Minerals 260

Bullabulling Gold Project – Native Vegetation Clearing Application: Supporting Document

Tenements: E 15/2111, G 15/30, G 15/31, G 15/32, G 15/33, G 15/34, G 15/35, G 15/36, G 15/37, G 15/38, G 15/39, G 15/40, G 15/41, G 15/42, G 15/44, G 15/45, G 15/47, G 15/49, L 15/156, L 15/157, L 15/158, L 15/196, L 15/206, L 15/328, L 15/331, L 15/332, L 15/333, L 15/334, L 15/335, L 15/336, L 15/339, L 15/357, L 15/358 L 15/359, M 15/1414, M 15/1878, M 15/1879, M 15/1880, M 15/1881, M 15/282, M 15/483, M 15/503, M 15/529, M 15/552 M 15/554, P 15/6208, P 15/6209, P 15/6210, P 15/6211, P 15/6212, P 15/6213, M 15/1939

Date – 2/04/2026

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ABBREVIATIONS AND DEFINITIONS

Acronym	Meaning
ABAB	Arid Bronze Azure Butterfly
AEP	Annual Exceedance Probability
ALA	Atlas of Living Australia
ALARP	As Low as Reasonably Practicable
BAM Act	*Biosecurity and Agriculture Management Act 2007*
BC Act	*Biodiversity Conservation Act 2016* - Western Australia
BGP	Bullabulling Gold Project
BoM	Bureau of Meteorology
CR	Critically Endangered
CSIRO	Commonwealth Scientific and Industrial Research Organisation
COO	Coolgardie IBRA Bioregion
COO02	Southern Cross Subregion
COO03	Eastern Goldfields Subregion
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DWER	Department of Water and Environment Regulation
DMPE	Department of Mines, Petroleum and Exploration
DP	Declared Pest
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands and Heritage
EMA	Ecology Matters Australia
EP Act	*Environmental Protection Act 1986*
EPA	Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESA	Environmentally Sensitive Area
FVC	Focused Vision Consulting
GDE	Groundwater Dependent Ecosystem
GDP	Ground Disturbance Permit
GDV	Groundwater Dependent Vegetation
GIS	Geographic Information System
GVA	Green Values Australia
GWL	Groundwater Licence
ha	Hectare
IBRA	Interim Biogeographic Regionalisation for Australia
km	Kilometres
LGA	Local Government Area
LiDAR	Light Detection and Ranging

Acronym	Meaning
m	Metres
mBGL	Metres Below Ground Level
M260	Minerals 260
MG	Marlinyu Ghoorlie
MGAC	Marlinyu Ghoorlie Aboriginal Corporation
MDCP	Mining Development and Closure Proposal
Mining Act	*Mining Act 1978*
NTLUA	Native Title Land Use Agreement
NVCP	Native Vegetation Clearing Permit
OS	Other Specially Protected
P	Priority
PEC	Priority Ecological Community
PMLU	Post Mining Land Use
PMST	Protected Matters Search Tool (DCCEEW)
SLAs	Soil-Landform Associations
SRE	Short Range Endemic
TE	Terrestrial Ecosystems
TEC	Threatened Ecological Community
TSF	Tailings Storage Facility
UCL	Unallocated Crown Land
VU	Vulnerable
WoNS	Weeds of National Significance

1 INTRODUCTION

Minerals 260 (M260) intends to recommence the Bullabulling Gold Project located 25km south-west of Coolgardie and 70km south-west of Kalgoorlie-Boulder in the Goldfields region of Western Australia (the Project). Minerals 260 (M260) acquired 100% of the Bullabulling Gold Project from Norton Gold Fields Pty Ltd in early 2025. The Project has a significant operational history, with the majority of the tenement holdings disturbed by previous mining and exploration work.

This document has been prepared to support the Native Vegetation Clearing Permit (NVCP) application, which seeks approval for the clearing of up to 2,909 ha of native vegetation within a 9,284 ha proposed Purpose Permit Area (Figure 1-1). A description of the proposed Project activities is provided in Section 2.

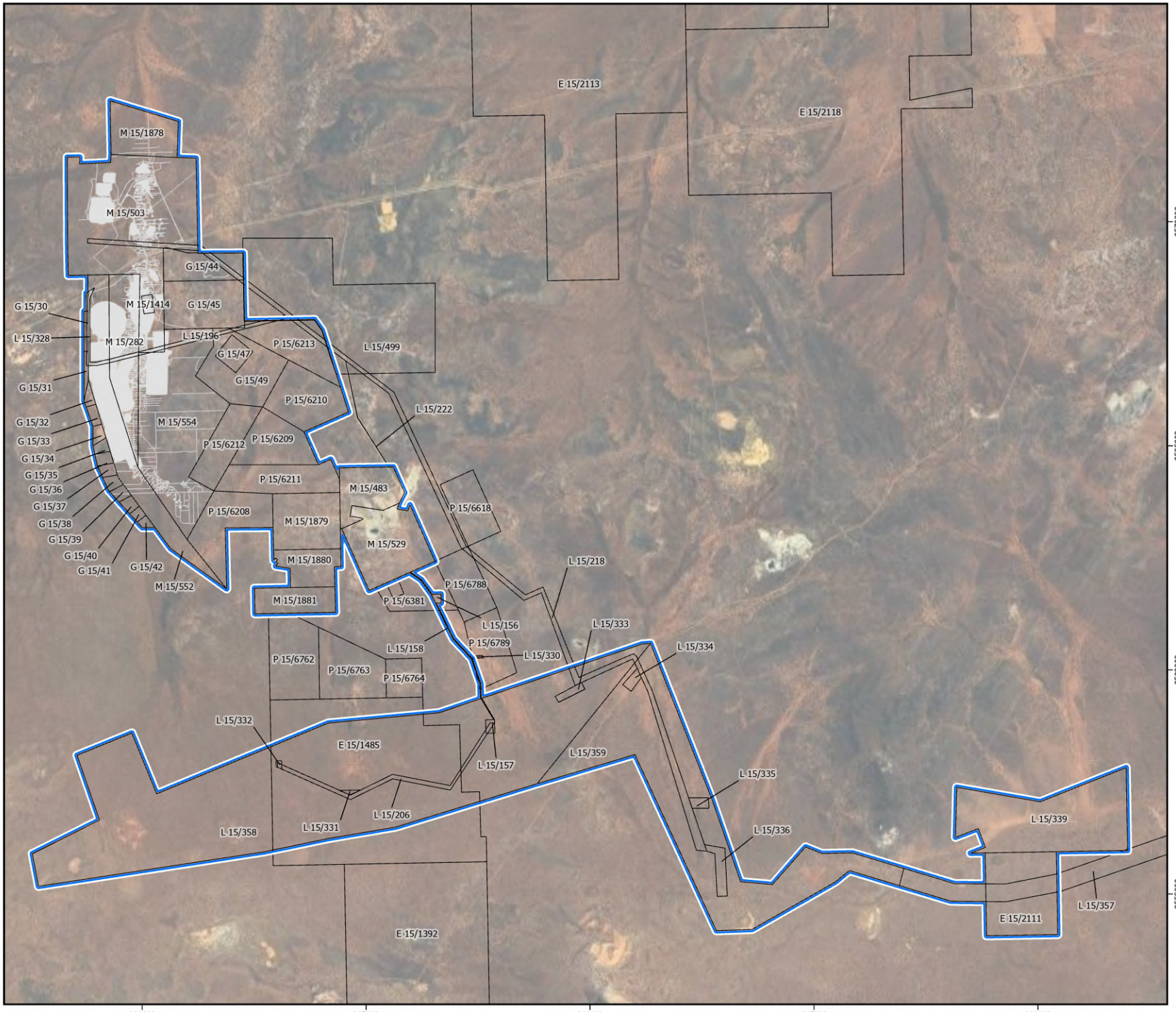
The application for the NVCP is based primarily on the findings of the Flora and Fauna Survey undertaken by Focused Vision Consulting (FVC) and Ecology Matters Australia (EMA) in 2025 for the Purpose Permit Area.

1.1 Purpose

Information is provided to enable assessment of the impacts of the proposed clearing on each of the ten 'Land Clearing Principles' described within Schedule 5 of the EP Act. This document presents the existing ecological information and environmental impact management and mitigation measures for the proposed clearing.

This NVCP document is aimed at and structured to provide the following:

- Provide a description and map of the proposed Purpose Permit Area proposed for clearing including location, size and purpose.
- Site overview, with a brief description of local climate, biogeographic region, geology, land use, soils, hydrology, and hydrogeology.
- Provide a description of the proposed Purpose Permit Area to be cleared including vegetation type, condition and representation in a regional context.
- Identify the presence of significant flora species, including within the proposed Purpose Permit Area.
- Provide description of the broad fauna habitat within the proposed Purpose Permit Area.
- Provide a discussion of proposed vegetation clearing concerning the EP Act *Schedule 5 – Principles for clearing native vegetation*.



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Figure 1-1
Proposed Permit Area

- Proposed Permit Area
- Existing disturbance
- Tenement

Data sources
Tenements: DMIRS Data and Software Centre
ESRI Basemap:© OpenStreetMap (and) contributors, CC-BY-SA

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Kilometres
GDA2020 MGA Zone 51

Date: 1/04/2026 Rev: A
Project: 250005
Author: O. Marino; Drawn: A. Reay
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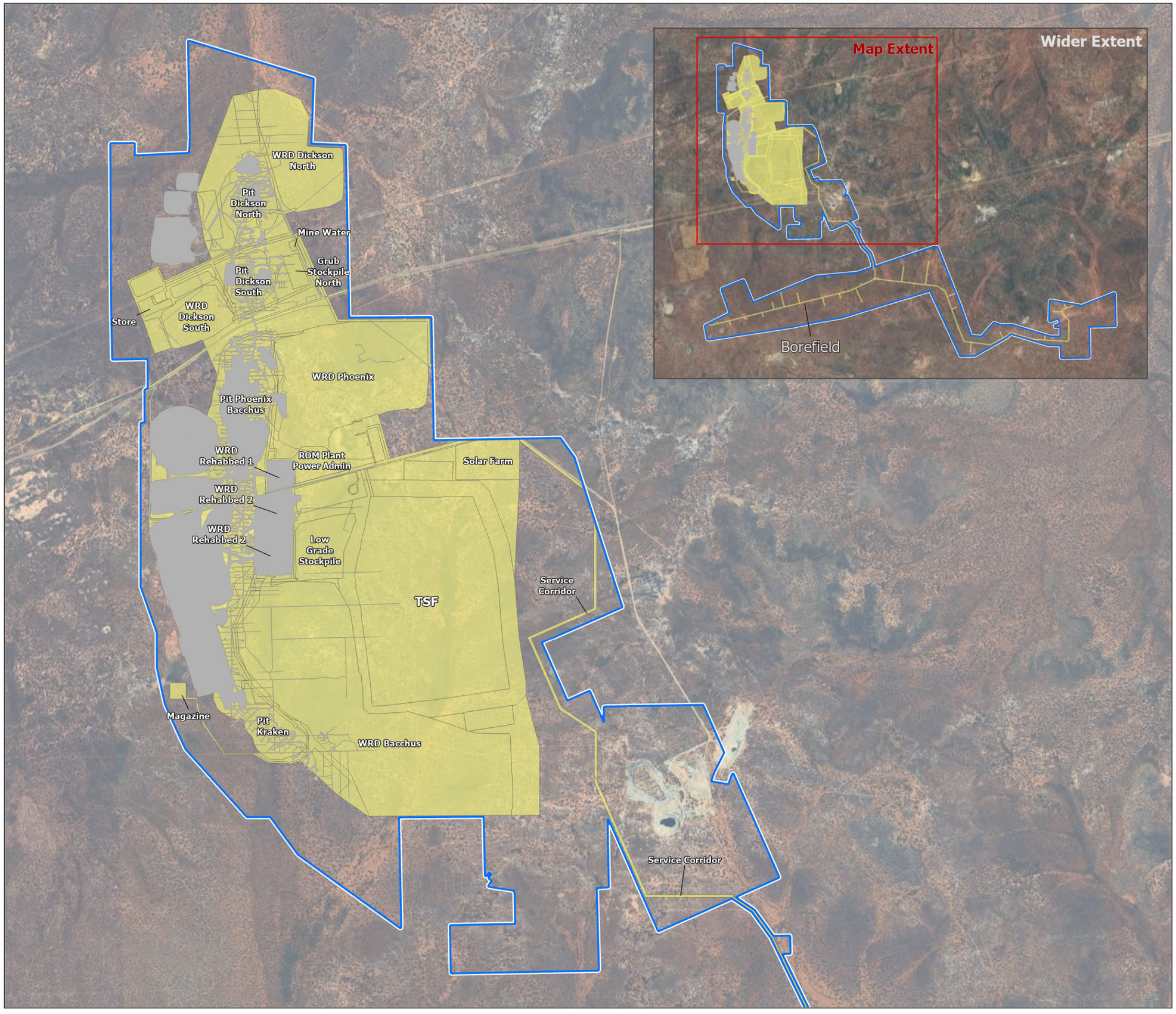
1.2 Background

The Bullabulling Gold Project is located 25km south-west of Coolgardie and 70km south-west of Kalgoorlie-Boulder in the Goldfields region of Western Australia (the Project). Minerals 260 (M260) acquired 100% of the Bullabulling Gold Project from Norton Gold Fields Pty Ltd in early 2025. The Project has a significant operational history with the majority of the tenure disturbed by previous mining and exploration work and historical workings. The Project is currently in exploration, with M260 undertaking investigative works in preparation for recommencement of operations at Bullabulling. The proposed site plan is presented in Figure 1-2.

1.3 The Proponent

The proponent's details are provided below; all compliance and regulatory requirements regarding this assessment document should be forwarded by email or post to the following details.

