Solanum elaeagnifolium	Silver-leaf Nightshade	12/11/2012
Solanum ellipticum (NC)	Velvet Potato-bush	12/11/2012
Solanum lithophilum/quadriloculatum		27/08/1996
Solanum mauritianum	Wild Tobacco Tree	24/05/2007

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Solanum nigrum	Black Nightshade	29/08/2008
Solanum petrophilum	Rock Nightshade	28/08/2008
Solanum petrophilum (NC)	Rock Nightshade	12/11/2012
Solanum quadriloculatum	Plains Nightshade	18/10/2010
Solanum retroflexum		3/08/1995
Solanum sp.	Nightshade/Potato-bush	6/11/2019
Solanum sturtianum	Sturt's Nightshade	10/11/2012
Sonchus oleraceus	Common Sow-thistle	7/11/2019
Sonchus sp.	Sow-thistle	13/10/2010
Sorghum halepense	Johnson Grass	16/03/2001
Spergularia diandra	Lesser Sand-spurrey	13/10/2007
Spergularia media	Coast Sand-spurrey	28/08/2008
Spergularia sp.	Sand-spurrey	21/04/2005
Sphaeromorphaea littoralis	Spreading Nut-heads	26/09/1995
Sporobolus actinocladus	Ray Grass	9/11/2012
Sporobolus caroli	Yakka Grass	29/03/1997
Sporobolus sp.		18/10/2010
Stellaria filiformis	Thread Starwort	18/04/2005
Stenopetalum lineare	Narrow Thread-petal	6/08/2008
Stenopetalum lineare (NC)	Narrow Thread-petal	22/04/2005
Suaeda australis	Austral Seablite	18/09/2006
Swainsona fissimontana	Broken Hill Pea	9/09/2008
Swainsona formosa	Sturt Pea	14/09/2010
Swainsona fuscoviridis	Dark Green Swainson-pea	15/09/2010
Swainsona phacoides	Dwarf Swainson-pea	18/10/2010
Swainsona sp.	Swainson-pea	28/08/1996
Swainsona stipularis	Orange Swainson-pea	13/09/2010
Swainsona swainsonioides	Downy Swainson-pea	13/09/2010
Tamarix aphylla	Athel Pine	27/03/2007
Tecticornia indica ssp. leiostachya	Brown-head Samphire	19/04/2005
Tecticornia pergranulata ssp. pergranulata	Black-seed Samphire	19/04/2005
Tecticornia sp.	Samphire	7/04/2005
Tecticornia tenuis	Slender Samphire	20/10/2010
Tetragonia eremaea	Desert Spinach	20/10/2010
Tetragonia sp.	False Spinach	16/10/2010
Tetragonia tetragonoides	New Zealand Spinach	12/10/2010
Teucrium racemosum	Grey Germander	17/10/2010
Themeda triandra	Kangaroo Grass	30/03/1997
Thysanotus baueri	Mallee Fringe-lily	12/11/2012
Thysanotus sp.	Fringe-lily	21/10/2010
Tragus australianus	Small Burr-grass	20/09/1995
Trianthema triquetrum	Red Spinach	8/09/2007
Tribulus eichlerianus	Eichler's Caltrop	29/03/1997
Triodia irritans	Spinifex	19/04/2005
Triodia sp.	Spinifex	19/04/2005
Tripogonella loliiformis	Five-minute Grass	16/10/2010
Triraphis mollis	Purple Plume Grass	25/06/2011
Vicia monantha	Spurred Vetch	27/08/1996
Vittadinia cuneata var.	Fuzzy New Holland Daisy	22/09/2006
Vittadinia cuneata var. cuneata	Fuzzy New Holland Daisy	17/10/2014
Vittadinia cuneata var. morrisii	New Holland Daisy	28/08/2008
Vittadinia dissecta var. hirta	Dissected New Holland Daisy	18/04/2005

Scientific Name	Common Name	Date of Last Record
Vittadinia eremaea	Desert New Holland Daisy	28/08/1996
Vittadinia gracilis	Woolly New Holland Daisy	12/11/2012
Vittadinia sp.	New Holland Daisy	12/11/2012
Vittadinia sulcata	Furrowed New Holland Daisy	12/11/2012
Wahlenbergia communis	Tufted Bluebell	12/11/2012
Wahlenbergia gracilenta	Annual Bluebell	18/10/2010
Wahlenbergia queenslandica		25/09/2006
Wahlenbergia sp.	Native Bluebell	4/07/1995
Wahlenbergia stricta ssp. stricta	Tall Bluebell	14/09/2010
Wahlenbergia tumidifructa	Swollen-fruit Bluebell	25/09/2006
Wurmbea citrina	Green-flower Nancy	14/09/2010
Wurmbea dioica ssp. dioica (NC)	Early Star-lily	27/08/1996
Xanthium spinosum	Bathurst Burr	23/05/2007
Zygophyllum ammophilum (NC)	Sand Twinleaf	28/08/1996
Zygophyllum iodocarpum (NC)	Violet Twinleaf	2/09/1996

8.3 BDBSA Fauna Species Records within 50 km of the Project area.

Scientific Name	Common Name	Date of Last Record
Acanthagenys rufogularis	Spiny-cheeked Honeyeater	1/12/2020
Acanthiza apicalis	Inland Thornbill	12/12/2011
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	4/02/2021
Acanthiza uropygialis	Chestnut-rumped Thornbill	3/02/2021
Accipiter cirrocephalus cirrocephalus	Collared Sparrowhawk	8/11/2012
Accipiter fasciatus fasciatus	Brown Goshawk	16/11/2008
Accipiter sp.	sparrowhawks and goshawks	21/09/2006
Aegotheles cristatus cristatus	Australian Owlet-nightjar	11/12/2011
Amytornis modestus	Thick-billed Grasswren	14/04/2008
Anas castanea	Chestnut Teal	30/03/2005
Anas gracilis gracilis	Grey Teal	20/04/2018
Anas superciliosa	Pacific Black Duck	10/12/2011
Anilios bicolor	Dark-spined Blind Snake	28/11/2020
Anilios bituberculatus	Prong-snouted Blind Snake	1/10/2022
Antaresia childreni	Children's Python	18/03/2005
Anthus australis	Australian Pipit	27/11/2020
Aphelocephala leucopsis leucopsis	Southern Whiteface	6/11/2012
Aquila audax audax	Wedge-tailed Eagle	30/11/2020
Ardeotis australis	Australian Bustard	27/06/2018
Artamus cinereus	Black-faced Woodswallow	12/11/2012
Artamus cinereus melanops	Black-faced Woodswallow (northern & eastern SA)	29/11/2020
Artamus leucorynchus	White-breasted Woodswallow	13/10/2010
Artamus minor	Little Woodswallow	20/09/1996
Artamus personatus	Masked Woodswallow	1/12/2020
Artamus superciliosus	White-browed Woodswallow	27/08/1996
Aspidites ramsayi	Woma	1/02/1997

Scientific Name	Common Name	Date of Last Record
Austronomus australis	White-striped Free-tailed Bat	9/04/2012
Aythya australis	Hardhead	10/11/2012
Barnardius zonarius	Australian Ringneck	9/04/2019
BATHYNELLACEA sp.	order of small interstitial crustaceans	21/07/2009
Bos taurus	Cattle (European Cattle)	14/04/2019
Cacatua sanguinea gymnopis	Little Corella	6/11/2012
Cacomantis pallidus	Pallid Cuckoo	11/05/2006
Calamanthus campestris	Rufous Fieldwren	12/11/2012
Calamanthus campestris isabellinus	Rufous Fieldwren (NW, northern FR, NE, LNE)	30/11/2020
Canis lupus dingo	Dingo	24/04/2019
Canis sp.		21/05/2005
Capra hircus	Goat (Feral Goat)	24/04/2019
Carduelis carduelis britannica	European Goldfinch	7/05/2006
Certhionyx variegatus	Pied Honeyeater	29/11/2020
Chalcites basalis	Horsfield's Bronze Cuckoo	30/11/2020
Chalcites osculans	Black-eared Cuckoo	30/11/2020
Chalinolobus gouldii	Gould's Wattled Bat	29/11/2020
Chalinolobus morio	Chocolate Wattled Bat	29/11/2020
Charadrius sp.		26/05/2007
Charadrius veredus	Oriental Plover	14/11/2005
Chenonetta jubata	Maned Duck	28/02/2018
Cheramoeca leucosterna	White-backed Swallow	1/12/2020
Christinus marmoratus	Marbled Gecko	18/11/2008
Cincloramphus cruralis	Brown Songlark	29/11/2020
Cincloramphus mathewsi	Rufous Songlark	29/11/2020
Cinclosoma cinnamomeum	Cinnamon Quailthrush	8/11/2012
Circus approximans	Swamp Harrier	4/03/2011
Circus assimilis	Spotted Harrier	27/11/2020
Climacteris picumnus picumnus	Brown Treecreeper	12/12/2008
Columba livia	Feral Pigeon	13/11/2008
Coracina maxima	Ground Cuckooshrike	28/05/2005
Coracina novaehollandiae	Black-faced Cuckooshrike	21/10/2010
Corvus bennetti	Little Crow	26/09/2006
Corvus coronoides	Australian Raven	1/12/2020
Corvus mellori	Little Raven	12/05/2006
Corvus orru cecilae	Torresian Crow	13/12/2011
Corvus sp.	Crows	23/04/2019
Coturnix pectoralis	Stubble Quail	16/11/2011
Cracticus nigrogularis nigrogularis	Pied Butcherbird (MM)	10/12/2011
Cracticus torquatus leucopterus	Grey Butcherbird	9/12/2011
Cryptoblepharus australis	Desert Wall Skink	3/10/2019
Cryptoblepharus cf plagiocephalus (NC)	Desert Wall Skink	3/09/1996
Cryptoblepharus sp.		8/04/2012