Proponent Details		
Company Name:		Bullabulling Operations Pty Ltd.
ABN:		74 106 444 606
ACN:		106 444 606
Address:		Level 2, 1292 Hay Street, West Perth
Postal Address:		As above.
Key Contact Representative	Name:	Nick Jones
	Position:	Approvals, Community & Environment Manager
	Phone Number:	+61 430 073 429
	Email:	njones@minerals260.com.au



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Figure 1-2
Site Plan

- Proposed Permit Area
- Proposed Indicative Activities
- Existing Disturbance

Data sources
Tenement: DMIRS Data and Sofware Centre
ESRI Basemap:© OpenStreetMap (and) contributors, CC-BY-SA
Roads/Localities: GEODATA (2006): GEODATA TOPO 250K Series 3 (Shape file format) dataset.
http://pid.geoscience.gov.au/dataset/ga/64058

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Kilometers
GDA2020 MGA Zone 51
Date: 1/04/2026 Rev: A
Project: 250005
Author: L. Chandler; Drawn: A. Reay
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2 PLANNED MINING ACTIVITIES

The Project has a significant operational history with the majority of the tenure disturbed by previous mining and exploration works. M260 proposes to recommence mining operations at the Bullabulling Gold Project including: open cut mine voids, waste rock landforms, a tailings storage facility (TSF), heap leach facility, processing plant, and associated supporting infrastructure including haul roads, access roads, water supply infrastructure, power supply, administration and workshop facilities, fuel and chemical storage, and topsoil stockpiles. Mining will be conducted in accordance with the Mining Development and Closure Proposal (MDCP) approved by DMPE.

The Purpose Permit Area is located on tenements E 15/2111, G 15/30, G 15/31, G 15/32, G 15/33, G 15/34, G 15/35, G 15/36, G 15/37, G 15/38, G 15/39, G 15/40, G 15/41, G 15/42, G 15/44, G 15/45, G 15/47, G 15/49, L 15/156, L 15/157, L 15/158, L 15/196, L 15/206, L 15/328, L 15/331, L 15/332, L 15/333, L 15/334, L 15/335, L 15/336, L 15/339, L 15/357, L 15/358 L 15/359, M 15/1414, M 15/1878, M 15/1879, M 15/1880, M 15/1881, M 15/282, M 15/483, M 15/503, M 15/529, M 15/552 M 15/554, P 15/6208, P 15/6209, P 15/6210, P 15/6211, P 15/6212, P 15/6213, M 15/1939. Access to the Project is from the Great Eastern Highway and Gibraltar Road. Existing access tracks will be utilised where practicable to minimise additional clearing requirements.

2.1 Estimated Vegetation Disturbance Requirements

M260 proposes that up to 2,909 ha of native vegetation will be cleared within the 9,284 ha Purpose Permit Area to facilitate the works listed above (Table 2-1). Within the Purpose Permit Area there is 557 ha of existing disturbance from historical mining and exploration activities (Table 2-1). Clearing will preferentially target existing disturbed areas where practicable to minimise the extent of native vegetation clearing required.

M260 proposes to commence vegetation clearing following grant of the NVCP and MDCP. Clearing activities will be implemented progressively over the life of the mine in accordance with the approved mine plan.

Table 2-1: Existing and Planned Clearing and Permit Area

Disturbance and Permit Area	Area (ha)
Existing disturbance within permit area	557
Total area of new clearing proposed	2,352
Total footprint	2,909
Proposed purpose permit area	9,284

2.2 Method of Vegetation Clearing

The following methods of vegetation clearing will be implemented during the construction and operational phases of the Project:

- Vegetation will be mechanically cleared, e.g. using bulldozers or graders operating to push vegetation at or above ground level, retaining root stock and soil structure where practicable.
- Cleared vegetation will be stockpiled separately from topsoil for later use in rehabilitation works.
- Following vegetation removal, topsoil will be stripped and stockpiled away from drainage lines for later use in rehabilitation works.
- Subsoil may also be stripped and stockpiled separately to ensure adequate capping material and growth medium is collected.
- Machinery operators will minimise the frequency and intensity of passes to maintain the structural integrity of soils. Topsoil will not be handled when wet.
- Clearing will be undertaken progressively as close as practicable to the commencement of the relevant mining activity, to minimise clearing and the duration of exposed surfaces and associated erosion and dust risks.
- No burning of vegetation will occur on site.

2.3 Environmental and Operational Controls

2.3.1 Ground Disturbance Procedure

M260 will ensure all clearing and ground disturbance is carried out in accordance with their Ground Disturbance Procedure. The following environmental controls will be implemented to manage clearing activities within the Purpose Permit Area:

- Prior to clearing, a project-specific internal Ground Disturbance Permit (GDP) will be completed and signed off by the M260 Environmental Department.
- Clearing areas will be delineated in accordance with the GDP. The clearing boundary will be surveyed and demarcated with survey pegs and flagging tape.
- Pre-clearance inspections for Malleefowl will be conducted no more than two weeks prior to clearing during the Malleefowl breeding season (September to March), inspections will

include an assessment of identified malleefowl mounds activity status in accordance with the National Malleefowl Monitoring Manual (National Malleefowl Recovery Group, 2025).

- Avoidance buffers will be implemented to ensure clearing remains within the approved Purpose Permit Area, spotters may also be used when deemed necessary.
- Post-clearing, disturbed areas will be surveyed, recorded spatially, and documented on site plans.

2.3.2 Weed Control

To minimise the further spread of weed species, M260 and any contractors will complete Weed, Seed, and Hygiene Certificates prior to arrival on site and adhere to hygiene procedures to minimise the risk of spreading or introducing weeds. All vehicles entering site will follow the Equipment Hygiene Procedure.

2.3.3 Fire management

Fire management practices will be implemented to minimise the risk of uncontrolled fire within the Purpose Permit Area. M260 will maintain firefighting equipment on site, implement hot work permit procedures, and restrict the use of open flame or spark-generating equipment in areas of native vegetation. No burning of vegetation spoil will occur on site.

3 SITE OVERVIEW

3.1 Environmental and Social Setting

3.1.1 Season and Climatic Conditions

The Goldfields-Esperance Region of Western Australia experiences a semi-arid climate with hot dry summers and cool dry winters. The closest operating weather station with long-term climatic data (BoM, 2025) is located at Kalgoorlie-Boulder Airport station (ID 12038) while the Coolgardie station (ID 12018) has the longest recorded rainfall data (Figure 3-1).

Seasonal variations in temperature are significant in this region. The average daily maximum temperature ranges from 33.7°C in January to 16.9°C in July. The highest recorded temperature was 46.5°C on the 22nd of January 1990 and lowest on the 12th of July 1969 at -3.4°C (BoM, 2026). Coolgardie station records June with the highest average rainfall at 29.1mm while September records the lowest at 13.5mm (BoM, 2026). The largest events of rainfall tend to occur between January and April. The average annual rainfall received per year is 264.9mm, while evaporation for the region is approximately 10 times greater than the annual rainfall.

Projected future climate change for the region based on current modelling developed by CSIRO and BoM suggest a warming trend where average temperatures are projected to rise by 1.0–2.7°C by 2050 under intermediate emissions scenarios, and up to 4.5°C by 2090 under high emissions scenarios. In terms of rainfall, there is an overall decrease trend particularly in winter and spring with summer rainfall events experiencing slight increases in some scenarios, however variability is projected to be predominantly high.

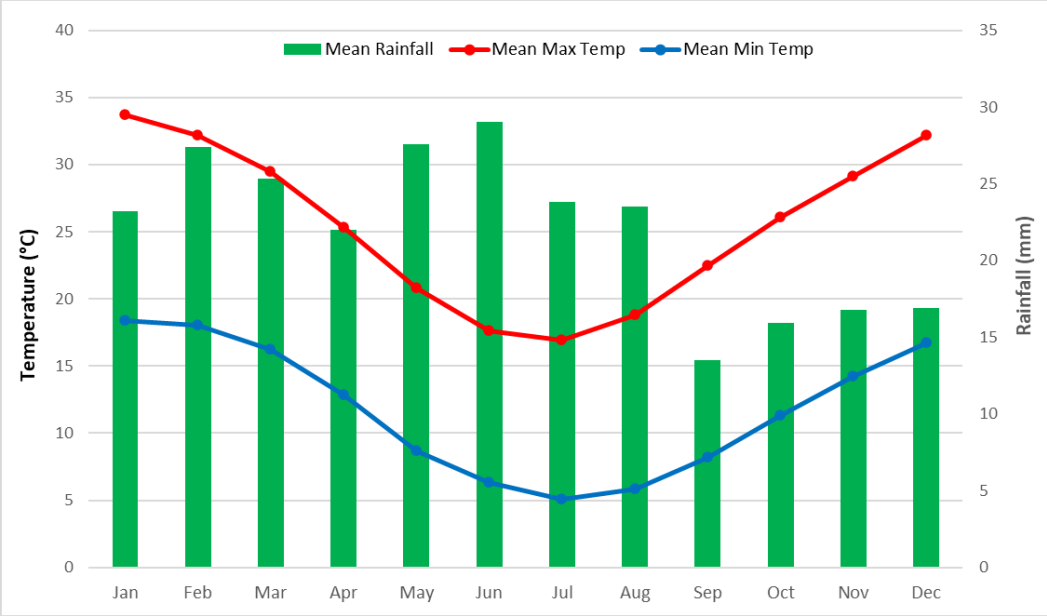


Figure 3-1: Mean temperature from the Kalgoorlie-Boulder Airport Station (12038) years 1939-2026 and mean rainfall from the Coolgardie Station (12018) years 1893-2025 (BoM, 2026)

3.1.2 Topography and Geomorphology

The Purpose Permit Area is located within the Coolgardie Interim Biogeographic Regionalisation of Australia (IBRA) region and within the Eastern Goldfields (COO3) subregion (Figure 3-2). The Coolgardie bioregion consists of an undulating landscape broken up by greenstone and granite low hills. Diverse eucalyptus woodlands, rich in endemic species occur on low greenstone hills, alluvial soils on valley floors, around saline playas of the region's occluded drainage system and on broad plains of calcareous soils. Granite outcrops support 'granite grass', wattle shrubland and York Gums. The playa salt lakes support dwarf shrublands of samphire. The upper levels in the landscape support scrubs and mallee rich in endemic Proteaceae in the west and acacias in the east (McKenzie et al. 2003).

The Eastern Goldfields subregion is comprised of sandplains that support Mallees, Acacia thickets and shrub-heaths. Diverse Eucalyptus woodlands occur on salt lakes, on ranges and in valleys (Cowan 2001). The areas of salt lakes support dwarf shrublands of samphire and the basic granulites of the Fraser Range support Woodlands and Dodonaea shrubland (Cowan, 2001).

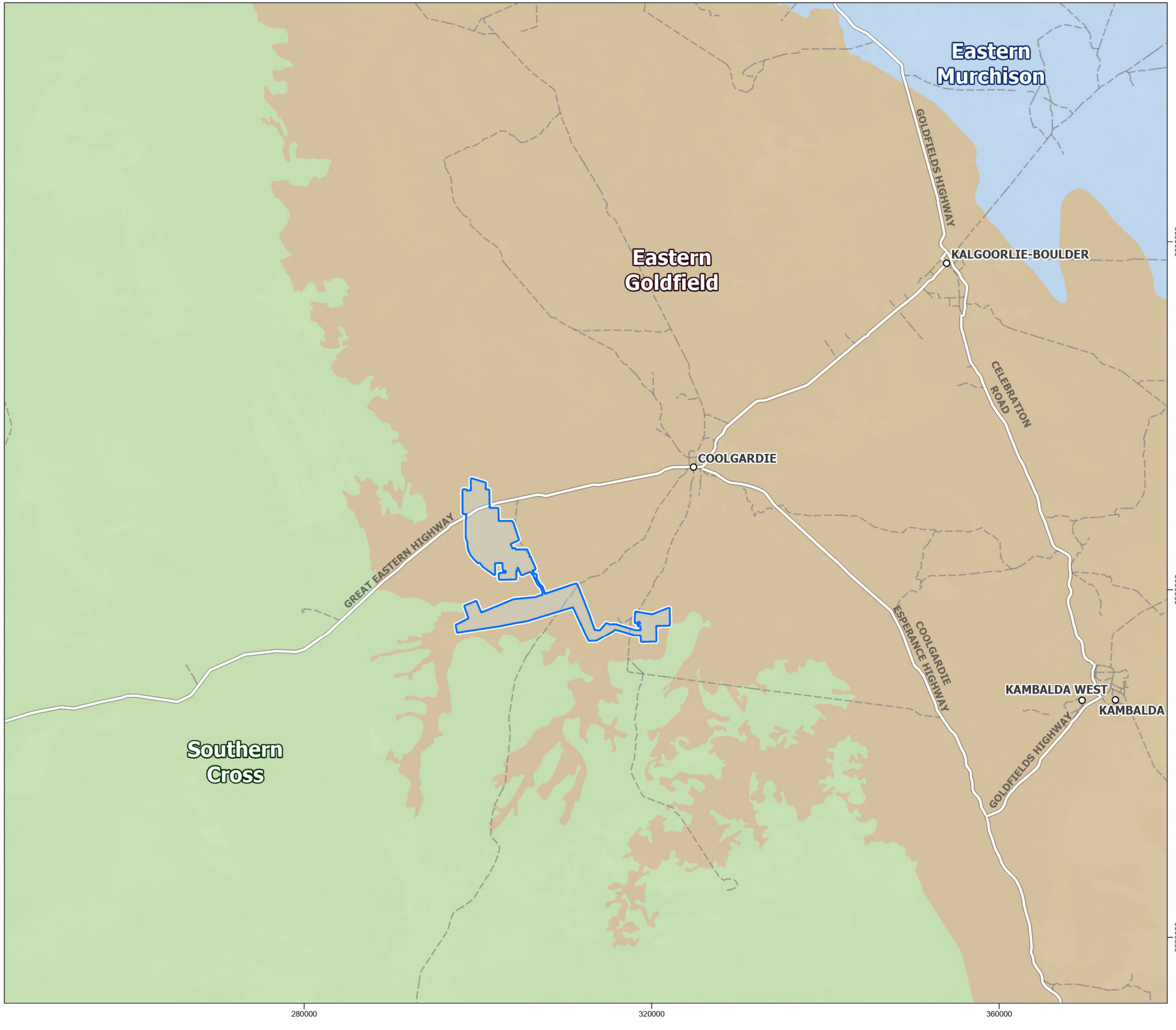
3.1.3 Landscape Systems

The project lies within the Kalgoorlie Province. The landscape consists of undulating plains (with some sandplains, hills and salt lakes) on the granitic rocks and greenstone of the Yilgarn Craton. Soils range from calcareous loamy earths and red loamy earths with some salt lake soils to red deep sands, yellow sandy earths, shallow loams and loamy duplexes.