Scientific Name	Common Name	Date of Last Record
Ctenophorus kartiwarru	Red-backed Sand Dragon	9/11/2012
Ctenophorus modestus	Swift Rock Dragon	12/11/2012
Ctenophorus nuchalis	Central Netted Dragon	5/10/2019
Ctenophorus pictus	Painted Dragon	23/11/2017
Ctenophorus sp.		20/11/2005
Ctenotus leonhardii	Common Desert Ctenotus	20/03/2017
Ctenotus olympicus	Saltbush Ctenotus	13/11/2021
Ctenotus orientalis	Spotted Ctenotus	9/04/2012
Ctenotus regius	Eastern Desert Ctenotus	1/10/2022
Ctenotus robustus	Eastern Striped Skink	11/11/2021
Ctenotus schomburgkii (revised)	Common Sandplain Ctenotus	1/10/2022
Ctenotus sp.		14/11/2011
Ctenotus strauchii	Short-legged Ctenotus	1/10/2022
Ctenotus taeniatus	Eyrean Ctenotus	4/09/1996
Cygnus atratus	Black Swan	13/08/1996
Daphoenositta chrysoptera pileata	Black-capped Sittella	14/10/2010
Delma tincta	Excitable Delma	30/11/2020
Dicaeum hirundinaceum hirundinaceum	Mistletoebird	26/05/2007
Diplodactylus conspicillatus (revised)	Variable Fat-tailed Gecko	6/10/2019
Diplodactylus furcosus	Ranges Stone Gecko	15/10/2010
Diplodactylus tessellatus	Tessellated Gecko	1/10/2022
DIPLURA sp.	Two-pronged Bristletails	20/07/2009
Egernia stokesii	Gidgee Skink	18/03/2009
Egernia striolata	Eastern Tree Skink	8/04/2012
Elanus axillaris	Black-shouldered Kite	13/12/2011
Elseyornis melanops	Black-fronted Dotterel	1/12/2020
Emblema pictum	Painted Finch	1/03/2011
Eolophus roseicapilla	Galah	1/12/2020
Epthianura albifrons	White-fronted Chat	9/11/2012
Epthianura aurifrons	Orange Chat	27/11/2020
Epthianura tricolor	Crimson Chat	29/11/2020
Equus caballus	Horse (Brumby)	28/08/1996
Eremiascincus phantasmus	Ghost Skink	5/03/2011
Eremiascincus richardsonii	Broad-banded Sandswimmer	30/09/2021
Eurostopodus argus	Spotted Nightjar	28/11/2021
Eurystomus orientalis	Oriental Dollarbird	18/02/2000
Falco berigora berigora	Brown Falcon	1/12/2020
Falco cenchroides cenchroides	Nankeen Kestrel	27/11/2020
Falco longipennis murchisonianus	Australian Hobby	14/10/2010
Falco subniger	Black Falcon	9/12/2011
Felis catus	Domestic Cat (Feral Cat)	27/11/2020
Fulica atra australis	Eurasian Coot	10/11/2012
Gavicalis virescens	Singing Honeyeater	12/11/2012
Gavicalis virescens forresti	Singing Honeyeater (northern SA)	29/11/2020

Scientific Name	Common Name	Date of Last Record
Gehyra lazelli	Southern Rock Dtella	12/11/2012
Gehyra sp.		10/12/2011
Gehyra variegata (NC)	Tree Dtella	7/11/2012
Gehyra variegata (revised)	Western Tree Dtella	14/11/2021
Gehyra variegata complex		2/09/1996
Gehyra versicolor	Eastern Tree Dtella	1/10/2022
Gelochelidon macrotarsa	Australian Tern	18/09/1996
Geopelia cuneata	Diamond Dove	1/12/2020
Geopelia placida placida	Peaceful Dove	4/03/2011
Grallina cyanoleuca cyanoleuca	Magpielark	20/03/2019
Gymnorhina tibicen	Australian Magpie	27/11/2020
HARPACTICOIDA sp.	order of copepods	21/07/2009
Heteronotia binoei	Bynoe's Gecko	1/10/2022
Hieraaetus morphnoides	Little Eagle	23/09/2006
Himantopus leucocephalus	Pied Stilt	27/11/2020
Hirundo neoxena neoxena	Welcome Swallow	8/11/2012
Hydracarina sp.	n/a	20/07/2009
Lalage tricolor	White-winged Triller	1/12/2020
Leggadina forresti	Central Short-tailed Mouse (Forrest's Mouse)	1/10/2022
Leporillus sp.	stick-nest rats	26/05/2005
Lerista labialis	Eastern Two-toed Slider	3/03/2011
Lerista muelleri	Dwarf Three-toed Slider	16/11/2005
Lerista punctatovittata	Spotted Slider	28/11/2020
Lerista sp.		20/11/2005
Lerista timida	Dwarf Three-toed Slider	6/10/2019
Lialis burtonis	Burton's Snake-lizard	30/11/2020
Limnodynastes tasmaniensis	Spotted Marsh Frog	24/11/2005
Liopholis inornata	Desert Skink	7/10/2019
Lucasium byrnei	Gibber Gecko	1/10/2022
Lucasium damaeum	Beaded Gecko	28/11/2020
Lucasium microplax	Central Sandplain Gecko	17/11/2008
Lucasium steindachneri	Map Gecko	20/03/2017
MACROPODIDAE sp.	kangaroos	24/04/2019
Macropus (Osphranter) robustus	Euro	22/04/2019
Macropus (Osphranter) rufus	Red Kangaroo	29/11/2020
Macropus fuliginosus	Western Grey Kangaroo	18/04/2019
Macropus giganteus	Eastern Grey Kangaroo	26/09/2006
Macropus sp.		19/10/2010
Malacorhynchus membranaceus	Pink-eared Duck	11/05/2006
Malurus assimilis assimilis	Purple-backed Fairywren	30/11/2020
Malurus cyaneus leggei	Superb Fairywren (Mainland SA)	20/10/2010
Malurus leucopterus leuconotus	White-winged Fairywren	1/12/2020
Malurus sp.	fairywrens	25/09/2006

Scientific Name	Common Name	Date of Last Record
Malurus splendens melanotus	Black-backed Fairywren (MM)	15/11/2005
Melanodryas cucullata	Hooded Robin	14/10/2010
Melopsittacus undulatus	Budgerigar	1/12/2020
Menetia greyii	Dwarf Skink	1/10/2022
Merops ornatus	Rainbow Bee-eater	27/11/2020
Microcarbo melanoleucos melanoleucos	Little Pied Cormorant	25/05/2005
Milvus migrans affinis	Black Kite	6/11/2012
Mirafra javanica	Horsfield's Bush Lark	21/10/2010
Morethia adelaidensis	Adelaide Snake-eye	1/10/2022
Morethia boulengeri	Common Snake-eye	30/11/2020
Morethia sp.		26/05/2005
Mormopterus petersi	Inland Free-tailed Bat	10/04/2012
Mormopterus planiceps	Southern Free-tailed Bat	8/04/2012
Mormopterus sp.		28/11/2020
Muridae sp.		13/10/2010
Mus musculus	House Mouse	1/10/2022
Myiagra inquieta	Restless Flycatcher	12/05/2006
Neobatrachus pictus	Burrowing Frog	11/12/2011
Neobatrachus sp.		11/12/2008
Neobatrachus sudellae	Sudell's Frog	1/10/2022
Neophema elegans elegans	Elegant Parrot	5/02/2021
Neophema sp.	Neophema parrots	30/08/1996
Neopsephotus bourkii	Bourke's Parrot	23/05/2005
Nephrurus levis	Common Knob-tailed Gecko	1/10/2022
Ninox boobook	Australian Boobook	7/05/2006
Northiella haematogaster haematogaster	Eastern Bluebonnet (eastern and central SA)	3/02/2021
Notomys fuscus	Dusky Hopping-mouse	1/10/2022
Nycticorax caledonicus australasiae	Nankeen Night Heron	22/05/2005
Nyctophilus geoffroyi	Lesser Long-eared Bat	10/04/2012
Nyctophilus sp.		29/11/2020
Nymphicus hollandicus	Cockatiel	29/11/2020
Ocyphaps lophotes lophotes	Crested Pigeon	1/12/2020
OLIGOCHAETA sp.	oligichaete worms	21/07/2009
Oreoica gutturalis	Crested Bellbird	8/11/2012
Oryctolagus cuniculus	Rabbit (European Rabbit)	1/10/2022
Ovis aries	Sheep (Feral Sheep)	15/04/2019
Oxyura australis	Blue-billed Duck	12/05/2006
Pachycephala rufiventris rufiventris	Rufous Whistler	8/11/2012
Pardalotus striatus substriatus	Striated Pardalote	8/11/2012
Passer domesticus domesticus	House Sparrow	19/10/2010
Pedionomus torquatus	Plains-wanderer	9/05/2006
Peltohyas australis	Inland Dotterel	11/05/2006
Petrochelidon ariel	Fairy Martin	26/09/2006