The Purpose Permit Area lies within five land systems (AC1, BB5, Mx41, Mx42 and Mx43) (Figure 3-3). The AC1 system occurs only on a small portion northeast of the project, dominant land systems consisting of the BB5, Mx41, Mx42 and Mx43 are listed in Table 3-1.

Table 3-1: Land systems description

Land System	Description
AC1 Atlas System	Gently sloping to gently undulating plateau areas, or uplands, on granites, gneisses, and allied rocks, with long gentle slopes and, in places, abrupt erosional scarps.
BB5 Atlas System	Rocky ranges and hills of greenstones-basic igneous rocks.
Mx41 Atlas System	Flat to undulating pediments marginal to unit AC1; granitic rock outcrop; some low escarpments.
Mx42 Atlas System	Broad flat to undulating valleys with isolated granitic rock outcrops and some low escarpments; some seasonal lakes and clay pans.
Mx43 Atlas System	Gently undulating valley plains and pediment with some outcrop of basic rock.



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Figure 3-2
IBRA Sub-Regions

- Populated Places
- Minor Road
- Principal Road
- Proposed Permit Area
- Eastern Goldfield
- Eastern Murchison
- Southern Cross

Data sources
Tenement: DMIRS Data and Sofware Centre
ESRI Basemap:© OpenStreetMap (and) contributors, CC-BY-SA
Roads/Localities: GEODATA (2006): GEODATA TOPO 250K Series 3 (Shape file format) dataset.
http://pid.geoscience.gov.au/dataset/ga/64058

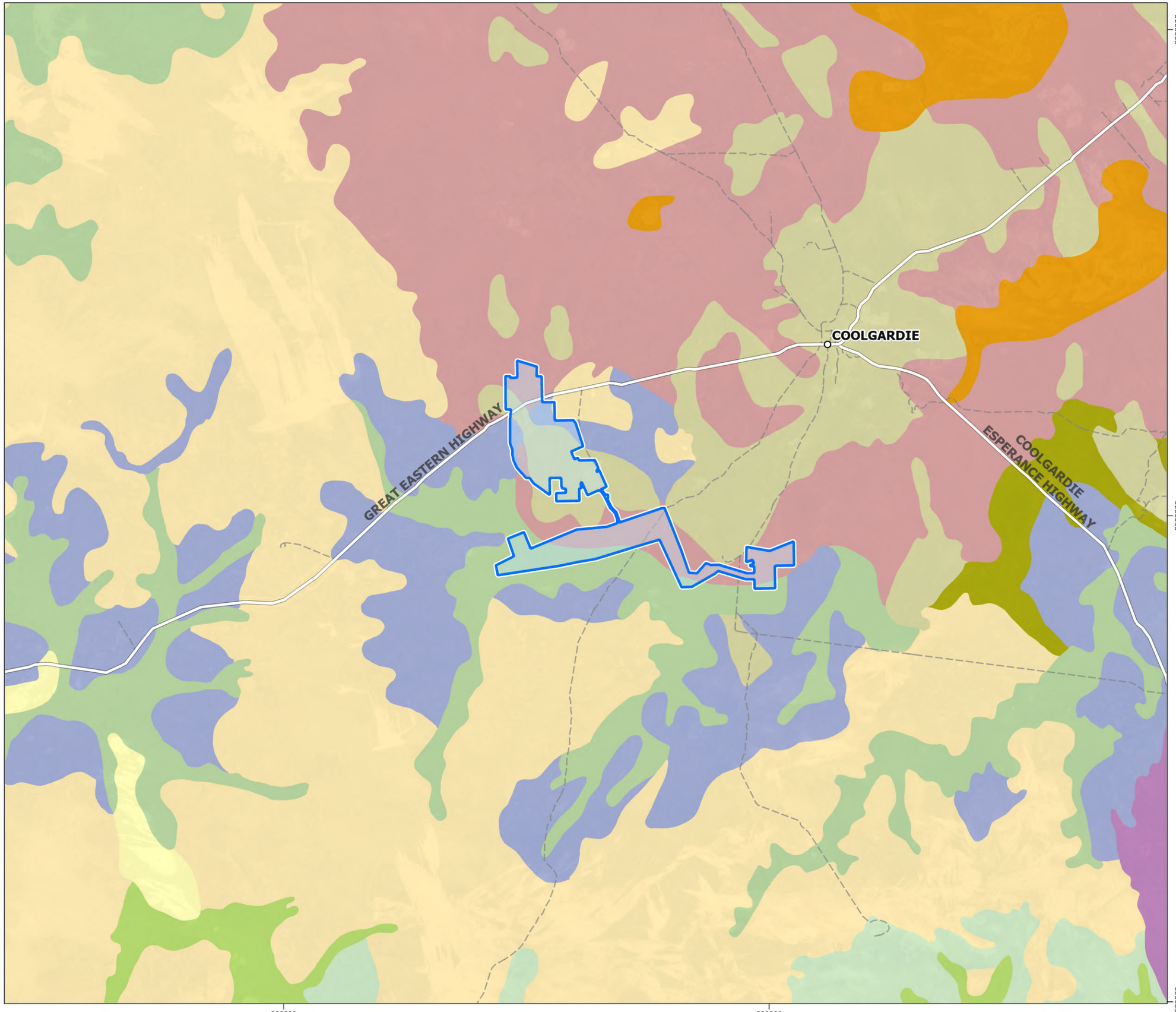
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Project: 250005
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Figure 3-3
Land Systems

- Populated Places
- Minor Road
- Principal Road
- Proposed Permit Area

Land Systems

- AC1 atlas system
- BB5 atlas system
- Mx41 atlas system
- Mx42 atlas system
- Mx43 atlas system
- My154 atlas system
- My54 atlas system
- Nc2 atlas system
- SV15 atlas system
- SV2 atlas system
- Ya28 atlas system

Data sources
Tenement: DMIRS Data and Sofware Centre
ESRI Basemap:© OpenStreetMap (and) contributors, CC-BY-SA
Roads/Localities: GEODATA (2006): GEODATA TOPO 250K Series 3 (Shape file format) dataset.
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GDA2020 MGA Zone 51
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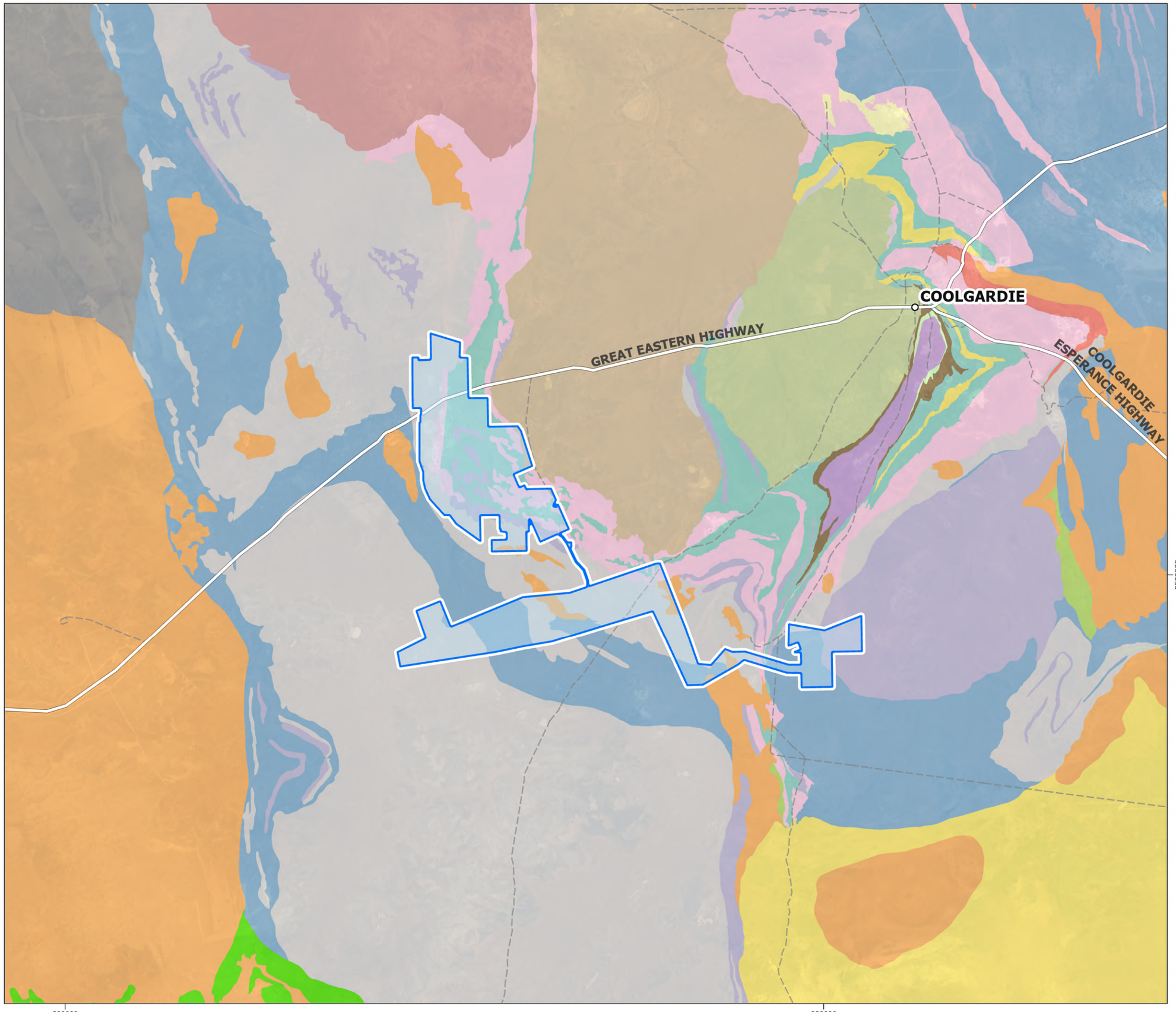
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3.1.4 Geology

The Purpose Permit Area occurs within the Kalgoorlie Province, which occurs on the central eastern portion of the Yilgarn Craton known as the 'Eastern Goldfields Terrains'. The geology of the Kalgoorlie Province is characterised by calcareous and red loamy earths with some salt lake soils, deep red sands, yellow sandy earths, shallow loams and loamy duplexes (Tille, 2006). The Archaean bedrock of the Yilgarn Craton consists of granitic rocks and greenstones (Tille, 2006). Geological units intersecting the Purpose Permit ARea are presented in Figure 3-4 and described in Table 3-2.

Table 3-2: Surface Geological Units associated with the Purpose Permit Area.

Code	Description
Czc	Colluvium - gravel, sand, and silt as sheetwash or talus
Abm	Metamorphosed high - Mg basalt, Komatiitic basalt, includes variolitic basalt and basalt with relic (pyroxene) spinifex texture
Czl	Laterite and reworked products
Qa	Alluvium - clay, silt, sand, and gravel in channels
Czg	Quartzo-feldspathic sand over granitoid rock
Ag	Granitoid rock, undivided
Czs	Sandplain, yellow sand with limonitic pisoliths near base
Agp	Pegmatite
Ab	Mafic schist, metabasalt, metadolerite and amphobolite, doleritic layers and lenses
Aku	Metakomatite
Agb	Bullabulling Monzogranite: foliated, partly recrystallized monzogranite with scattered microcline phenocrysts
Agbl	Bali Monzogranite: porphyritic, with biotite
Ama	Amphibolite
Au	Ultramafic rocks, chist, includes tremolite(-chlorite) and talc-chlorite (-carbonate) schists



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Figure 3-4

Geology

- Populated Places
- Minor Road
- Principal Road
- Proposed Permit Area

500k Interpreted Geology

- Bali Monzogranite
- Black Flag Group
- Bonnie Vale Tonalite
- Brilliant Formation
- Burbanks Formation
- Burra Monzogranite
- Calooli Monzogranite
- Celebration Dolerite Member
- Connolly Gneiss
- Eastern Goldfields Superterrane greenstones
- Gleesons Basalt
- Greenfields Gabbro
- Greenmont Basalt
- Hampton Hill Formation
- Kalgoorlie Group
- Kambalda Komatiite
- Lindsays Basalt
- Maloneys Dam Metagranite
- Mungari Monzogranite
- Paringa Basalt
- Powder Gabbro
- Silt Dam Monzogranite
- Three Mile Dolerite
- Walganna Suite
- Woolgangie Monzogranite
- Yilgarn Craton granites
- Youanmi Terrane greenstones

Data sources

Tenement: DMIRS Data and Sofware Centre

ESRI Basemap:© OpenStreetMap (and) contributors, CC-BY-SA

Roads/Localities: GEODATA (2006): GEODATA TOPO 250K Series 3 (Shape file format) dataset.

http://pid.geoscience.gov.au/dataset/ga/64058

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Kilometers

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Date: 1/04/2026 Rev: A

Project: 250005

Author: O. Marino; Drawn: A. Reay

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3.1.5 Pre-European Vegetation

Pre-European vegetation in Western Australia has been broadly characterised by Beard (1975, 1990) which described and mapped the vegetation of the Coolgardie IBRA region at a scale of 1:1,000,000 (Shepherd et al. 2002). Seven Beard (1990) vegetation associations (vegetation association 8, 128, 435, 522, 936, 1413 and 2009) occur within the Purpose Permit Area and presented in Figure 3-5 and listed in Table 3-3 below.