Scientific Name	Common Name	Date of Last Record
Petrochelidon nigricans	Tree Martin	8/11/2012
Petrogale sp.		19/10/2010
Petrogale xanthopus xanthopus	Yellow-footed Rock-wallaby	20/09/2021
Petroica boodang boodang	Scarlet Robin	8/11/2012
Petroica goodenovii	Red-capped Robin	1/12/2020
Phalacrocorax sp.		14/10/2010
Phalacrocorax sulcirostris	Little Black Cormorant	19/10/2010
Phaps chalcoptera	Common Bronzewing	18/10/2010
Phaps histrionica	Flock Bronzewing	1/12/2020
Phylidonyris pyrrhopterus	Crescent Honeyeater	20/09/2006
Planigale gilesi	Giles' Planigale (Paucident Planigale)	1/10/2022
Planigale tenuirostris	Narrow-nosed Planigale	1/10/2022
Podargus strigoides	Tawny Frogmouth	17/03/2019
Pogona barbata	Eastern Bearded Dragon	29/11/2020
Pogona sp.		21/05/2005
Pogona vitticeps	Central Bearded Dragon	24/11/2022
Poliocephalus poliocephalus	Hoary-headed Grebe	20/04/2018
Pomatostomus ruficeps	Chestnut-crowned Babbler	1/12/2020
Pomatostomus superciliosus	White-browed Babbler	19/11/2011
Poodytes gramineus goulburni	Little Grassbird	13/08/1996
Psephotellus varius	Mulga Parrot	6/11/2012
Pseudechis australis	Mulga Snake	30/11/2020
Pseudomys bolami	Bolam's Mouse	1/10/2022
Pseudomys desertor	Desert Mouse	5/03/2011
Pseudomys hermannsburgensis	Sandy Inland Mouse	10/11/2012
Pseudomys sp.		30/08/1996
Pseudonaja aspidorhyncha	Patch-nosed Brown Snake	11/11/2012
Pseudonaja mengdeni	Gwardar	24/09/2006
Pseudonaja textilis	Eastern Brown Snake	30/11/2020
PSEUDOSCORPIONES sp.	False Scorpions	20/07/2009
Psophodes cristatus	Chirruping Wedgebill	1/12/2020
Psophodes occidentalis	Chiming Wedgebill	7/11/2012
Ptilotula penicillata	White-plumed Honeyeater	17/03/2009
Purnella albifrons	White-fronted Honeyeater	29/11/2020
Pygopus schraderi	Eastern Hooded Scaly-foot	11/11/2021
Pyrrholaemus brunneus	Redthroat	1/12/2020
Rhipidura albiscapa	Grey Fantail	28/05/2005
Rhipidura leucophrys leucophrys	Willie Wagtail	1/12/2020
Rhynchoedura eyrensis	Eyrean Beaked Gecko	12/11/2021
Rhynchoedura ornata (NC)	Beaked Gecko	13/11/2012
Rhynchoedura ornata (revised)	Western Beaked Gecko	23/11/2017
Scotorepens balstoni	Inland Broad-nosed Bat	5/04/2012
Scotorepens sp.		27/11/2020
Smicrornis brevirostris	Weebill	8/11/2012

Scientific Name	Common Name	Date of Last Record
Sminthopsis crassicaudata	Fat-tailed Dunnart	1/10/2022
Sminthopsis macroura	Stripe-faced Dunnart	1/10/2022
Sminthopsis murina	Common Dunnart	20/10/2010
Sminthopsis sp.		24/09/2006
Strophurus ciliaris	Northern Spiny-tailed Gecko	23/04/2018
Strophurus intermedius	Southern Spiny-tailed Gecko	1/10/2022
Strophurus williamsi	Eastern Spiny-tailed Gecko	17/11/2008
Struthidea cinerea cinerea	Apostlebird	16/03/2019
Sturnus vulgaris vulgaris	Common Starling	26/05/2005
Sugomel niger	Black Honeyeater	5/09/1996
Sus scrofa	Pig (Feral Pig)	27/03/2019
Suta spectablilis	Mallee Black-headed Snake	18/10/2014
Suta suta	Curl Snake	1/10/2022
SYMPHYLA sp.	Symphylans	20/07/2009
Tachybaptus novaehollandiae novaehollandiae	Australasian Grebe	10/11/2012
Tadarida sp.		27/05/2005
Tadorna tadornoides	Australian Shelduck	13/07/2017
Taeniopygia guttata castanotis	Zebra Finch	1/12/2020
Tiliqua occipitalis	Western Bluetongue	8/11/2012
Tiliqua rugosa	Sleepy Lizard	14/11/2021
Tiliqua scincoides	Eastern Bluetongue	20/10/2010
Todiramphus pyrrhopygius	Red-backed Kingfisher	12/11/2012
Todiramphus sanctus sanctus	Sacred Kingfisher	8/11/2012
Tribonyx ventralis	Black-tailed Nativehen	10/05/2006
Turnix velox	Little Buttonquail	1/12/2020
Tympanocryptis lineata complex	Lined Earless Dragon	3/10/2019
Tympanocryptis petersi	Lined Earless Dragon	28/09/2021
Tympanocryptis sp.		9/12/2011
Tympanocryptis tetraporophora	Eyrean Earless Dragon	1/10/2022
Tyto javanica delicatula	Eastern Barn Owl	10/12/2011
Underwoodisaurus milii	Common Barking Gecko	9/11/2012
Vanellus miles	Masked Lapwing	26/05/2007
Vanellus tricolor	Banded Lapwing	1/12/2020
Varanus gouldii	Sand Goanna	24/11/2022
Varanus sp.	goannas	28/05/2005
Vespadelus baverstocki	Inland Forest Bat	10/04/2012
Vespadelus sp.		30/11/2020
Vulpes vulpes	Fox (Red Fox)	4/05/2012

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9.2 APPENDIX 2: ROCK CHARACTERISATION REPORT

Kalkaroo Copper

MC3828

Waste Characterisation Assessment

September 2021

TABLE OF CONTENTS

1 OBJECTIVES

The objectives of this report and the test work were to:

- Determine the acid forming characteristics and ARD potential of rock samples of the borrow pit material intended to be quarried from MC 3828;
- Identify any sample areas that will be problematic with respect to ARD generation;
- Determine the elemental composition of the samples and identify any elements, which may be of concern; and
- Determine the saline/sodic characteristics and potential for salinity issues of the waste material.

This waste rock characterisation report has been conducted on the sole rock types to be quarried from the open pit proposed on MC 3828. This report supports the Mining Lease Proposal for MC 3828 to ensure that the potential risks to the environment from contamination through Acid Rock Drainage (ARD), salinity and heavy metals have been evaluated and appropriate environmental management plans established if required.

2 BACKGROUND

2.1 Location

The EMLP area is located on Kalkaroo Pastoral Station, approximately 9kms south of the Kalkaroo Copper Project. It lies within Exploration Licence No. 5800 and resides wholly within Mineral Claim No. MC 3828.

The New South Wales - South Australia border is located approximately 60 km to the east, and the Barrier Highway about 40 km to the south. The nearest population centre is Broken Hill, approximately 100 km east of the project.

Kalkaroo Copper Pty Ltd proposes to excavate a small borrow pit on a low rise comprising of an estimated 240,000 cubic metres of rock material resource. A total of 172,000 cubic metres of material is planned to be won from the borrow pit and it shall reach a maximum depth of 5.0 metres below ground level on completion of mining. Mining will be completed using conventional quarrying methods. The intended use of this rock material is to provide a source of aggregate for road construction and sheeting applications necessary to support development of Kalkaroo Copper's Copper-Gold Project and to sheet the existing public access road as needed.

Figure 1 shows the regional location of the EMLP area.

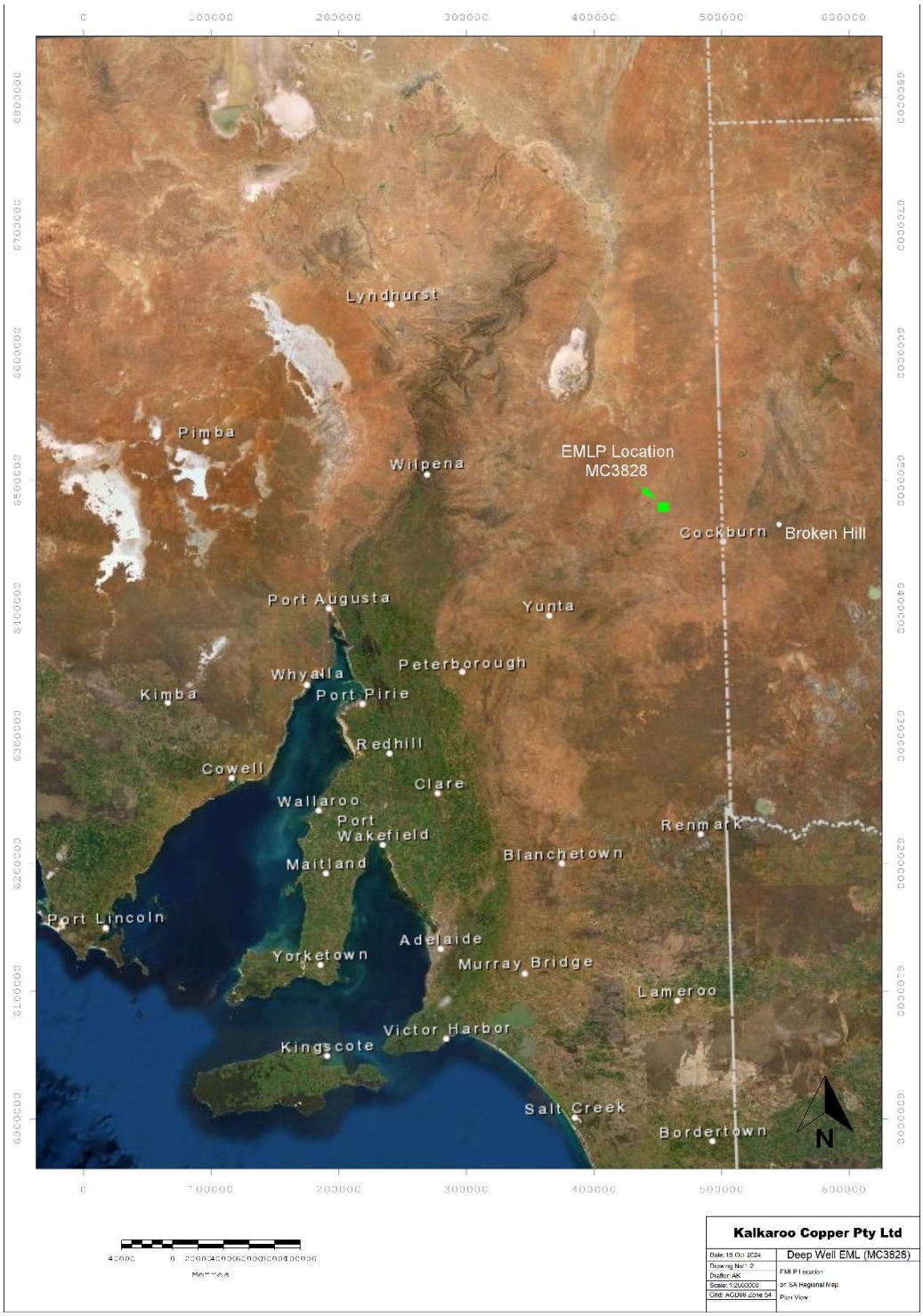


Figure 1: Regional location of the proposed borrow pit located within MC3828

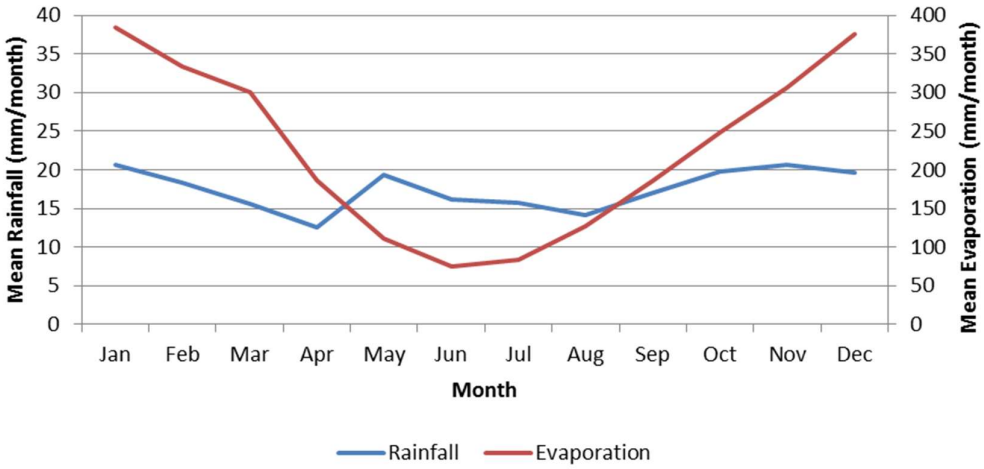
2.2 Climate

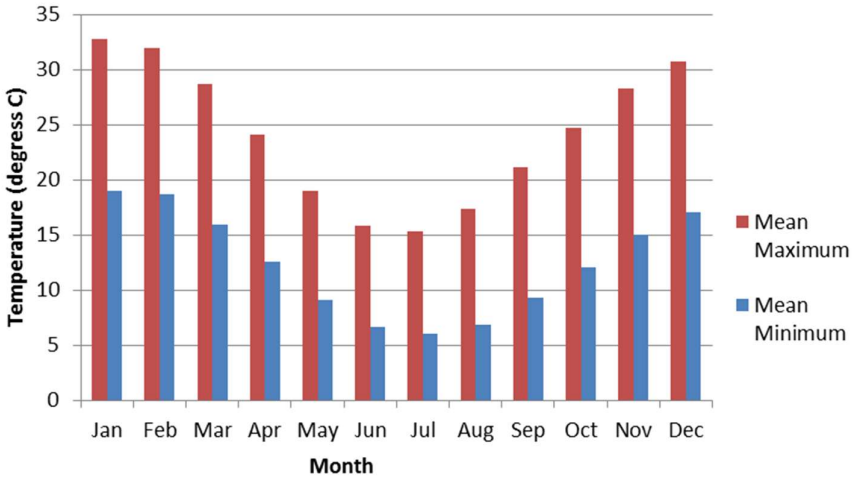
The project is located in a semi-arid environment where the annual pan evaporation exceeds annual rainfall by an average ratio of about twelve. Historical data from the Bureau of Meteorology for the town of Cockburn (the location of the nearest weather station, station number 20002) indicates that the annual average rainfall for the past 15 years is 253 mm/year (where incomplete records of data exist for a given year, data for the respective year has been excluded).

Although Cockburn is the closest weather station to the Project, there are no evaporation data available. The nearest station with available data is Umberumberka Reservoir (station number 047039) which is located 50km east of Cockburn. Pan evaporation at the site is expected to be significantly higher during the summer months, with summer evaporation approximately five times that of winter months. Graph 1 shows the rainfall and evaporation data for the Project.

Temperature data have been used from Broken Hill, approximately 130 km southeast from the site by road as no information was available for Cockburn or Umberumberka. Graph 2 shows the temperature data for the project area.

Graph 1: Rainfall and evaporation data from Cockburn weather station





Graph 2: Temperature data from Broken Hill weather station

The 1 in 100 year annual exceedance probability (AEP) 72 hour storm event for the site has an estimated intensity of 2.16 mm/hr, resulting in a total predicted rainfall of 156 mm.

2.3 Historical Activity

There are no known contamination issues within the EMLP area. Pre-existing disturbance has occurred within the EMLP area through historical road works activities where some of the rock of interest from within MC3828 was historically used to sheet a section of the existing government road that became boggy in wet weather.

Previous exploration activities have resulted in a number of exploration drill sites by earlier explorers mainly completed in the late 1990s. None of these drill holes have been found within the EMLP area from a physical ground inspection of the EMLP area on foot.

3 GEOLOGY

The material of interest consists of dark grey weakly metamorphosed siltstone-shale of the ~1650 million year old Palaeo-Proterozoic metasediments of the Strathearn Group. of the Olary Domain part of the Curnamona Province in north eastern South Australia.

This low rise is the top of a basement topographic high or ridge, which protrudes through an onlapping Quarternary age cover sequence. The material to be quarried outcrops on MC 3828.

The material to be quarried is generally uniform, consisting predominantly of flaggy dark grey (reduced) variably biotitic &/or graphitic siltstone to shale (pelite), with a low metamorphic grade of probable lower greenschist facies.

Historically, the material has already been used un-crushed und likely unscreened at various places along the Mingary to Kalkaroo road.

For the purposes of this report, only this rock material will be quarried and extracted for use and no other lithological rock types exist within the proposed borrow pit location within MC 3828.

4 WASTE MATERIAL INVENTORY

The EMLP area containing the low rocky rise of interest was surveyed using DGPS instrumentation. Data from this DGPS survey was then triangulated to produce a three-dimensional Digital Terrain Model (DTM) of the EMLP area. From this DTM, a mineable surface rock resource of approximately 240,000 cubic metres of material has been ascertained. A total of 172,000 cubic metres of material is planned to be won from the borrow pit and it shall reach a maximum depth of 5.0 metres below ground level on completion of mining.

5 SAMPLE LOCATIONS

Representative samples of the outcropping waste rock were selected. A plan view of the sample locations is shown in Figure 2.

Figure 2: Showing the locations of Surface Rock Samples obtained for testing.

6 TESTING

Ten (10) samples consisting of representative waste rock were submitted for analysis to enable initial classification of the selected waste rock types by acid rock drainage (ARD) criteria.

The samples were analysed using the following traditional geochemical static tests by Bureau Veritas Minerals Pty Ltd (BV).

- Total Sulphur (S) analysis
- Total Sulphate Sulphur
- Total Oxidisable Sulphur
- Acid neutralising capacity (ANC) testing;
- Single addition net acid generation testing (NAG).
- Net acid producing potential (NAPP)

In addition, selected samples underwent further testing by BV which included;

- Multi-element heavy metal analysis of solids
- Laboratory pH (1:5 soil:water leach)
- Electrical Conductivity (1:5 soil:water leach)

7 ACID MINE DRAINAGE ANALYSIS

7.1 Acid Base Accounting (ABA)

The ABA evaluates the balance between acid generation processes (via oxidation of sulphide minerals) and acid neutralising processes and it involves determining the maximum potential acidity (derived from %total sulphur) and the inherent acid neutralising capacity (ANC).

Traditionally, NAPP testing is used as a screening test to qualitatively determine the acid generating potential based upon acid-base accounting. Two measures of the ABA are calculated, the Net Acid Producing Potential (NAPP) and the ANC/MPA Ratio. Generally, very close to zero or negative NAPP values for samples indicate that the sample may have sufficient ANC to prevent acid generation. Conversely, positive NAPP results indicate the material may be acid generating.