Table 3-3: Pre-European Vegetation associations of the Purpose Permit Area (DPRID 2023)

Vegetation Association	Description
Boorabbin 8	Goldfields; gimlet, redwood etc. *E. salubris, E. oleosa.* Riverine; rivergum *E. camaldulensis*
Coolgardie 128	Rock
Coolgardie 435	Shrublands; Acacia neurophylla, Acacia beauverdiana and Acacia resinimarginea thicket
Coolgardie 522	Goldfields; gimlet, redwood etc. *E. salubris, E. oleosa.* Riverine; rivergum *E. camaldulensis*
Coolgardie 936	Goldfields; gimlet, redwood etc. *E. salubris, E. oleosa.* Riverine; rivergum *E. camaldulensis*
Coolgardie 1413	Wattle, casuarina and teatree acacia-Allocasuarina-melaleuca alliance
Coolgardie 2009	Goldfields; gimlet, redwood etc. *E. salubris, E. oleosa.* Riverine; rivergum *E. camaldulensis*

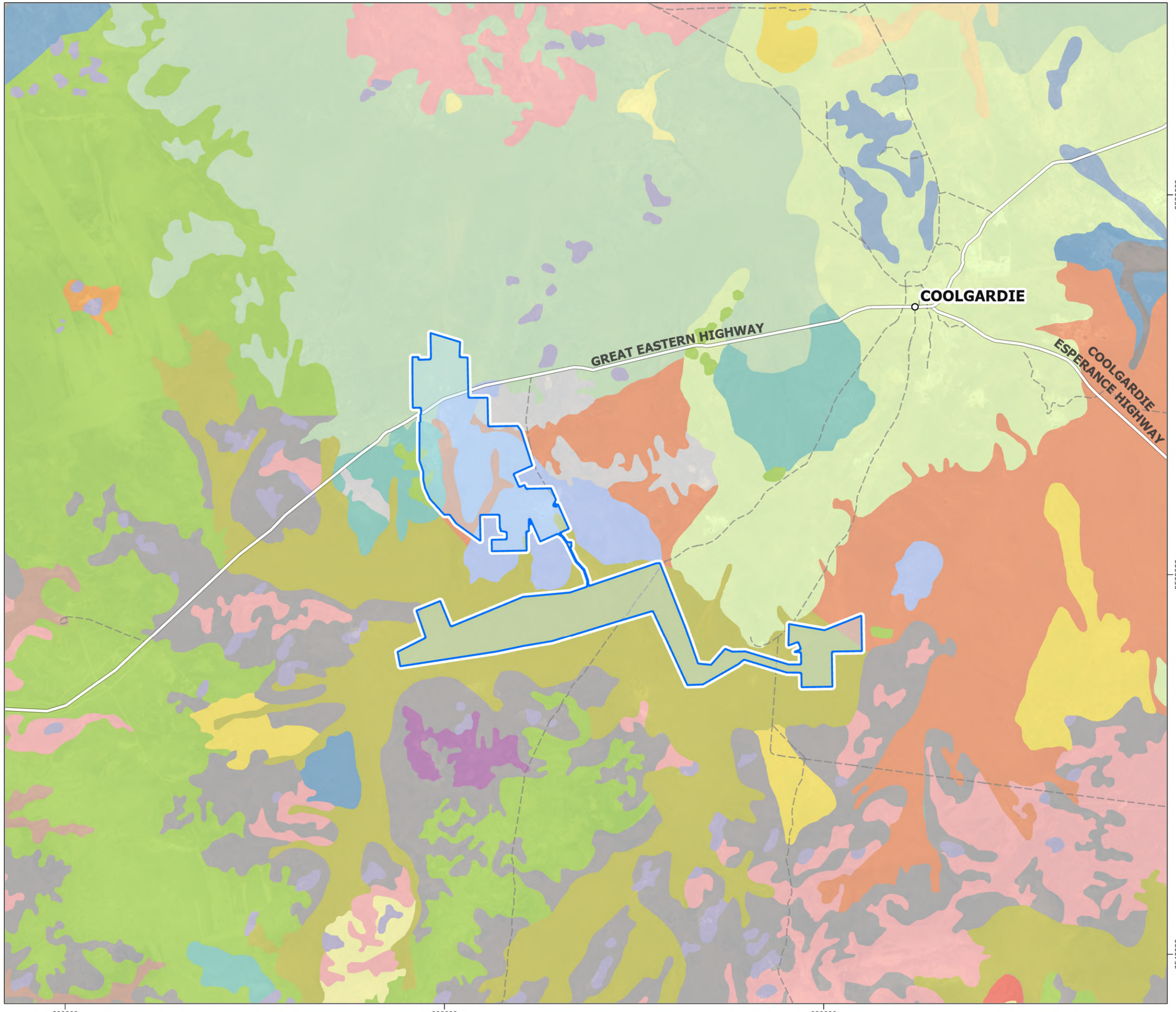
3.1.6 Groundwater Dependent Vegetation

The functioning and composition of Groundwater Dependent Ecosystems (GDEs) are often highly responsive to changes in groundwater availability (Murray et al. 2003). Therefore, the groundwater regime is a key factor influencing the composition of flora and fauna, ecological processes, and ecosystem services.

In addition to plant species composition, hydrogeological information (hydrological regimes and soil types) assists in characterising GDEs (DWER 2017). Regional GDE mapping, groundwater hydrology, geology and characteristic Groundwater Dependent Vegetation (GDV) are therefore considered in combination, in order to attempt to determine the presence of GDEs.

One potential terrestrial GDE intersects the Purpose Permit Area (Figure 3-6). This potential GDE have been classified as low potential. The potential GDE occurs in areas mapped as pre-European vegetation associations 8, 435, 522, 936 and 2009, representing woodlands of various Eucalyptus species and thickets of Acacia, Allocasuarina and Melaleuca (FVC, 2026).

No known groundwater dependent flora was recorded within the study area and therefore, none of the recorded vegetation units are considered representative of groundwater dependent vegetation (FVC, 2026).



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Figure 3-5
Pre-European Vegetation

- Populated Places
- Minor Road
- Principal Road
- Proposed Permit Area

System Association

- BOORABBIN_1148
- BOORABBIN_125
- BOORABBIN_128
- BOORABBIN_1413
- BOORABBIN_2009
- BOORABBIN_40
- BOORABBIN_435
- BOORABBIN_511
- BOORABBIN_522
- BOORABBIN_551
- BOORABBIN_8
- BOORABBIN_9
- BOORABBIN_936
- CAVE HILL_128
- CAVE HILL_1413
- CAVE HILL_522
- COOLGARDIE_123
- COOLGARDIE_125
- COOLGARDIE_128
- COOLGARDIE_1294
- COOLGARDIE_1413
- COOLGARDIE_2009
- COOLGARDIE_468
- COOLGARDIE_520
- COOLGARDIE_522
- COOLGARDIE_540
- COOLGARDIE_9
- COOLGARDIE_936
- JAURDI_435

Data sources
Tenement: DMIRS Data and Sofware Centre
ESRI Basemap:© OpenStreetMap (and) contributors, CC-BY-SA
Roads/Localities: GEODATA (2006): GEODATA TOPO 250K Series 3 (Shape file format) dataset.
http://pid.geoscience.gov.au/dataset/ga/64058

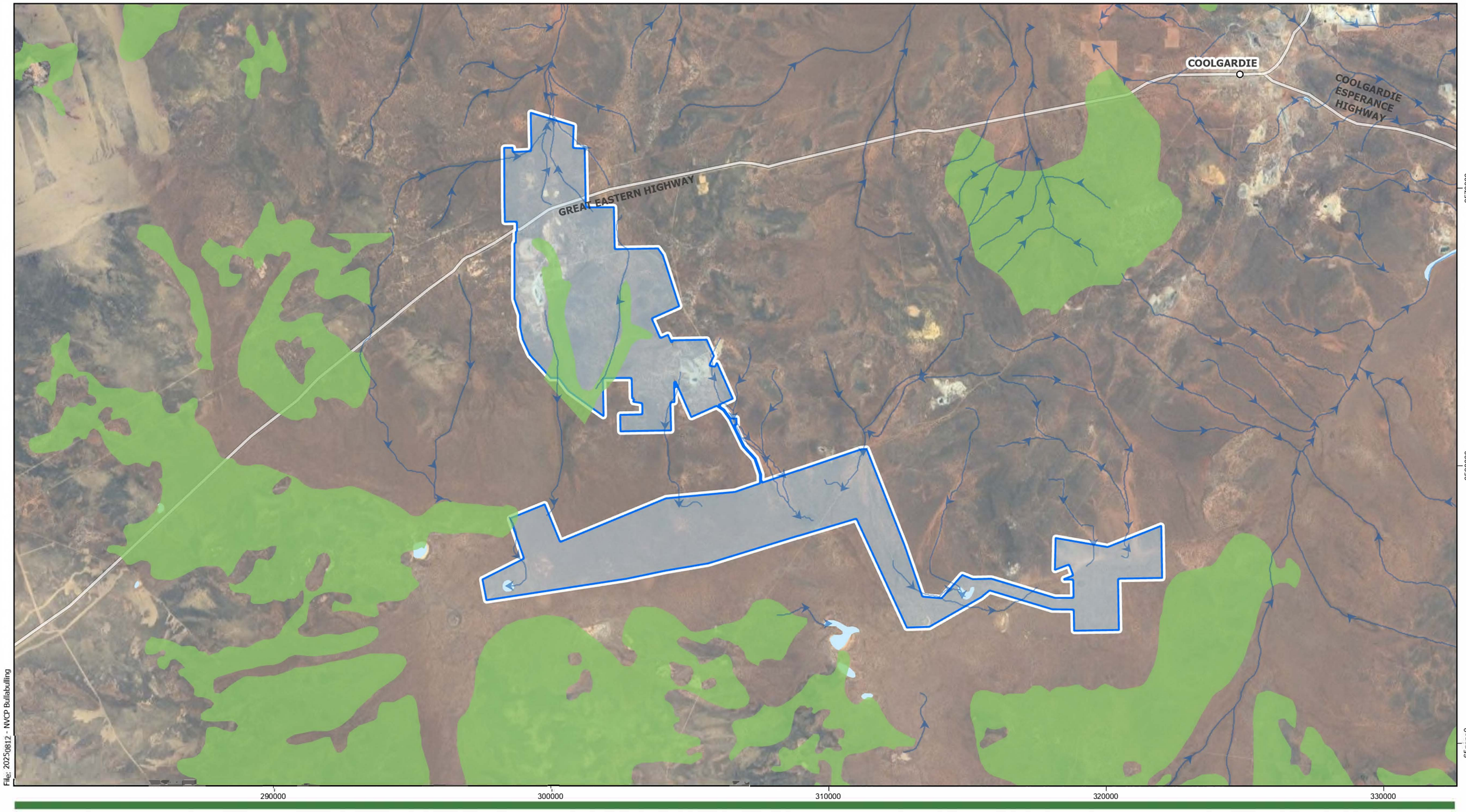
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Kilometers
GDA2020 MGA Zone 51
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Project: 250005
Author: O. Marino; Drawn: A. Reay
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File: 20250812 - NVCP Bullabulling



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Figure 3-6
Potential Groundwater Dependent Vegetation

- Principal Road
- Netowork stream lines
- Proposed Permit Area
- Populated Places
- Potential Terrestrial GDE
- Lakes

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Project: 250005
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3.1.7 Historical and Current Land Use

Land use surrounding the project is shown in Figure 3-7. The dominant land uses of the Eastern Goldfield subregion include Unallocated Crown Land (UCL), Crown reserves, DBCA managed lands and pastoral grazing, with conservation areas and mining leases also present (Cowan, 2001). The Purpose Permit Area is located within the Bullabulling Station pastoral lease.

Mining and pastoralism are dominant within the region with no vested Conservation Reserves located within the project. There are no DBCA managed or DBCA lands of interest located within the Purpose Permit Area, the closest significant environmental feature is the Kangaroo Hills Timber Reserve, which is DBCA-managed land located approximately 7km east of the Project.

3.1.8 Social Setting and Affected Communities

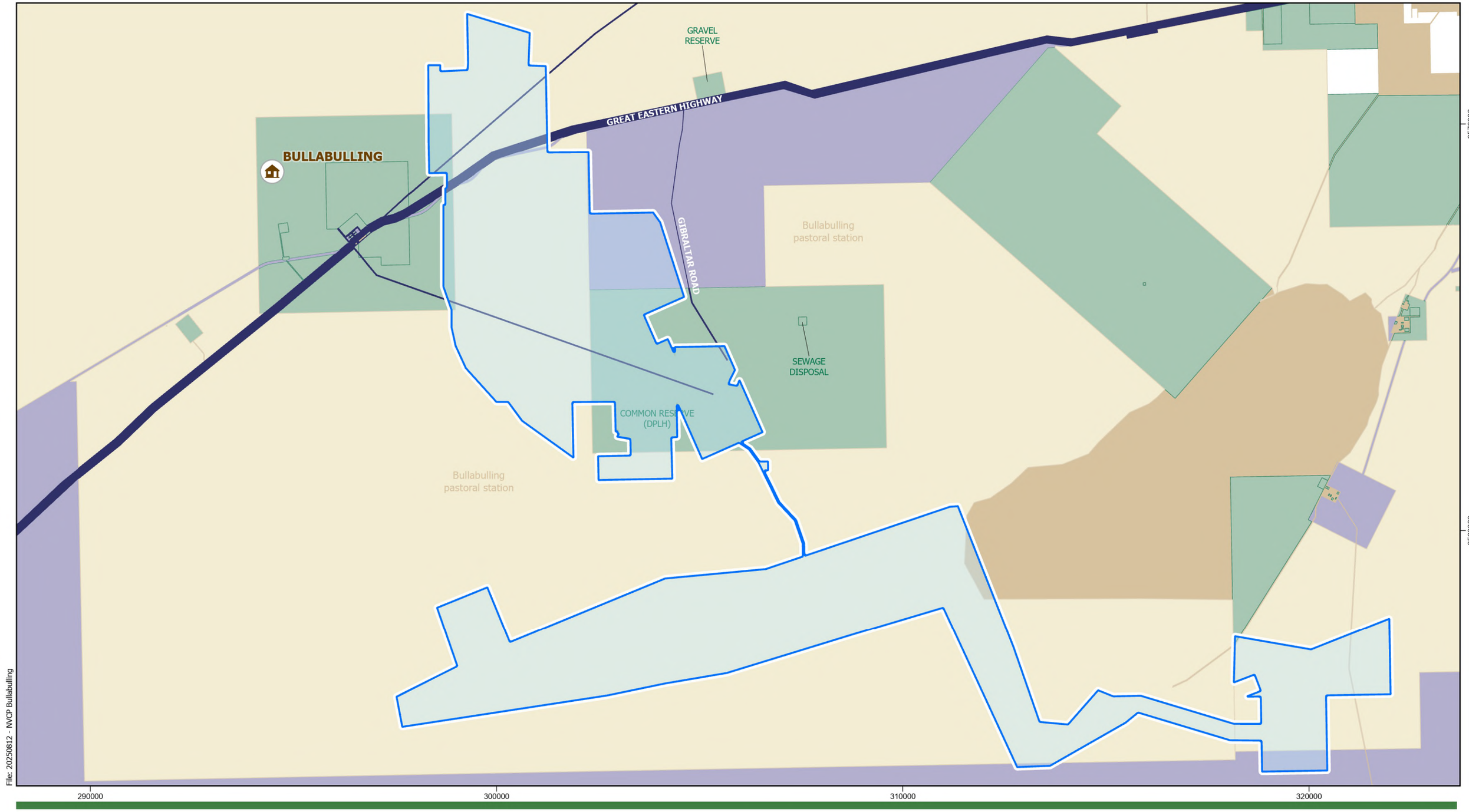
The Project is located south of the Great Eastern Highway approximately 26km south-west of Coolgardie townsite and 70km south-west of the City of Kalgoorlie-Boulder. The nearest sensitive receptor is Bullabulling homestead, being located approximately 9km west of the permit area (Figure 3-7). It is understood that the Bullabulling homestead is not a habitable structure.