The ANC/MPA Ratio provides and indication of the relative margin of safety for acid generation within material and generally ranges from 1.0 to 3. Literature investigations show that the potential for ARD production is very low for mine waste materials with ANC/MPA ratios greater than 2. (Amira, 2002. Campbell G, 2007).

Table 1 presents the acid-forming characteristics and ARD classification for each sample. The samples have been selected according to the representative rock likely to be encountered during mining.

The acid-base characteristics of the rock from the EMLP area to be mined are as follows:

Ten samples were provided for analysis. The total Sulphur(S) contents ranged from less than 0.01 to 0.17%$S_{(tot)}$ with a Median of 0.05% $S_{(tot)}$.

ANC values ranged from 9.0 kg H_2SO_4/t to 14.0 kg H_2SO_4/t with a median of 14 kg H_2SO_4/t.

Based upon the ABA accounting, all ten samples are classified as Non-Acid Forming.

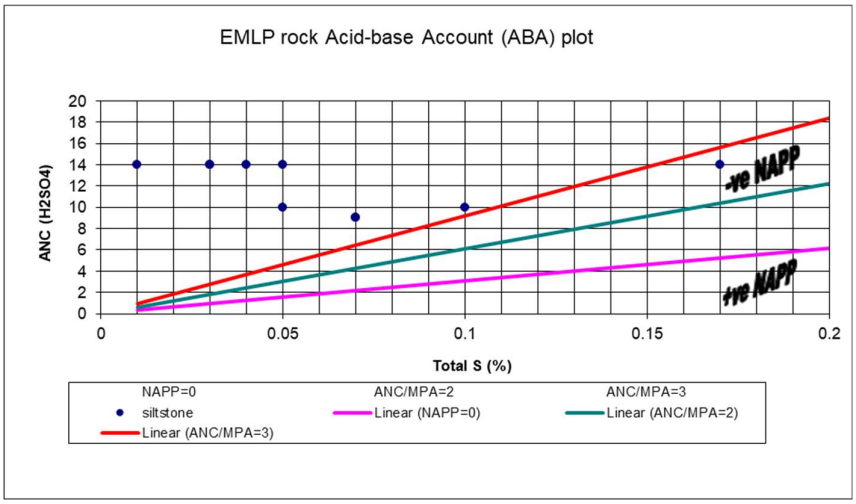


Figure 3: Acid-base account plot of representative rock to be mined from within MC 3828.

Figure 3 is an acid-base account plot of ANC versus total S. The NAPP zero line which defines NAPP positive and NAPP negative domains and lines for ANC/MPA ratio values of 2 and 3 are also plotted. The NAPP=0 line is equivalent to an ANC/MPA ratio of 1. The figure shows that all samples had an ANC/MPA ratio above 2.

7.2 Net Acid Generation and Sample Classification

The NAPP value is used in conjunction with the single addition net acid generation (NAG) test to geochemically classify samples in relation to their ARD potential. For the purposes of this report, a typical Acid forming potential (AFP) classification criteria is shown below in Table 1.

*Table 1 Acid forming potential classification criteria**

Primary geochemical material type	Final NAG pH	Static NAG Value kg H_2SO_4/t	NAPP kg H_2SO_4/t
Potentially Acid Forming (PAF)	< 4.5	> 5	Positive
Potentially Acid Forming - Low Capacity (PAF-LC)	≤ 4.5	≤ 5	Positive
Non Acid Forming (NAF)	≥ 4.5	≤ 0.5	< 0.5
Acid Consuming Material (ACM)	≥ 4.5	< 0.5	< -100
Uncertain (UC-NAF)	≥ 4.5	< 0.5	Positive
Uncertain (UC-PAF)	< 4.5	> 0.5	Negative

**Taken from LEADING PRACTICE SUSTAINABLE DEVELOPMENT PROGRAM FOR THE MINING INDUSTRY- Managing Acid and Metalliferous Drainage, 2016 but with a modification of PAF-LC ≤10 to PAF-LC ≤ 5.*

The single addition NAG test involves reaction of a sample with hydrogen peroxide to rapidly oxidise any sulphide minerals present. Both acid generation and acid neutralisation occur simultaneously during the NAG test, hence the end result represents a direct measurement of the net amount of acid generated.

Figure 4 is a typical ARD classification plot showing NAGpH versus NAPP of the representative rock samples taken. The results show that the samples all plot in the NAF domain,

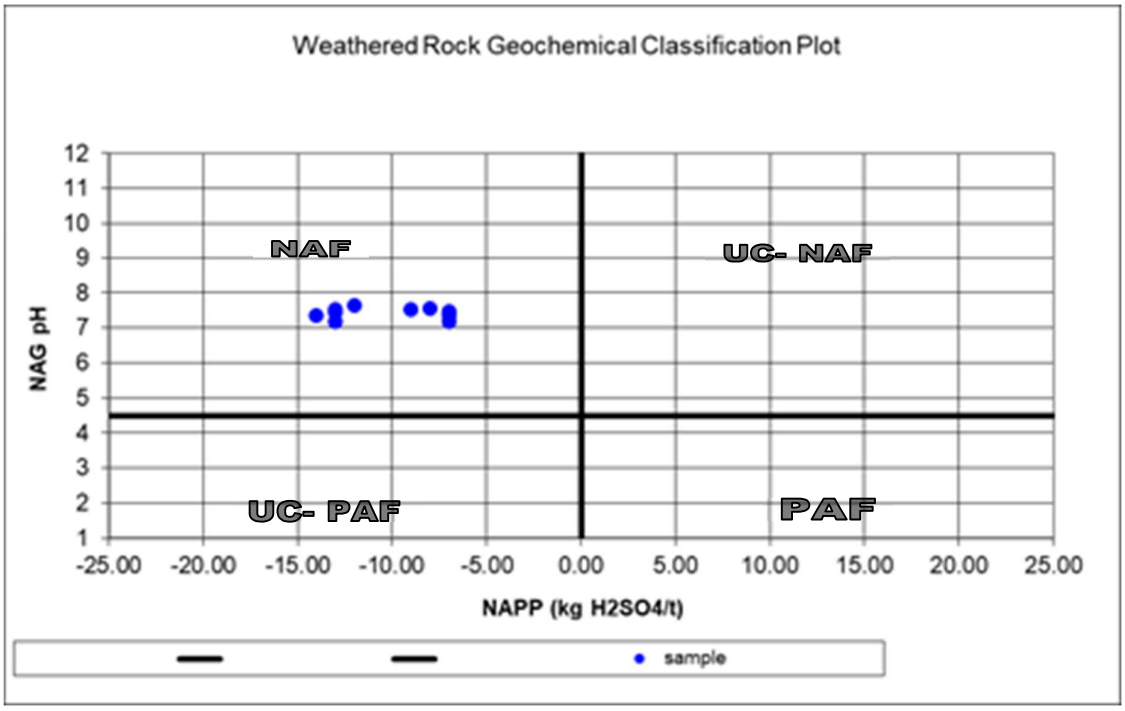


Figure 4: ARD classification plot of the representative rock material to be quarried from the proposed borrow pit on MC3828.

The ARD test results and sample classifications are shown in Table 2. All samples are classified as NAF based upon test results and ARD static assessment criteria and therefore pose no risk from Acid Rock Drainage.

Table 2: Acid forming characteristics of samples from the Kalkaroo Project

Sample_ID	Sample_no	from	to	ph	EC	NAG ph(OX)	$NAG_{4.5}$	$NAG_{7.0}$	NAPP	ANC	Oxidsable Sulfur	MPA	ANC/MPA	Total Sulfur	Geochemical
				pH Unit	uS/cm	pH Unit	kg H_2SO_4/t	kg H_2SO_4/t	kg H_2SO_4/t	kg H_2SO_4/t	%	kg H_2SO_4/t	Ratio	%	Classification
DEECTION LIMIT				**0.01**	**1**	**0.01**	**0.5**	**0.5**	**1**	**1**	**0.05**	**0.5**		**0.01**	
DW_ARD_	1	surface		8.8	169	7.2	<0.5	<0.5	-13	14	<0.05	1.0	14.0	0.03	NAF
DW_ARD_	4	surface		8.9	232	7.5	<0.5	<0.5	-9	14	<0.05	5.0	2.8	0.17	NAF
DW_ARD_	5	surface		8.9	235	7.2	<0.5	<0.5	-7	9	<0.05	2.0	4.5	0.07	NAF
DW_ARD_	6	surface		8.8	282	7.4	<0.5	<0.5	-7	10	<0.05	3.0	3.3	0.1	NAF
DW_ARD_	7	surface		8.8	273	7.5	<0.5	<0.5	-7	9	<0.05	2.0	4.5	0.07	NAF
DW_ARD_	8	surface		9.1	155	7.3	<0.5	<0.5	-14	14	<0.05	<0.5		<0.01	NAF
DW_ARD_	9	surface		8.9	250	7.6	<0.5	<0.5	-8	10	<0.05	1.5	6.7	0.05	NAF
DW_ARD_	10	surface		9.0	229	7.6	<0.5	<0.5	-12	14	0.05	1.5	9.3	0.05	NAF
DW_ARD_	11	surface		9.0	165	7.5	<0.5	<0.5	-13	14	<0.05	1.0	14.0	0.03	NAF
DW_ARD_	13	surface		8.9	177	7.5	<0.5	<0.5	-13	14	<0.05	1.0	14.0	0.04	NAF

8 MULTI-ELEMENT COMPOSITIONS OF SOLID SAMPLES

Multi-element scans were conducted on representative samples from each waste category. The elements included in the testing program were Arsenic, Barium, Berylium, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Nickel, Selenium, Vanadium, Zinc and Mercury. The multi-element composition analysis for the representative rock samples are presented in Table 3.