Due to the significant separation of the Project from these towns and sensitive receptors, no impacts are anticipated.

3.1.9 Heritage (including Natural, Cultural and Historic)

Terra Rosa Consulting have been engaged by the Marlinyu Ghoorlie Aboriginal Corporation (MGAC) to complete heritage surveys including the Purpose Permit area (Terra Rosa, 2025 and 2026). In total twelve (12) surveys, both ethnographic and archaeological, have been completed over the proposed permit area. The heritage surveys have been undertaken by Marlinyu Ghoorlie representatives and heritage consultants from Terra Rosa to support development. No DPLH aboriginal sites have been identified within the Purpose Permit Area (Figure 3-8). A number of cultural heritage avoidance places have been identified within the area and are subject to ongoing consultation with MG. All avoidance places have been documented spatially, physically demarcated in the field and all works in proximity are supervised by two (2) cultural heritage monitors to mitigate interaction.

M260 also conducts regular engagement with the Marlinyu Ghoorlie (MG) group to share project plans and activities, including a quarterly Relationship Committee. In addition to engagement via the Relationship Committee, M260 have discussed the draft development plans for the Bullabulling Gold Project in detail with Marlinyu Ghoorlie Elders as well as all survey groups in 2025 and 2026. Further detail regarding stakeholder consultation is provided below in Table 6-1.



Data sources
Tenement: DMIRS Data and Sofware Centre
ESRI Basemap:
Roads/Localities: GEODATA (2006): GEODATA TOPO 250K Series 3 (Shape file format) dataset.
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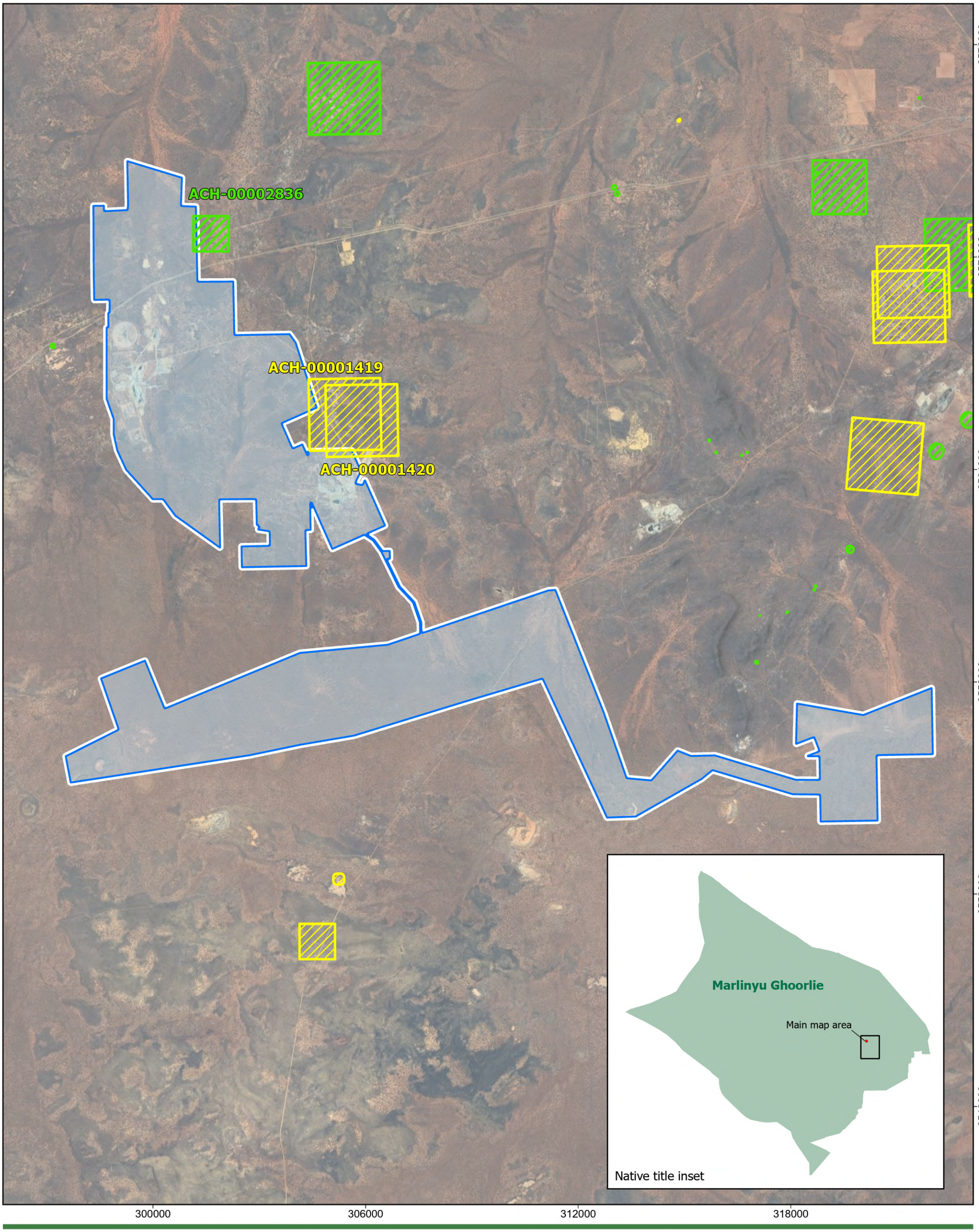
M260

Figure 3-7
Land Use and Social Settings

- Populated Places
- Proposed Permit Area
- Homestead site
- Road parcel
- Vacant crown land
- Bullabulling pastoral lease
- Crown reserve
- Cadastre addresses lot boundary

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Kilometres
GDA 1994 MGA Zone 51
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Project: 250005
Author: O. Marino; Drawn: A. Reay
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Data sources
Heritage places: Department of Planning, Lands and Heritage (DPLH-099) and (DPLH-100); Native title: National Native Title Tribunal (NTD_Register_Nat_shp) January 2025; Base image: Google Earth© OpenStreetMap (and) contributors, CC-BY-SA, Esri, Geoscience Australia, NASA, NGA, USGS

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Figure 3-8
Aboriginal and cultural heritage

- Proposed Permit Area
- Registered
- Lodged
- Native title determination application

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Kilometres
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3.2 Terrestrial Environmental Quality

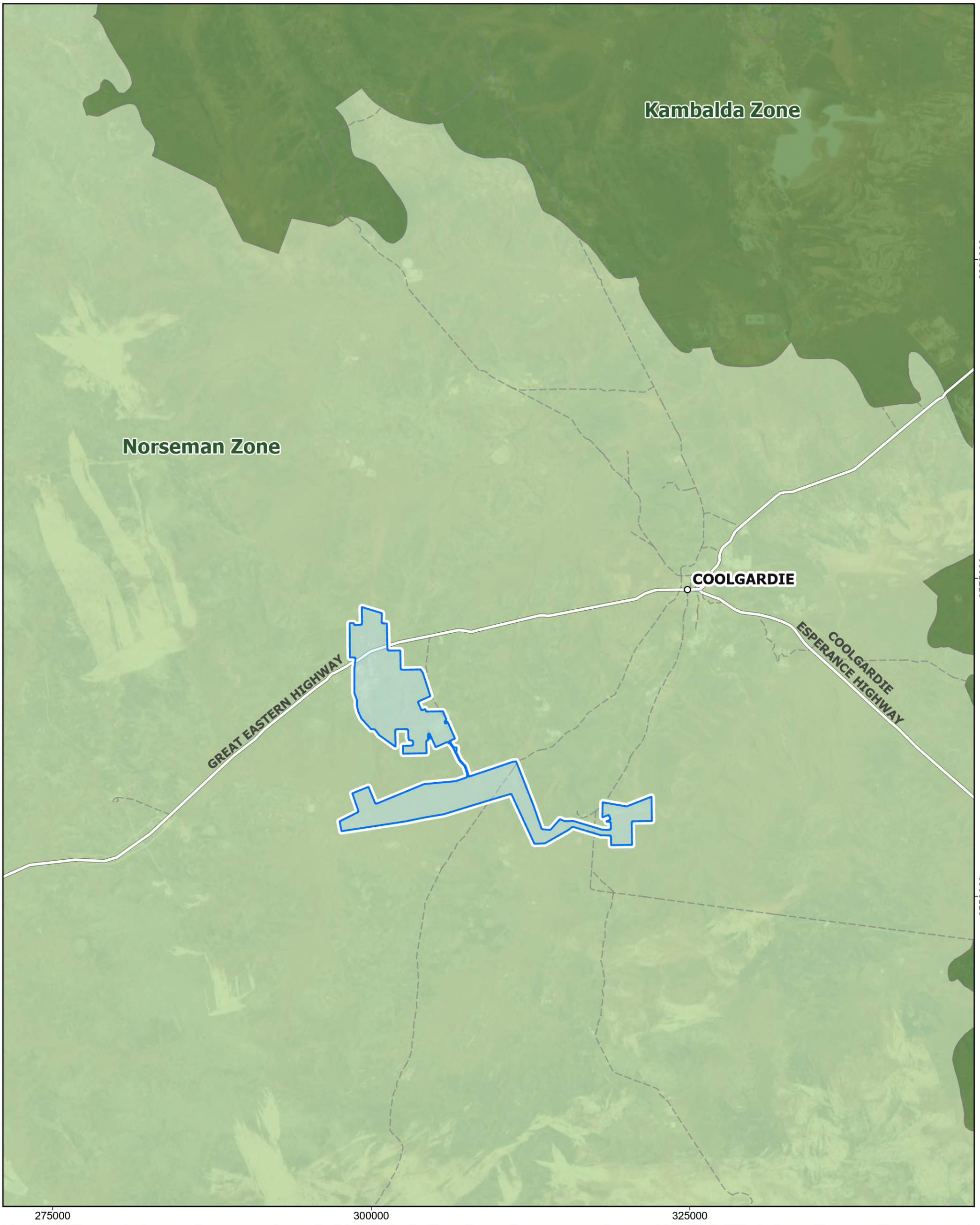
3.2.1 Soils

A soil and landforms assessment within the permit area was undertaken by Mine Earth (Mine Earth, 2026) to support this NVCP application (Appendix 3). The assessment grouped soils into six soil-landform associations (SLAs): 'Undulating plains', 'Clayey plains', 'Low rises and hills', 'Drainage lines', 'Low slopes', and 'Disturbed'. Soils within the permit area were variable, ranging from loamy sand to clays, with salinity classifications ranging from non-saline to extremely saline. Approximately half of samples tested were classed as sodic or highly sodic and potentially dispersive upon severe disturbance. The soils generally recorded a low propensity to hard-set, had a slow to very rapid hydraulic conductivity, low soil organic carbon and plant-available nutrients, and total concentrations of arsenic, chromium and selenium above average crustal abundance.

The topsoil (0 to 0.2m) from the Undulating plains and Drainage lines SLAs is considered suitable as a surface rehabilitation material for flat and sloped rehabilitation areas. Topsoils from the 'Clayey plains', 'Low slopes' and 'Low rises and hills' SLAs were largely sodic, with some elevated salinity concentrations and are considered less suitable for application to sloped rehabilitation areas.

The physical and chemical characteristics of the subsoils (0.2m to approximately 1m) were highly variable, both between SLAs and with depth. If there is a topsoil deficit, subsoils from the 'Undulating plains' SLA within the pit and TSF footprints could be salvaged and stockpiled for potential use as a rehabilitation resource.

Soils have been mapped at a regional scale according to the WA Soil Groups (Galloway, et al., 2024) within the Purpose Permit Area (Figure 3-9).



Data sources
Soil landscape zones: Department of Primary Industries and Regional Development, Soil landscape land quality - Zones (DPIRD-017)
ESRI basemap: © OpenStreetMap (and) contributors, CC-BY-SA

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Figure 3-9
Soil Zones

- Populated Places
- Proposed Permit Area
- Minor Road
- Principal Road
- Kambalda Zone
- Norseman Zone

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Kilometres
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Project: 200005
Author: O. Marino;
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3.3 Inland Waters

3.3.1 Surface Water

The Purpose Permit Area is within the Salt Lake Basin in the Lake Lefroy and Raeside-Ponton catchment area. No Ramsar or wetlands of importance intersect the Purpose Permit Area (DBCA 2018). The Purpose Permit Area lies high in the catchment and across the divide between north and south drainage systems. A network of minor drainage lines intersects the Purpose Permit Area and stormwater flows are relatively shallow and diffuse (Figure 3-10).

The Purpose Permit Area lies across the catchment divide for two regional drainage systems. The catchment divide lies approximately along the Great Eastern Highway. The northern portion of the Purpose Permit Area drains to the north and east, terminating in Cattle Swamp, part of the White Flag Lake system, north-west of Kalgoorlie-Boulder. This catchment is in the wider Raeside-Ponton catchment. The southern portion drains south then east, discharging into the Brown Lake system southeast of Coolgardie. This catchment is part of the regional Lake Lefroy catchment (Hydrologia, 2022).

The objectives for surface water management during vegetation clearing are to:

- Minimise the risk of erosion at the site and impacts on the downstream environment in the 10% AEP and smaller design rainfall events
- Minimise discharge of contaminated or saline stormwater from the site; and
- Manage flood risk for the 1% AEP design event.

Clearing of vegetation associated with drainage lines will be minimised where practicable, and surface hydrology management measures will be implemented to maintain flow continuity. The removal of native vegetation within the Purpose Permit Area has the potential to increase surface water runoff velocities, erosion and sediment mobilisation in the short term, particularly along minor drainage lines. However, given the arid climate, the ephemeral and diffuse nature of surface water flows, and the proposed surface water management measures, the proposed clearing is not expected to result in significant impacts to surface water quality or downstream hydrological function.

3.3.2 Groundwater

The Purpose Permit Area broadly lies within the Norseman-Wiluna greenstone belt of the Yilgarn Craton. The greenstone belt is characterised by north-south striking sequences of interbedded Archean mafic, ultramafic, felsic and metasedimentary sequences. The greenstone belt is further

subdivided into a series of Terranes and domains, with the Purpose Permit Area located within the Coolgardie Domain of the Kalgoorlie Terrane (GRM, 2021).

The hydrogeology of the region is characterised by a Tertiary palaeo-drainage system, which is underlain by the Archean Yilgarn Goldfields fractured rock groundwater province.

Groundwater in the region is typically associated with:

- Fresh and weathered fractured rock aquifers;
- Tertiary palaeochannel sand (Wollubar Sandstone) deposited along the palaeo-drainages;
- Shallow calcrete units that commonly overlie palaeochannel deposits;
- Shallow alluvium.

Locally, the Hannan palaeochannel trends down-gradient to the east north-east and passes about 10 km south of the Purpose Permit Area. The Wollubar Sandstone, deposited at the base of the palaeochannel, comprises a sequence of high permeability sand and conglomerate which forms the target aquifer. The sandstone has an average maximum thickness of around 17 m and width of about 600 m. The sandstone aquifer is underlain by Archean bedrock and overlain by the Perkolilli Shale, both of which have significantly lower bulk permeability. Surficial units within the Roe groundwater catchment, including potential aquifers associated with calcrete and alluvium, are thin and are therefore of limited hydrogeological significance (GRM, 2021).

Groundwater flows within the basement rocks will be towards the sandstone aquifer, mostly via secondary higher permeability fracture zones. The sandstone will also receive downward flows from the overlying shale. However, because of the relatively low permeability of these bounding units, the average groundwater inflow rates from these sources are likely to be low. Within the sandstone aquifer the groundwater flow is downgradient to the east north-east. Groundwater levels across the Purpose Permit Area typically range from 30 – 80 mBGL in the near mine fractured rock aquifer to ~13mBGL in the Hannan Palaeochannel to the south.

6576000
6568000
6560000
6552000
6544000
296000
304000
312000
320000

File: 20250812 - NVCP Bullabulling

Data sources
Catchments and drainage: Hydrologia 2022.
ESRI basemap: Esri, Geoscience Australia, NASA, NGA, USGS

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Figure 3-10
Surface Hydrology

Drainage line
Catchment

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Kilometres
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Project: 200005
Author: O. Marino;
Drawn: A. Reay
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3.4 Flora, Vegetation and Fauna

3.4.1 Flora and Vegetation

Multiple flora and vegetation surveys have been conducted in the Bullabulling project area with the most current field assessment completed by FVC in 2025 (FVC, 2026, Appendix 1). This study was scoped to address a reconnaissance flora and vegetation assessment, using the relatively recent and directly adjacent 2021 Botanica survey results (Botanica, 2021) as a primary basis, combined with the field survey results and available local and regional flora and vegetation data and information from databases and the literature, predominantly previous surveys.

A review of DBCA's Threatened Ecological Community (TEC) and Priority Ecological Community (PEC) database and the PMST report (DCCEEW 2025) did not identify any TECs, PECs or their buffers as occurring within the permit area, which was defined as the project area plus a 50 m buffer (FVC, 2026).

No Threatened flora listed under the BC Act or under the EPBC Act have been previously recorded in the Purpose Permit Area, nor were any recorded during the 2025 field survey (FVC, 2026).

Five Priority 3 (P3) species were recorded within the study area during the 2026 (FVC, 2026) and 2021 (Botanica, 2021) surveys:

- *Acacia crenulata,*
- *Cryptandra crispula,*
- *Eremophila microphylla,*
- *Eremophila veronica* and;
- *Notisia intonsa.*

In addition to the five Priority 3 flora recorded in the Purpose Permit Area during the 2025 and 2021 field surveys, an additional nine Priority flora are considered 'Likely to occur' elsewhere in the Purpose Permit Area, including within the unsurveyed portions of the project area, and the certainty of these conclusions range from low to high (FVC, 2026). No weeds classed as DP plants under the BAM Act or WoNS were recorded during the survey (FVC, 2026).

Two flora specimens collected during the FVC (2026) survey were unable to be identified to species level and may represent significant species. Acacia sp1. (collection code SBP10) has a high potential of being an undescribed (new) species and was recorded opportunistically in one location within vegetation unit EsEiSa. A specimen identified as Poaceae sp. (collection code BG24r.14) may potentially be representative of the Priority 3 species *Austrostipa turbinata*, although the likelihood of

this is considered low. The collected specimen was recorded in one location within vegetation unit AvSc.

A total of 25 vegetation units has been identified within the permit area (Table 3-4).

Table 3-4: Vegetation units within the proposed Purpose Permit Area and indicative disturbance

Veg ID	Vegetation Group	Total Within Purpose Permit Area (ha)	Proportion Within Purpose Permit Area (%)	Total indicative disturbance (ha)
N/A	Unknown	230.28	2.48	2.52
Cleared	Cleared/Rehabilitated	680.42	7.33	499.51
Mosaic	Combination of EsAcEa and AaaLcTk	235.74	2.54	180.68
AaMhPg	*Acacia acuminata, Melaleuca hamata* and *Alyxia buxifolia* Tall Open Shrubland over *Prostanthera grylloana, Olearia pimeleoides* and *Leucopogon sp.* Clyde Hill (M.A. Burgman 1207) Low Open Shrubland	29.89	0.32	12.14
AaaLcTk	*Allocasuarina acutivalvis* subsp. acutivalvis and *Acacia resinimarginea* Tall Open Shrubland over *Leucopogon* sp. Clyde Hill (M.A. Burgman 1207) and *Thryptomene kochii* Low Open Shrubland	2.57	0.03	2.31
AvAc	*Atriplex vesicaria* and *A. codonocarpa* Low sparse chenopod Shrubland	9.12	0.10	0.00
AvSc	*Atriplex vesicaria, Disphyma crassifolium* subsp. clavellatum and *Sclerolaena cuneata* Low Open Shrubland	10.45	0.11	0.00
AvMmPd	*Atriplex vesicaria, Maireana marginata* and *Plantago debilis* Low Shrubland	225.11	2.42	6.82
EcEs	*Eucalyptus celastroides* and *E. salubris* Open Forest	3.59	0.04	0.00
EcMpEo	*Eucalyptus celastroides* subsp. *Celastroides.* Low Open Woodland over *Melaleuca pauperiflora* subsp. *Fastigiate.* Tall Shrubland over *Eremophila oppositifo*lia subsp. *angustifolia*, *Eremophila ternata*	1.92	0.02	1.92
EsAaSs	Eucalyptus clelandii, Eucalyptus griffithsii and Eucalyptus loxophleba subsp. lissophloia. Open Woodland over Acacia acuminata, Eremophila oppositifolia subsp. angustifolia and Alyxia buxifolia Tall Open Shrubland over Scaevola spinescens, Acacia erinacea and Eremophila glabra subsp. glabra	825.96	8.90	594.78

Veg ID	Vegetation Group	Total Within Purpose Permit Area (ha)	Proportion Within Purpose Permit Area (%)	Total indicative disturbance (ha)
	Shrubland Olearia muelleri Low Sparse Shrubland			
EgAaaOp	*Eucalyptus griffithsii* and *Eucalyptus oleosa* subsp. *Oleosa.* Low Open Woodland over *Allocasuarina acutivalvis* subsp. *acutivalvis*, *Acacia resinimarginea,* and *Melaleuca hamata*. Tall Open Shrubland over *Olearia pimeleoides, Westringia cephalantha* and *Beyeria sulcata* var. *brevipes* Low Open Shrubland over *Triodia tomentosa* Sparse Tussock Grassland	30.61	0.33	12.98
ElAaSaf	Eucalyptus loxophleba low open woodland over Acacia acuminata, Acacia gibbosa and Eremophila alternifolia Tall Open Shrubland over Senna artemisioides subsp. filifolia, Eremophila ionantha and Eremophila interstans subsp. virgata Open Shrubland over Austrostipa elegantissima, Schoenia cassiniana and Waitzia acuminata Sparse Tussock Grassland/Sparse Forbs	142.34	1.53	62.86
ElAaDa	Eucalyptus loxophleba subsp. lissophloia, Eucalyptus griffithsii and Eucalyptus capillosa subsp. capillosa Low Open Woodland over, Acacia crenulata, Acacia acuminata and Acacia tetragonophylla Tall Open Shrubland over Dodonaea adenophora, Eremophila granitica and Eremophila oppositifolia subsp. angustifolia Open Shrubland over Prostanthera grylloana and Olearia pimeleoides Low Sparse Shrubland	200.64	2.16	85.67
EsEsAv	Eucalyptus salmonophloia and E. salubris Open Woodland over Eremophila scoparia Sparse Shrubland over Atriplex vesicaria Low Open Shrubland	237.21	2.55	8.02
EsEiEi	Eucalyptus salmonophloia and Eucalyptus salubris Woodland over Eremophila interstans subsp. virgata and Santalum acuminatum Tall Open Shrubland over Eremophila ionantha, Exocarpos aphyllus	37.31	0.40	1.37
EsEiEs	Eucalyptus salmonophloia, Eucalyptus transcontinentalis and Eucalyptus salubris Open Woodland over Eremophila interstans subsp. interstans and Santalum spicatum Tall Open Shrubland over Eremophila interstans subsp. virgata, E. ionantha and E. scoparia	1799.86	19.38	1171.61

Veg ID	Vegetation Group	Total Within Purpose Permit Area (ha)	Proportion Within Purpose Permit Area (%)	Total indicative disturbance (ha)
	Shrubland over *Austrostipa scabra, Maireana triptera* and *Ptilotus obovatus* Open Tussock Grassland/ Low Open Shrubland			
EsAaLa	Eucalyptus salubris and Eucalyptus salmonophloia Open Woodland over Acacia acuminata, Eremophila alternifolia and Santalum spicatum Tall Shrubland over Acacia hemiteles, Eremophila decipiens subsp. decipiens and Lycium australe Shrubland over Maireana pyramidata, Ptilotus obovatus and Sclerolaena diacantha. Low Open Shrubland over Goodenia mimuloides and Cephalipterum drummondii. Open Forbs	152.43	1.64	71.72
EsEcEt	*Eucalyptus salubris* Low Open Woodland over *Eremophila caerulea* subsp. *caerulea*, *Eremophila ternata* and *Eremophila microphylla* over Mixed Chenopod Low Sparse Shrubland	5.57	0.06	2.11
EsEiSa	*Eucalyptus salubris* Open Woodland over *Eremophila ionantha, E. scoparia* and *Senna artemisioides* subsp. *filifolia* Open Shrubland	3899.61	42.00	104.30
EsAhTs	*Eucalyptus salubris, Eucalyptus aequioperta* and *Melaleuca pauperiflora* subsp. *Fastigiata* Open Woodland over *Acacia hemiteles* Tall Open Shrubland over *Dodonaea viscosa* subsp. *angustissima*	90.27	0.97	10.00
MhScSs	*Melaleuca halmaturorum* and *M. pauperiflora* subsp. *fastigiata* Tall Shrubland over *Sclerolaena cuneata* and *Atriplex vesicaria* Low Open Shrubland and *Lycium australe* over *Streptoglossa* sp. Open Herbland	19.63	0.21	0.27
MhMp	Melaleuca halmaturorum and Melaleuca pauperiflora subsp. fastigiata Tall Shrubland	53.49	0.58	2.62
EsAbEs	Mixed Eucalyptus spp. Open Woodland over *Acacia burkittii* and *A. hemiteles* Tall Sparse Shrubland over Mixed Open Shrubland	342.03	3.68	12.01
EsAcEa	Mixed Eucalyptus spp. Open Woodland over *Acacia crenulata, Alyxia buxifolia* and *Melaleuca leiocarpa* Tall Open	12.89	0.14	12.02

Veg ID	Vegetation Group	Total Within Purpose Permit Area (ha)	Proportion Within Purpose Permit Area (%)	Total indicative disturbance (ha)
	Shrubland over *Exocarpos aphyllus* Open Shrubland over Mixed Forbs			

In terms of vegetation condition across the permit area, it was found to range from 'Degraded' to 'Excellent', with the majority (47.39%) being deemed as 'Very Good' condition. Indicative disturbance is provided in Table 3-5.