The results for each element were then compared with average crustal abundance data on a log 2 scale to provide an extent of element enrichment. These comparisons are reported as Geochemical Abundance Indices (GAI's). As a general rule, literature states that elements with a GAI of 3 or greater, signifies enrichment to a concentration that warrants further examination. Table 4 shows the GAI for each assayed element.

The results show that all elemental enrichments are below the Health based Investigation Levels (HIL) for parks, recreational open space and playing fields as described under Schedule B(1) of the National Environmental Protection Council (NEPC) Guideline on Investigation Levels for Soil and Groundwater. The rock would be categorised as having elemental enrichments very similar to the average concentration in the earths crust as all GAI were zero.

Table 3: *Multi-element composition analysis for the EMLP area borrow pit location.*

Project	Lithology	Sample_ID	Sample_no	from	to	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Nickel	Vanadium	Zinc	Mercury	Selenium
						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
Average Crustal Abundance						*1.8*	*425*	*2.8*	*0.2*	*100*	*25*	*55*	*12.5*	*950*	*75*	*135*	*70*	*0.08*	*0.05*
NEPC Health Based Investigation Limits for Soils (Schedule B(1) Parks, recreational open space and playing fields)						*200*	*-*	*20*	*20*	*200*	*200*	*2000*	*600*	*3000*	*600*	*-*	*14000*	*30*	*700*
Crozier Hill	Siltstone	DW_ARD_	1	surface		0.1	0.5	0.1	0.1	0.1	2	0.1	0.1	0.9	0.8	0.1	0.5	0.1	0.1
Crozier Hill	Siltstone	DW_ARD_	4	surface		0.1	1.8	0.1	0.1	0.1	2	0.1	0.1	2.1	0.7	0.1	0.1	0.1	0.1
Crozier Hill	Siltstone	DW_ARD	5	surface		0.1	1.9	0.1	0.1	0.1	2	0.1	0.1	1	0.7	0.1	0.1	0.1	0.1
Crozier Hill	Siltstone	DW_ARD_	6	surface		0.1	2.5	0.1	0.1	0.1	2	0.1	0.1	1.3	0.6	0.1	0.1	0.1	0.1
Crozier Hill	Siltstone	DW_ARD_	7	surface		0.1	2.5	0.1	0.1	0.1	17	0.1	0.1	1.8	0.5	0.1	0.2	0.1	0.1
Crozier Hill	Siltstone	DW_ARD_	8	surface		0.1	2.8	0.1	0.1	0.1	5	0.1	0.1	1.7	0.5	0.1	0.5	0.1	0.1
Crozier Hill	Siltstone	DW_ARD_	9	surface		0.1	1.5	0.1	0.1	0.1	2	0.1	0.1	2.2	0.4	0.1	0.1	0.1	0.1
Crozier Hill	Siltstone	DW_ARD	10	surface		0.1	1.8	0.1	0.1	0.1	2	0.1	0.1	2.4	0.4	0.1	0.3	0.1	0.1
Crozier Hill	Siltstone	DW_ARD_	12	surface		0.1	3.9	0.1	0.1	0.1	2	0.1	0.1	3.2	0.3	0.1	0.6	0.1	0.1
Crozier Hill	Siltstone	DW_ARD_	13	surface		0.1	3.4	0.1	0.1	0.1	2	0.1	0.1	3.2	0.3	0.1	0.9	0.1	0.1
Median value of the representative samples						***0.1***	***2.2***	***0.1***	***0.1***	***0.1***	***2***	***0.1***	***0.1***	***1.95***	***0.5***	***0.1***	***0.25***	***0.1***	***0.1***

Table 4: Multi-element GAI interpretations for the EMLP area borrow pit location.

Project	Lithology	Sample_ID	Sample_no	from	to	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Nickel	Vanadium	Zinc	Mercury	Uranium
						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
Average Crustal Abundance*						*1.8*	*425*	*2.8*	*0.2*	*100*	*25*	*55*	*12.5*	*950*	*75*	*135*	*70*	*0.08*	*0.05*
						Geochemical Abundance Indices													
Crozier Hill	Siltstone	DW_ARD	1	surface														0	0
Crozier Hill	Siltstone	DW_ARD	4	surface														0	0
Crozier Hill	Siltstone	DW_ARD_	5	surface														0	0
Crozier Hill	Siltstone	DW_ARD	6	surface														0	0
Crozier Hill	Siltstone	DW_ARD_	7	surface														0	0
Crozier Hill	Siltstone	DW_ARD_	8	surface														0	0
Crozier Hill	Siltstone	DW_ARD	9	surface														0	0
Crozier Hill	Siltstone	DW_ARD_	10	surface														0	0
Crozier Hill	Siltstone	DW_ARD_	12	surface														0	0
Crozier Hill	Siltstone	DW_ARD_	13	surface														0	0

GAI = log2[Cn/(1.5 x Bn)]

Where: Cn= measured content of the sample

Bn = “average” crustal abundance of the element.

9 SALINITY AND SODICITY PROPERTIES

Risks from the production of saline seepage depends on the dissolution of salt in the rock and its leaching by water. In time, the rate of salt movement will slow down until the material becomes essentially inert and the ambient salinity of the water is not affected. Leaching by water can generate contaminated effluents with elevated concentrations of dissolved salts. Sources of saline drainage include seepage and runoff from rock.

The assessment of Saline/Sodic wastes has been interpreted in accordance with *Queensland DME – 'Technical guidelines for the environmental management of exploration and mining 'Assessment and management of saline/sodic wastes' (January, 1995)* with additional classification using US Department of Agriculture criteria.

Table 5 shows the indicative criteria used for analysis of the screening test results.

Table 5: *Saline/sodic screening test criteria used (Taken from Managing Sodic Soils no. 0.504, US Department of Agriculture.*

	pH(1:5)	ESP %	SAR	EC (1:5) dSm-1
Normal	<8.5	<15	<13	<0.45
Saline	<8.5	<15	<13	<0.45
Saline-Sodic	<8.5	>15	>13	>0.45
Sodic	>8.5	>15	>13	>0.45

9.1 Testing and results

Initial screening tests were conducted to determine pH and electrical conductivity (EC), This analysis work was conducted by BV laboratory group.

The results of the initial screening test work are summarised in Table 6. The results indicate the rock to exhibit sodic properties with pH exceeding 8.5 in all samples and likely low salinity due to the very low EC values in all samples.

Table 6: Initial Saline/sodic screening test results for the Crozier Hill Borrow pit

Project	Sample_ID	Sample_no	from	to	ph	EC	EC	Classification
					pH Unit	uS/cm	dSm^{-1}	
Sample				LOR*	0.1			
Siltstone	DW_ARD_	1	surface		8.84	169	0.169	Sodic/Low Salinity
Siltstone	DW_ARD_	4	surface		8.89	232	0.232	Sodic/Low Salinity
Siltstone	DW_ARD_	5	surface		8.88	235	0.235	Sodic/Low Salinity
Siltstone	DW_ARD_	6	surface		8.76	282	0.282	Sodic/Low Salinity
Siltstone	DW_ARD_	7	surface		*8.83*	*273*	0.273	Sodic/Low Salinity
Siltstone	DW_ARD_	8	surface		9.06	155	0.155	Sodic/Low Salinity
Siltstone	DW_ARD_	9	surface		8.91	250	0.25	Sodic/Low Salinity
Siltstone	DW_ARD_	10	surface		*8.96*	*229*	0.229	Sodic/Low Salinity
Siltstone	DW_ARD_	12	surface		8.97	165	0.165	Sodic/Low Salinity
Siltstone	DW_ARD_	13	surface		8.87	177	0.177	Sodic/Low Salinity

10 CONCLUSION

The rock material to be mined from the borrow pit location within MC3828 has been classified as Non Acid Forming, based upon the static ARD test work analysis and results on the representative samples assessed.

The rock material to be mined does not contain any individual elemental enrichments that require further investigation. The material is a benign rock with very low elemental composition.

The results show the rock material to be Sodic based upon pH testing but have low salinity based upon Electrical Conductivity results. This suggests the material will not pose any environmental risks when used in road sheeting applications.

11 REFERENCES

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9.3 APPENDIX 3: LEASE APPLICATION

File Copy

Government of South Australia
Primary Industries and Resources SA

Form 10
MINING ACT 1971

APPLICATION FOR MINING LEASE

(Please use BLOCK LETTERS)

1. Applicant

I, KALKAROO COPPER PTY LTD
(Full name or company name)

of 63 CONYNGHAM STREET, GLENSIDE SOUTH AUSTRALIA 5065
(Full address for correspondence or company registered address)

apply for –

- ☐ a mineral lease
- ☑ an extractive minerals lease

(tick one box)

over –

- ☑ the whole of the land comprised in mineral claim number .... MC 3828

or

- ☐ that portion of the land comprised in mineral claim number ..... shown on the attached sketch plan.

The area applied for as a lease is within the OH (CURNAMONA) council area.

2. Ownership of land[1] (including native title claims and declarations) within area of proposed lease
The following searches[2] have been conducted to establish ownership (or claims to ownership) of land within the area of the proposed lease with the following results:

BLOCK 1121 (PLAN NO.834800, CL1285/21) OWNED BY URANIUM ONE AUST PTY LTD

[1] *See notes at end of document for information on the "owner" of land.*
[2] *Include LTO searches and searches of the State Native Title Register and the Register of Native Title Claims kept under the Native Title Act 1993 of the Commonwealth.*

A copy of each of the following must be attached:

- each title evidencing ownership of the land (if any); and
- an extract from the State Native Title Register relating to the land (if any entry exists); and
- an extract from the Register of Native Title Claims (Cwth) relating to claims to native title in the land (if any entry exists).