Table 3-5: Vegetation condition within the proposed Purpose Permit Area (FVC, 2026)

Vegetation Condition	Extent (ha)	Proportion of proposed Purpose Permit Area (%)
Excellent	178.81	1.93
Very Good - Excellent	21.69	0.23
Very Good	4,397.16	47.39
Good - Very Good	2,727.05	29.39
Good	850.72	9.17
Poor-Good	19.51	0.21
Poor	6.34	0.07
Degraded-Poor	0.00	0.00
Degraded	167.75	1.81
Cleared/Rehabilitated	680.56	7.33
Unknown	229.71	2.48
Total	9,279.30	100

As the EPA have an objective to maintain vegetation associations above a 30% retention threshold for unconstrained areas (EPA 2016a). Vegetation associations 8, 128, 435, 522, 936, 1413 and 2009 exceed the 30% retention threshold at a State, IBRA region and subregion and local government context, meeting the EPA objective of retention of vegetation for the purpose of biodiversity conservation (Table 3-6).

Table 3-6: Pre-European Vegetation Associations of the Purpose Permit Area (FVC, 2026)

Beard Vegetation Association	Scale	Pre-European Extent (ha)	Pre-European Extent Remaining (%)
8	Bioregion (Coolgardie)	280,248.26	98.34
	Subregion (COO02)	54,162.12	93.36
	Subregion (COO03)	226,086.14	99.53
	LGA (Shire of Coolgardie)	160,584.43	99.34
128	Bioregion (Coolgardie)	184,549.90	99.64
	Subregion (COO02)	156,192.81	99.59
	Subregion (COO03)	26,871.74	99.93
	LGA (Shire of Coolgardie)	96,232.93	99.98
435	Bioregion (Coolgardie)	738,211.22	99.22
	Subregion (COO02)	732,093.31	99.22
	Subregion (COO03)	6,117.91	100.00
	LGA (Shire of Coolgardie)	365,870.49	100.00
522	Bioregion (Coolgardie)	688,406.97	99.93
	Subregion (COO02)	480,231.80	99.99
	Subregion (COO03)	208,175.17	99.78
	LGA (Shire of Coolgardie)	313,238.77	99.86
936	Bioregion (Coolgardie)	586,792.23	99.58
	Subregion (COO02)	275,894.49	99.99
	Subregion (COO03)	310,897.74	99.22
	LGA (Shire of Coolgardie)	359,112.73	99.32
1413	Bioregion (Coolgardie)	1,061,212.28	98.24
	Subregion (COO02)	953,237.73	98.07
	Subregion (COO03)	107,974.55	99.77
	LGA (Shire of Coolgardie)	334,488.08	99.93
2009	Bioregion (Coolgardie)	7,058.46	97.44
	Subregion (COO02)	819.37	100.00
	Subregion (COO03)	6,239.08	97.11
	LGA (Shire of Coolgardie)	7,058.46	97.44

3.4.2 Fauna

3.4.2.1 Terrestrial Fauna

The basic fauna assessment (EMA, 2025) identified a total of 273 vertebrate fauna species considered likely to occur in the study area, consisting of 66 reptiles, four amphibians, 137 birds and

25 mammals. Of these, 16 are conservation significant. Two species are considered resident - Malleefowl (*Leipoa ocellata*) and Southern Whiteface (*Aphelocephala leucopsis*), both listed as Vulnerable under the BC Act and EPBC Act. Two species are likely to be regular visitors (Western Rosella (P4) and Peregrine Falcon (OS)), and 12 species may occur in the area as vagrants (EMA, 2025).

Terrestrial Ecosystems (TE) undertook a basic vertebrate fauna risk assessment and targeted survey for Malleefowl over 2,529.3ha of the greater project area in 2021 (Terrestrial Ecosystems, 2022) which contained significant consolidated historical survey effort by various companies. Of the 2,529.3ha assessed area, approximately 550ha was noted as highly disturbed by previous mining and exploration mining activity. The assessment details that four broad fauna habitats were identified including:

- Acacia shrubland thickets,
- Mixed Eucalypt woodland with and without an understorey of shrubs,
- Mallee woodland; and
- Rehabilitated areas with or without Eucalypt woodland over chenopods in addition to those areas that have already been disturbed and largely devoid of vegetation.

Additional targeted fauna assessments were undertaken for significant species known to occur in the region (EMA, 2025):

- Malleefowl (*Leipoa ocellata*) (VU – BC and EPBC Act) – mound validation and LiDAR assessment.
- Arid Bronze Azure Butterfly – ABAB (*Ogyris petrina*) (CR – BC and EPBC Act) – habitat reconnaissance survey.
- Inland Hairstreak Butterfly (*Jalmenus aridus*) (P1 – BC Act) – habitat reconnaissance survey and targeted survey.

The study area consists of two areas - the Mine area (surveyed by EMA in 2025, TE in 2021 and RPS Group in 2012), and the Borefield (surveyed by EMA in 2025 - Appendix 2), totalling 9,021.5 ha.

Five field assessments were undertaken in October 2025, including two ‘basic fauna assessments, one targeted butterfly survey, and two Malleefowl mound/habitat assessments.

A total of thirteen broad habitat types were identified in the study area. The dominant habitat within the purpose permit area is ‘Open woodland on clay-loam plain’ (61.7%). The remaining twelve habitats occupy less than 10% of the study area each (EMA, 2025). The ‘Open woodland on clay-loam plain’ habitat is widespread and common in the region. It provides habitat for many species of fauna and acts as an important habitat for connectivity for fauna.

Shrubland habitats ('Mallee woodland and shrubland', 'Dense mallee woodland and shrubland', 'Shrubland', 'Tall Melaleuca shrubland on calcrete', and 'Sparse low shrubs on rocky rise') occur throughout the study area, particularly the Mine area, and these represent potential Malleefowl and Southern Whiteface habitat. Where the shrublands are dense, topography is gentle, and there are suitable substrates and other mound building materials (such as 'Dense mallee woodland and shrubland'), this represents high quality Malleefowl breeding habitat. In contrast, the more open areas of the above shrubland habitat types are more suitable for Southern Whiteface (VU), which requires trees or tall shrubs for nesting, and patchy bare earth with a variety of understorey and mid-storey species for movement and foraging (EMA, 2025). M260 is committed to avoiding high-quality Malleefowl breeding habitat and Southern Whiteface nesting habitat as far as practicable.

Drainage line habitats occur in the Purpose Permit Area, and contain dense vegetation, supporting a diversity of species. Open chenopod plain is sparsely vegetated and supports a lower diversity of fauna.

There is a total of 273 vertebrate fauna species considered likely to occur in the Purpose Permit Area, consisting of 66 reptiles, four amphibians, 137 birds and 25 mammals. Of these, 16 are conservation significant. Two are considered resident to the permit area: Malleefowl and Southern Whiteface (both VU EPBC Act and BC Act) (EMA, 2025).

3.4.2.1.1 Malleefowl (*Leipoa ocellata*)

The basic fauna assessment (EMA, 2025) identified high-quality Malleefowl breeding habitat (Dense mallee woodland and shrubland) within the study area. This habitat is highly suitable for breeding and occupies 116 ha of the study area. Its suitability for Malleefowl breeding habitat is demonstrated by appropriate vegetation structure (species, density and canopy), substrates for mounds building (soils, leaf litter), and negligible to gentle slope.

A further 1,274.2ha of the study area is considered low-quality Malleefowl breeding habitat (EMA, 2025). It is less suitable for breeding due to the presence of historical disturbance which has created a more open vegetation structure and soil compaction in some areas. Although these areas retain some suitable features, the absence of recently used mounds and the availability of higher-quality habitat nearby suggest Malleefowl are more likely to breed elsewhere until this area regenerates. The remaining fauna habitats may be used by Malleefowl for foraging and dispersal (EMA, 2025).

Regionally, Malleefowl are common and widespread. The regional and local population is less under threat than populations in more disturbed areas (such as the Wheatbelt), where clearing is widespread and feral predators are abundant.

To manage the risk to Malleefowl, M260 has proposed that no greater than 2 weeks prior to vegetation clearing, the disturbance footprint will be inspected for the presence of Malleefowl mounds by a

suitably qualified environmental specialist. If an active Malleefowl mound is detected within the disturbance footprint it will be avoided. Where an active Malleefowl mound is detected that cannot be avoided, M260 will engage with DBCA to obtain approval under section 40 of the *Biodiversity Conservation Act 2016*. Disturbance of confirmed inactive mounds as assessed by a suitably qualified environmental specialist, does not constitute disturbance of the species and does not require a section 40 authorisation. During operations (and if the mound is not removed), mounds that have been recorded within the Purpose Permit Area will be inspected at the start of each breeding season. Where a mound is observed to be active, a 50m buffer shall be retained; vehicle movements and speeds shall be restricted within 200m of the Malleefowl mound as far as practicable.

3.4.2.1.2 Southern Whiteface (*Aphelocephala leucopsis*)

Southern Whiteface is commonly recorded throughout arid Australia and is associated with open woodlands and shrublands. However, it is under threat from habitat loss and numbers are reducing in some areas of Australia. The nearest desktop record is 15 km south of the Borefield area and there are several additional records within 40 km of the study area (ALA, 2025).

Southern Whitefaces live in a wide range of open woodlands and shrublands where there is an understorey of grasses or shrubs, or both. These areas are usually in habitats dominated by acacias or eucalypts on ranges, foothills and lowlands, and plains (Higgins and Peter, 2002). Primary habitat for this species within the study area are: ‘Open woodland on clay-loam plain’, ‘Mallee woodland and shrubland’, and ‘Shrubland’ habitats, which provide trees or tall shrubs for nesting, some areas of moderately dense vegetation, and some areas of more open ground interspersed within shrub and ground cover layers; however as the species is ubiquitous, it may also occupy other habitats with areas of low trees, shrubs and ground cover.

A pair of Southern Whiteface was recorded in the Drainage line habitat type within the Purpose Permit Area during the field assessment. Given more suitable habitat is present in the study area, and the species is known in the area, Southern Whiteface are considered Resident; however, as Southern Whiteface is common in the region, the local population is not likely to be significantly impacted by the proposed vegetation clearing.

3.4.2.1.3 Significant Butterflies

A desktop review was conducted in conjunction with a field assessment to determine the occurrence of butterflies over the survey area. Two species of significant butterfly were considered to potentially occur in the study area:

- The Inland Hairstreak Butterfly (*Jalmenus aridus)* occurs in the Goldfields region, however very little is known about the biology of this species due to its short life cycle, with adult butterflies only emerging for a few weeks during spring. Since 2021, over 25 new populations of this species have been recorded in the region, primarily south and east of the study area.

The nearest two subpopulations being located approximately 10 km north and 18 km east of the Purpose Permit Area (DBCA, 2025b). Suitable habitat exists in the study area where known host plants *Senna artemisioides* ssp. *filifolia* and *Acacia tetragonophylla* occur, these include shrubland and woodland habitat types. However, the Inland Hairstreak Butterfly was not detected during the targeted survey. Given the survey was conducted in its flight period and the species was flying in other areas in the region at the time of survey, it is therefore considered unlikely that this species occurs within the Purpose Permit Area.

- The Arid Bronze Azure Butterfly – ABAB (*Ogyris petrina*) is a very rare species due to its specific ecological requirements. The butterfly can only survive in the presence of its host ant *Camponotus* sp. nr. *terebrans,* an undescribed species of ant which builds distinctive nests eucalypt woodland. While eucalypt woodland is common, the ants are not common. Furthermore, the butterfly can only be searched for during its flight period, which lasts only a few weeks each year and emergence is unpredictable, however searches for host ant nests outside of the flight period may narrow down search areas. The field assessment concluded that the potential habitats within the study area were unsuitable due to the wrong mix of or insufficient understorey plants, presence of recent disturbance, the habitat not being large enough, and the presence of areas of low-lying and flood prone, waterlogged or sheet water drainage. In addition, no *Camponotus* sp. nr. *terebrans* nests were found during the survey. In some areas *Crematogaster* ants dominated the bases of the trees (they can displace *Camponotus*), and the meat ant, *Iridomyrmex purpureus* was ubiquitous. Meat ants are a major competitor of *Camponotus* ants. In consideration to the above, the Arid Bronze Azure Butterfly is also considered unlikely to occur in the Purpose Permit Area.

3.4.2.2 Short Range Endemic (SRE) Fauna

A Desktop Study Area and a SRE field survey was carried out by Invertebrate Solutions in 2022 (Invertebrate Solutions, 2022) (Appendix 4). The Desktop Study Area found no Confirmed or Likely SRE species, and one Possible SRE species, an undescribed Bothriembryon land snail which does not occur within the Purpose Permit Area. The remaining species identified from desktop resources were found to be widespread. An additional five conservation significant invertebrates (widespread, non-SRE species) were identified in the desktop assessment; however, none have potential habitat within the Purpose Permit Area. Based on these findings, no SRE are anticipated to occur within the Purpose Permit Area as the majority of the species that are classified as Possible SRE taxa is due to incomplete taxonomy and unknown species distributions. In addition, most of the species recorded from the desktop review and survey effort, are widespread across the Goldfields and/or arid Western Australia (Invertebrate Solutions, 2022).

4 ENVIRONMENTAL MANAGEMENT MEASURES

M260 is committed to appropriately managing its activities and ensuring potential impacts to the environment are avoided where possible. Where avoidance is not practicable, impacts will be minimised and mitigated.

4.1 Approved Policies and Planning Instruments

The clearing of native vegetation in Western Australia is regulated under Part V of the EP Act and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. In addition to the matters required to be considered in accordance with s. 51O of the EP Act, M260 has also had regard for the below statutes, polices and guidelines:

- *Environmental Protection Act 1986* (WA) (EP Act)
- *Biodiversity Conservation Act 2016* (WA) (BC Act)
- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)
- *Soil and Land Conservation Act 1945*
- *Rights in Water and Irrigation Act 1914*
- *Aboriginal Heritage Act 1972*
- WA Environmental Offsets Policy (Government of Western Australia 2011)
- A guide to the assessment of applications to clear native vegetation: Under Part V Division 2 of the *Environmental Protection Act 1986* (Department of Environmental Regulation 2014)
- Procedure: Native vegetation clearing permits (Department of Water and Environmental Regulation 2021)
- Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (Environmental Protection Authority 2016)
- Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment (Environmental Protection Authority 2020b).