3. Potential native title land within area of proposed lease[3]
At the time of application, native title (within the meaning of the *Native Title (South Australia) Act 1994)* exists or might exist in the following land within the area of the proposed lease (even though there is currently no registered claim to, or declaration of, native title in the land)[4]:

SAD6001/98 ADNYAMATHANHA NO.1 SC99/1

[3] *See notes at end of document for information on relevant definitions under the Act.*
[4] *Include all areas in respect of which native title has not been extinguished.*

4. Negotiations with native title parties
If native title land is within the area of the proposed lease, *tick one box and give details:*

☐ A native title mining agreement was registered under Part 9B of the *Mining Act 1971*
on .....

☐ A native title mining determination was registered under Part 9B of the *Mining Act 1971*
on .....

☑ An agreement or determination has not been registered but the following steps have been taken towards negotiations with native title parties:
Ongoing discussions with claimants & their lawyers towards the preparation of a draft agreement...

Tick following box if the Minister is requested to process the application while a native title mining agreement is negotiated:

☑ I seek an agreement with the Minister that the lease will be granted contingent on the registration of an agreement or determination under Part 9B of the *Mining Act 1971*. I understand that the lease cannot be granted until the agreement or determination is registered.

Note: The Minister may refuse an application for a lease over native title land if it appears to the Minister that the applicant is not proceeding with reasonable diligence to obtain the agreement or determination necessary to the grant of the lease.

5. Exempt land within area of proposed lease

- The following land within the area of the proposed lease is exempt land under section 9 of the *Mining Act 1971*[5]:

[5] *Please identify exempt land in a sketch plan. Do not include land that has ceased to be exempt land because of a waiver of exemption or a court determination about compensation payable to the owner.*

- Waivers of exemption have been negotiated in relation to the following land within the area of the proposed lease:

A copy of each waiver not previously forwarded to the Mining Registrar must be attached.

6. Notice of entry to land
Give details, attach copies or tick box as appropriate:

- Notice of entry was given to the following owners of the land under section 58A of the *Mining Act 1971* on the following dates:

Owners:	Date:
URANIUM ONE AUST PTY LTD	11th JANUARY 2008

A copy of each notice not previously forwarded to the Mining Registrar (including appropriate details about the service of the notice in accordance with the requirements of Part 7 of the Mining Regulation – see also Form 21) must be attached.

- Notice of entry has not been given to the following owners of the land because entry is authorised by an agreement with those owners:

Owners:

A copy of each agreement not previously forwarded to the Mining Registrar must be attached.

- Notice of entry has not been given to the holders of native title in the land because entry is authorised by –
  - a native title mining agreement under Part 9B of the *Mining Act 1971* ☐
  - a native title mining determination under Part 9B of the *Mining Act 1971* ☐

7. **Attached plans and statements**
   The following must be attached:

- a plan showing the area of the mineral claim and the area of the proposed lease; and
- a statement of the mining operations proposed to be carried out under the lease and the measures proposed to be taken to remedy damage to land that may result from the proposed mining operations (in the form of Form 11 of schedule 1 of the *Mining Regulations* 1996 together with the plan required by that form).

Form 11 Attached

8. **Additional information:**
   1. Contact telephone number: 08 83389292
   2. Contact facsimile number (if available): 08 83389293
   3. If the applicant is a company:
      (1) A.C.N. No.: 28 111 129 812
      (2) Contact person: CHRIS GILES

DATE: 3rd JULY 2008

SIGNATURE[6]: .....
or
COMPANY SEAL[7]:

COMMON SEAL
KALKAROO COPPER PTY LTD
A.C.N. 111 129 812

.....
(Director)

.....
(Director/~~Secretary~~)

[6] *This application must be executed by the holder of the relevant mineral claim.*
[7] *If the applicant is a company, the application must bear the company's seal and be witnessed by appropriate officers.*

RELEVANT PROVISIONS FROM THE MINING ACT 1971

1. **"Owner"** of land means –
   (a) a person who holds a registered estate or interest in the land conferring a right to immediate possession of the land; or
   (b) a person who holds native title in the land; or
   (c) a person who has, by statute, the care, control or management of the land; or
   (d) a person who is lawfully in occupation of the land.

2. **"Native title land"** means land in respect of which native title exists or might exist but does not include –
   (a) land found or declared by the Supreme Court or the Environment, Resources and Development Court not to be subject to native title; or
   (b) land found or declared by a competent authority under a law of the Commonwealth not to be subject to native title.

3. **Native title**
   (1) The expression **"native title"** means the communal, group or individual rights and interests of Aboriginal peoples

- Notice of entry has not been given to the holders of native title in the land because entry is authorised by –
  - a native title mining agreement under Part 9B of the *Mining Act 1971* ☐
  - a native title mining determination under Part 9B of the *Mining Act 1971* ☐

7. Attached plans and statements

The following must be attached:

- a plan showing the area of the mineral claim and the area of the proposed lease; and
- a statement of the mining operations proposed to be carried out under the lease and the measures proposed to be taken to remedy damage to land that may result from the proposed mining operations (in the form of Form 11 of schedule 1 of the *Mining Regulations* 1996 together with the plan required by that form).

Form 11 Attached

8. Additional information:

1. Contact telephone number: 08 83389292
2. Contact facsimile number (if available): 08 83389293
3. If the applicant is a company:
   (1) A.C.N. No.: 28 111 129 812
   (2) Contact person: CHRIS GILES

DATE: 3rd JULY 2008

SIGNATURE[6]**:** .....
or
COMPANY SEAL[7]**:**

COMMON SEAL
KALKAROO COPPER PTY LTD
A.C.N. 111 129 812

.....
(Director)

.....
(Director/~~Secretary~~)

[6] *This application must be executed by the holder of the relevant mineral claim.*
[7] *If the applicant is a company, the application must bear the company's seal and be witnessed by appropriate officers.*

Secure-CHEQUE 3 – SEE REVERSE

nab National Australia Bank Limited
22 King William Street Adelaide SA

000138
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⑈000138 ⑈085⑈005⑆85406⑈9271⑈

3. **Native title**

(1) The expression **"native title"** means the communal, group or individual rights and interests of Aboriginal peoples

in relation to land or waters where –

(a) the rights and interests are possessed under the traditional laws acknowledged, and the traditional customs observed, by the Aboriginal peoples; and

(b) the Aboriginal peoples, by those laws and customs, have a connection with the land or waters; and

(c) the rights and interests are recognised by the common law; and

(d) the rights and interests have not been extinguished or have revived.[1]

(2) Without limiting subsection (1), **"rights and interests"** in that subsection includes hunting, gathering, or fishing, rights and interests.

(3) Subject to subsection (4), if native title rights and interests as defined by subsection (1) are, or have been at any time in the past, compulsorily converted into, or replaced by, statutory rights and interests in relation to the same land or waters that are held by or on behalf of Aboriginal peoples, those statutory rights and interests are also covered by the expression **"native title".**

(4) To avoid doubt, subsection (3) does not apply to rights and interests created by a reservation or condition (and which are not native title):

(a) in a pastoral lease granted before 1 January 1994; or

(b) in legislation made before 1 July 1993, where the reservation or condition applies because of the grant of a pastoral lease before 1 January 1994.

(5) To avoid doubt, native title in land was extinguished by an act occurring before 31 October 1975 that was inconsistent with the continued existence, enjoyment or exercise of native title in the land.

Explanatory note –

This subsection is intended to be consistent with principles governing the extinguishment of native title as stated in *Mabo v Queensland (No. 2)* (1992) 175 C.L.R. 1. Examples of this principle of major public importance are –

(a) the valid grant, before 31 October 1975, of a freehold interest in land;

(b) the valid grant, before 31 October 1975, of a lease (including a pastoral lease but not a mining lease);

(c) the valid grant, assumption or exercise by the Crown, before 31 October 1975, of a right to exclusive possession of land.

However, if the grant of a freehold interest, a lease or a right of exclusive possession was made to or for the benefit of Aboriginal people, this subsection is not intended to apply to the grant unless it is a category A past act within the meaning of section 229, or a category B past act within the meaning of section 230, of the Commonwealth Act and, if it is a category B past act, this subsection only applies to the extent that the grant is inconsistent with the continued existence of native title in the land.

[1] *If section 47 of the Native Title Act 1993 (Cwth) is a valid enactment of the Commonwealth Parliament, it is possible that native title may revive in certain circumstances under that section.*

4. Exempt land (Section 9)

(1) Subject to this section –

(a) land that is lawfully and genuinely used –

(i) as a yard, garden, cultivated field, plantation, orchard or vineyard;

(ii) as an airfield, railway or tramway;

(iii) as the grounds of a church, chapel, school, hospital or institution; or

(b) land that constitutes any parklands or recreation grounds under the control of a council; or

(ba) land –

(i) that is dedicated or reserved, pursuant to statute, for the purpose of waterworks; or

(ii) that is vested in the Minister of Public Works for the purpose of waterworks; or

(iii) that is comprised within an easement in favour of the Minister of Public Works; or

(bb) land that constitutes a forest reserve under the *Forestry Act 1950;* or

(c) any separate parcel of land of less than 2 000 square metres within any city, town or township; or

(d) land that is situated –

(i) within 400 metres of a building or structure used as a place of residence (except a building or structure of a class excluded by regulation from the ambit of this paragraph); or

(ii) within 150 metres of –

(A) a building or structure, with a value of $200 or more, used for an industrial or commercial purpose; or

(B) a spring, well, reservoir or dam,

(but not if it is an improvement made for the purposes of mining operations),

shall be exempt from mining operations in pursuance of this Act and, unless the land ceases to be so exempt, no miner's right, precious stones prospecting permit, claim, lease or licence shall authorise prospecting, exploring or mining upon such land (but this section does not prevent the pegging out of a claim upon such land).

Government of South Australia
Primary Industries and Resources SA

Form 11 MINING ACT 1971

STATEMENT OF PROPOSED MINING OPERATIONS AND MEASURES TO REMEDY DAMAGE TO LAND

(Please use BLOCK LETTERS)

Pursuant to my application for a mining lease over mineral claim number

I submit the following statement in accordance with section 35 of the *Mining Act 1971*.

1. *(a)* The mineral(s) to be mined is ☐ are ☑ Construction Materials, Siltstone - Road Base

(b) Extraction will be open cut ☑ underground ☐

(c) Mining operations will be conducted throughout the year ☑ *OR*

only between the months of ☐

[ ] and [ ]

(d) Hours of operation are expected to be from [6.30] a.m. to [6.30] p.m. on

[7] days a week.

(e) Explosives ☑ will ☐ will not be used.

(f) The open cut ☑ underground ☐ operation is expected to extend over an area

of [300] metres by [250] metres and [5] metres deep.

(g) The screening measures shown on the plan consist of

No screening measures are shown. Screening measures will be addressed within the subsequent Mining Lease proposal (MLP). The MLP shall be submitted upon finalisation of all necessary environmental and project studies.

(h) The present land use is PASTORAL LAND USE (GRAZING)

(i) The proposed after use is PASTORAL LAND USE (GRAZING) and

will be achieved by COMPREHENSIVE REHABILITATION (TO BE ADDRESSED WITHIN MLP)

(j) Access will be gained from Mingary to Kalkaroo Road road as shown on the accompanying plan.

(k) Products will be transported to Kalkaroo Copper Project

and it is expected that [10] trucks per day ☑ week ☐ will use public roads.

(l) The following measures are proposed to remedy damage to land that may result from the mining operations.

Proposed measures to remedy damage to land arising from mining operations will be addressed in detail within the MLP. The MLP shall be lodged separately upon completion of all necessary environmental and project related studies pertaining to the project.

2. The attached plan shows with reasonable accuracy –

(a) the physical features of the area including high and low ground, the location of creeks, drainage channels, dams, roads, fences, power lines, existing workings, dumps and tailings dams, standing trees and shrubs and any other relevant features within or adjacent to the claim area;

(b) the location and extent of proposed open cut workings, shafts, adits, overburden dumps, mullock dumps, tailings dams, stockpiles, buildings and treatment plant, proposed access tracks to be constructed and silt dams to prevent stream pollution and siltation.

3. Additional information:

1. Full name.. KALKAROO COPPER PTY LTD
2. Address:... 63 CONYNGHAM STREET, GLENSIDE SOUTH AUSTRALIA 5065
3. Contact telephone number: 08 8338 9292
4. Contact facsimile number (if available):.. 08 83389293
5. (1) A.C.N. No.:..... 28 111 129 812
   (2) Contact person: CHRIS GILES

DATE:.. 3rd JULY 2008

SIGNATURE:.....
or
COMPANY SEAL[1]**:**

COMMON SEAL
KALKAROO
COPPER
PTY LTD
A.C.N. 111 129 812

.....(Director)

.....(Director/~~Secretary~~)

[1] *If a company, the document must bear the company's seal and be witnessed by appropriate officers.*

LSD 11

HAVILAH RESOURCES NL

63 Conyngham Street
Glenside 5065 South Australia
phone 61 8 8338 9292
fax 61 8 8338 9293

KALKAROO COPPER PTY LTD

Extractive Minerals Lease Application (EMLA) over MC 3828 "Deep Well"

The proposed Deep Well EMLA is located within Mineral Claim 3828 which is approximately 65km NE of Olary on Kalkaroo Station. The site is situated about 49km north of the Barrier Highway.

The Deep Well EML will be required to supply the Kalkaroo Copper project with necessary material for road building and infrastructure construction requirements until appropriate material can be sourced from the Kalkaroo Copper project open pit. Approximately 600,000t of rock from the Deep Well gravel pit will be mined. The gravel pit will cover an area of approximately 8 ha and have a maximum depth of about 5 metres.

Material will be mined from Deep Well at a rate of approximately 200,000 tpa on a campaign basis throughout the year.

Rock will be excavated using conventional truck and shovel techniques and will be stockpiled to a maximum height of 8 metres. A front end loader will feed a portable crushing and screening plant with material from this stockpile at a rate of 1500tpd to produce a coarse rubble aggregate suitable for use in road construction activities.

To access the "Deep Well EMLA" it is proposed to upgrade and utilise the existing Mingary to Kalkaroo road. Site access will be used by light and heavy vehicle traffic and will be subject to regular maintenance.

Site infrastructure will be kept to a minimum. Water will be supplied from the existing basement rock aquifer, pending results of further hydrogeological investigations for use in dust suppression activites on the EMLA.

Environmental management and baseline studies will be a key part of future planning and rehabilitation requirements of the project. The existing public road to Kalkaroo homestead, currently situated within the EMLA area, will require diverting to maintain safe public thoroughfare for other road users.

Rehabilitation will be undertaken progressively throughout the life of the project. Seed bearing topsoil will be removed prior to the commencement of operations and will be stockpiled separately for rehabilitation activities.

Government of South Australia
Primary Industries and Resources SA

Form 11 MINING ACT 1971

STATEMENT OF PROPOSED MINING OPERATIONS AND MEASURES TO REMEDY DAMAGE TO LAND

(Please use BLOCK LETTERS)

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1. *(a)* The mineral(s) to be mined is ☐ are ☑ Construction Materials, Siltstone - Road Base

(b) Extraction will be open cut ☐ underground ☐

(c) Mining operations will be conducted throughout the year ☑ ***OR***

only between the months of ☐

and

(d) Hours of operation are expected to be from 6.30 a.m. to 6.30 p.m. on

7 days a week.

(e) Explosives ☐ will ☐ will not be used.

(f) The open cut ☐ underground ☐ operation is expected to extend over an area

of 300 metres by 250 metres and 5 metres deep.

(g) The screening measures shown on the plan consist of

No screening measures are shown. Screening measures will be addressed within the subsequent Mining Lease proposal (MLP). The MLP shall be submitted upon finalisation of all necessary environmental and project studies.

(h) The present land use is PASTORAL LAND USE (GRAZING)

(i) The proposed after use is PASTORAL LAND USE (GRAZING) and

will be achieved by COMPREHENSIVE REHABILITATION (TO BE ADDRESSED WITHIN MLP)

(j) Access will be gained from Mingary to Kalkaroo Road road as shown on the accompanying plan.

(k) Products will be transported to Kalkaroo Copper Project

and it is expected that 10 trucks per day ☑ week ☐ will use public roads.

(l) The following measures are proposed to remedy damage to land that may result from the mining operations.

Proposed measures to remedy damage to land arising from mining operations will be addressed in detail within the MLP. The MLP shall be lodged separately upon completion of all necessary environmental and project related studies pertaining to the project.

PRINT RESET Page

2. The attached plan shows with reasonable accuracy –

(a) the physical features of the area including high and low ground, the location of creeks, drainage channels, dams, roads, fences, power lines, existing workings, dumps and tailings dams, standing trees and shrubs and any other relevant features within or adjacent to the claim area;

(b) the location and extent of proposed open cut workings, shafts, adits, overburden dumps, mullock dumps, tailings dams, stockpiles, buildings and treatment plant, proposed access tracks to be constructed and silt dams to prevent stream pollution and siltation.

3. Additional information:

1. Full name..KALKAROO COPPER PTY LTD
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3. Contact telephone number:..08 8338 9292
4. Contact facsimile number (if available):..08 83389293
5. (1) A.C.N. No.:……28 111 129 812

   (2) Contact person:..CHRIS GILES

DATE:..

SIGNATURE:……
or
COMPANY SEAL[1]**:**

……
(Director)

……
(Director/Secretary)

[1] *If a company, the document must bear the company's seal and be witnessed by appropriate officers.*

LSD 11

PRINT RESET Page

Government of South Australia
Primary Industries and Resources SA

Mining Act 1971, as amended
(See Regulation 16)

Certificate of Registration of Mineral Claim

I have registered:

Kalkaroo Copper Pty Ltd
63 Conyngham Street
GLENSIDE SA 5065

Date of Pegging	6 July 2007
Miners Right No.	8994
File Reference	T02692

As the Holder of Mineral Claim:

Number	3828		
Start Date	21/08/2007	**Expiry Date**	20/08/2008
Area in Hectares	90.00		
Location	Approximately 55 km NE of Olary		

Parcel Type	Parcel No.	Plan Type	Plan No.	Hundred
Block	1121	Hundred	OH (Curnamona)	OH (Curnamona)

Special Location
Far North Planning Area
Natural Resource Mgmt Region - SA Arid Lands

Pastoral Property
Kalkaroo

Signed: _____ Dated: Registered 21/8/2007.

Helen Tyrteos
Mining Registrar

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