4.2 Management Measures – Avoidance

M260 is committed to appropriately managing its activities and ensuring any potential impacts to the environment are avoided where possible. Clearing has been minimised by utilising existing disturbed area. Where practical, existing disturbed areas will be utilised for haul/access roads and associated infrastructure to minimise clearing requirements.

In addition, M260 are committed to undertaking all compliance monitoring and reporting stipulated by applicable laws and regulations, and the operation will require all employees to exercise appropriate environmental practices. Environmental management includes:

- identifying risk and hazards
- operational environmental management plans
- training and competencies
- monitoring programs
- auditing and inspections
- incident investigation
- reporting requirements.

4.3 Management Measures – Minimisation

4.3.1 Vegetation Clearing Minimisation

M260 will implement the following measures to minimise the extent and impact of native vegetation clearing within the Purpose Permit Area:

- Clearing will be undertaken progressively and staged to align with the construction and operational schedule, so that vegetation is only removed when the land is imminently required for the relevant mining activity.
- The clearing footprint will be limited to the minimum area necessary for the safe and efficient conduct of each activity. Where practicable, existing cleared and previously disturbed areas (557 ha within the Purpose Permit Area) will be utilised in preference to clearing additional native vegetation.
- Project infrastructure layout and design will seek to avoid significant environmental features where practicable, including known Priority flora populations, active Malleefowl mounds, and vegetation associated with drainage lines.
- All cleared vegetation will be stockpiled separately from topsoil for later use in rehabilitation activities. No burning of vegetation will occur on site.
- Fire management practices will be implemented to prevent uncontrolled fire resulting in clearing beyond approved boundaries.

4.3.2 Land Clearing Controls

The following operational controls will be implemented to minimise and manage land disturbance impacts:

- Prior to clearing, an internal Ground Disturbance Permit (GDP) will be completed and signed off by the Environment Department and Activity Owner.
- The GDP will identify any conditions that apply to the clearing area (including any protected areas / species to be avoided where practicable).
- The clearing area will be delineated on foot and marked with survey pegs and flagging tape to ensure only the surveyed area is cleared.
- Clearing will not be undertaken until construction / mining is imminent, minimising erosion and dust risks.
- Environmental awareness training will be completed by personnel involved in clearing activities (including identification of flora and fauna of conservation significance).
- Avoidance buffers will be implemented to ensure clearing remains within the approved Purpose Permit Area boundaries; spotters may also be used if deemed necessary.

4.3.3 Weed Management

M260 will aim to prevent the introduction and spread of weeds in the proposed Purpose Permit Area as far as practicable. The following management measures will be implemented to minimise the risk of introducing weeds into the proposed Purpose Permit Area:

- Weed, Seed and Hygiene Certificates will be presented as verification prior to mobilisation.
- All vehicles and equipment will be cleaned before mobilisation to the Purpose Permit Area, to remove all dirt and vegetative materials.
- Vehicle and equipment washdown will only occur at an appropriate facility.
- Off-road vehicle use will be strictly controlled with no driving permitted off designated roads.
- Any new weed outbreaks will be recorded in the M260's Incident Reporting system and managed in accordance with site environmental procedures.
- Any vehicles that may have traversed weed impact areas will be cleaned prior to leaving site.

4.3.4 Fauna Management

M260 will aim to ensure fauna species are not adversely affected by clearing, including both through direct impacts and impacts to habitat. The following management measures will be implemented to minimise the potential impacts on fauna:

- Pre-clearance surveys within the specified clearing areas will be undertaken no greater than 2 weeks prior to vegetation clearing.
- No clearing at night will occur to avoid impacting nocturnal species.

- Awareness training will outline the appropriate behaviour and responses in the event of contact with native fauna.
- Native fauna will not be captured, fed, harmed, or disturbed. If relocation is required, site environmental department will be contacted.
- All significant fauna deaths will be reported through the company incident reporting system.
- A GDP will be required for all clearing.

4.3.5 Dust Management

M260 will aim to minimise fugitive dust emissions and other air quality issues associated with clearing by:

- Using water to suppress dust emission from unsealed roads, stockpiles and work areas as required.
- Ensuring that any saline water used is only sprayed within the haul roads and cleared infrastructure footprints, dribble bars will be used where required.
- Implement water truck operating procedures and train water cart operators so that personnel are aware of the potential impacts of saline water on vegetation.
- Reducing vehicle speeds as appropriate if dust emission from roads is visually excessive.
- Where possible, clearing activities will be scheduled to avoid high winds that may generate excessive dust.
- Report and respond to any community complaints regarding dust emissions that are deemed excessive as an incident.

4.3.6 Topsoil Management

Topsoil is an important resource for rehabilitation of disturbed sites, which need to be managed effectively. Incorrect management of topsoil can impact soil structure and decrease its usefulness in rehabilitation (Mine Earth, 2026). Topsoil will be managed by:

- Stockpiling vegetation, topsoil, and subsoil as per the GDP.
- Topsoils from the ‘Undulating plains’ and ‘Drainage lines’ Soil Landform Associations (SLAs) should be salvaged and stockpiled for use as a rehabilitation medium for use on slopes and flat surfaces.
- Topsoils from the ‘Low slopes’, ‘Clayey plains’ and ‘Low rises and hills’ SLAs should be stockpiled separately from other SLAs and further tested for suitability before utilised as a rehabilitation resource.

- Any rock fragments and surface vegetation litter present within the soil profiles should be collected and stockpiled with the topsoil.
- Machinery operators should minimise the frequency and intensity of topsoil disturbance, to minimise degradation to the structural integrity of the material.
- Stripping topsoil to the required depth (average salvage depth of 0.2m) and should occur as close as possible to the time when the proposed disturbance is scheduled to commence.
- The soil profiles (average salvage depth of 0.2m) within the proposed disturbance should be stripped and paddock-dumped into stockpiles approximately 2m in height and a practical height achievable by site earthmoving equipment. The piles should have adequate distance between them to create a series of mounds and troughs to capture surface water and organic matter.
- Excessive traffic and disturbance of the stockpiles should be minimised to minimise erosion and degradation of soil structure. Care should be taken to minimise the handling of the soils where possible, particularly when wet.
- Not using saline water for dust suppression during topsoil / subsoil harvesting or rehandling.
- Not storing materials or equipment on topsoil stockpiles.
- Marking out stockpile locations on maps and recording them in a GIS database, along with volumes.
- Implement weed, seed, and hygiene requirements.

4.3.7 Water Management

The Purpose Permit Area contains minor ephemeral drainage lines, which contain dense vegetation and support a diversity of fauna species (EMA, 2025). However, no major permanent watercourses or wetlands are located within the Purpose Permit Area. Clearing is not expected to materially impact regional surface water flow given the ephemeral and localised nature of these drainage features. Clearing is also considered unlikely to impact on groundwater quality provided that groundwater contamination from the use of hydrocarbons and chemicals will be actively managed.

Surface water management measures will be implemented to avoid unnecessary disturbance to natural surface drainage patterns, with particular attention to maintaining flow continuity in drainage lines where practicable. M260 will aim to minimise impacts on the quality of surface water and will avoid unnecessary disturbance to natural surface drainage. Management measures include:

- Implement erosion and sediment management measures where there is a risk of:
  - discharge of runoff from clearing impacting downstream environments; and/or
  - discharge of sediment laden runoff.

4.3.8 Hydrocarbon Management

M260 will actively manage the storage and use of hydrocarbon in machinery and vehicles use for clearing to minimise and contain spills and uncontrolled releases to prevent impacts to vegetation, soil and/or water. M260 aims to minimise such occurrences by ensuring that:

- Hazardous materials are approved prior to site entry.
- Hydrocarbons and chemicals are safely stored in accordance with Australian Standards.
- Hydrocarbons and other hazardous wastes are collected, treated, transported, and disposed of in an environmentally sound manner, in accordance with regulatory and legislative requirements.
- Effective spill clean-up material is readily available at each work site and on all mobile service trucks or vehicles, and where hydrocarbons and chemicals are stored, dispensed and / or used.

4.4 Management Measures – Rehabilitation

A Mining Development and Closure Proposal (MDCP) is being prepared for the Project. All clearing activities outlined in this NVCP will be addressed in the MDCP. Progressive rehabilitation will occur during the life of the Project. Final rehabilitation activities of the Project will be conducted at the end of the project life including for legacy mining disturbance. Rehabilitation monitoring will be implemented during, and post, the life of the Project to ensure legal obligations and closure objectives are met. Rehabilitation activities will aim to meet post closure land use objectives. M260 will:

- Continue to consult with key stakeholders throughout the life of the Project and at closure.
- Ensure the rehabilitated land surfaces are safe and stable.
- Undertake rehabilitation tasks detailed in the Mine Closure Plan.

5 ASSESSMENT AGAINST CLEARING PRINCIPLES

5.1 Assessment Against the 10 Clearing Principles

The proposed clearing works were assessed against the 10 clearing principles for native vegetation as listed in Schedule 5 of the EP Act. The 10 clearing principles stipulate when native vegetation should not be cleared. The proposal to clear native vegetation for M260's Bullabulling Gold Project is considered in terms of these principles, in accordance with Department of Environmental Regulation (2014) (now Department of Water and Environment Regulation) assessment guidelines.

As detailed design has progressed, an Indicative Footprint has been delineated to accommodate the mining infrastructure and is 2,909 ha inclusive of existing disturbance within the 9,284ha Purpose Permit Area. M260 commits to avoiding and minimising impacts to significant flora as far as practicable. Each of the 10 clearing principles as specified in Schedule 5 of the EP Act are addressed below in Table 5-1. These assessments have been made using information obtained from existing surveys and reports commissioned by M260.

Table 5-1: Assessment against the 10 clearing principles of clearing native vegetation within the proposed Purpose Permit Area.

Clearing Principle	Justification of Variance	Variance
Principle (a) Native vegetation should not be cleared if it compromises a high level of biological diversity.	The proposed Purpose Permit Area is 9,284 ha in area, of which a total clearing footprint of 2,909 ha is proposed, (30.7%) inclusive of 2,352 ha of remnant vegetation and 557 ha of existing disturbance. Located within the Coolgardie IBRA bioregion, Eastern Goldfields (COO3) subregion, and within the Great Western Woodlands. The vegetation is characteristic of the broader bioregion, comprising predominantly eucalyptus woodlands, mallee shrublands, and acacia shrublands. No TECs or PECs are known to occur within 50 m of the proposed Purpose Permit Area (FVC, 2026). A total of 25 vegetation units were described and mapped (FVC, 2026) within the Purpose Permit Area. The flora survey recorded 453 taxa from 215 genera and 62 families. No Threatened flora listed under the BC Act or EPBC Act were recorded. Five Priority 3 species were recorded (*Acacia crenulata, Cryptandra crispula, Eremophila microphylla, Eremophila veronica* and *Notisia intonsa*). Vegetation condition across the area assessed by FVC (2026) ranged from Degraded to Excellent, with the majority (47.39%) in Very Good condition. The biological diversity present is consistent with the broader bioregion and is not considered to represent unusually high levels of biological diversity.	Unlikely to be at variance.
Principle (b) Native vegetation should not be cleared if it compromises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.	The Basic Fauna Assessment (EMA, 2025) identified 13 broad habitat types across the area assessed. The dominant habitat is Open woodland on clay-loam plain (61.7%), widespread and common in the region. A total of 273 vertebrate fauna species are considered likely to occur, with 16 conservation significant species. Two are considered resident: Malleefowl (*Leipoa ocellata*, VU) and Southern Whiteface (*Aphelocephala leucopsis*, VU) (EMA, 2025). The EMA (2025) fauna assessment identified 116 ha of high-quality Malleefowl breeding habitat and 1,274.2 ha of low-quality Malleefowl breeding habitat within the study area. The proposed clearing of up to 2,909 ha will result in some loss of both habitat types. M260 commits to minimising clearing within high-quality Malleefowl breeding habitat and to pre-clearance mound surveys no more than two weeks prior to clearing. A pair of Southern Whiteface was recorded in the Drainage line habitat type within the Purpose Permit Area during the field assessment. As Southern Whiteface is common in the region, the local population is not likely to be significantly impacted by the proposal (EMA, 2025). Targeted butterfly surveys for the Arid Bronze Azure Butterfly (CR) and Inland Hairstreak Butterfly (P1) concluded both are unlikely to occur. The SRE desktop study and field survey (Invertebrate Solutions, 2022) found no Confirmed or Likely SRE species within the Purpose Permit Area. It is unlikely that significant fauna and their habitats are restricted to within the proposed Purpose Permit Area; therefore, clearing of native vegetation is unlikely to fragment, restrict or isolate any populations of significant fauna species, particularly with management measures.	Unlikely to be at variance.

Clearing Principle	Justification of Variance	Variance
Principle (c) Native vegetation should not be cleared if it includes or is necessary for the continued existence of rare flora.	No Threatened flora listed under the BC Act or under the EPBC Act have been recorded within the proposed Purpose Permit Area. Five Priority 3 species were recorded within the assessed area during surveys: *Acacia crenulata, Cryptandra crispula, Eremophila microphylla, Eremophila veronica* and *Notisia intonsa.* All Priority 3 species recorded within the Purpose Permit Area are known to occur in the wider Coolgardie bioregion and are not restricted to the Purpose Permit Area. An additional nine Priority flora are considered Likely to occur elsewhere in the assessed area, including within unsurveyed portions. Two unidentified specimens may represent significant species (Acacia sp1. potentially a new undescribed species, and *Poaceae sp*. possibly representing Priority 3 *Austrostipa turbinata*). Priority flora locations will be recorded, flagged and avoided where practicable.	Not at Variance
Principle (d) Native vegetation should not be cleared if it compromises the whole or a part of or is necessary for the maintenance of a Threatened ecological community	No Threatened ecological communities or Priority Ecological Communities occur within, or have buffers that overlap, the proposed Purpose Permit Area.	Not at Variance
Principle (e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.	The Purpose Permit Area area is within the Coolgardie IBRA bioregion in the Eastern Goldfields, which has not been subject to extensive broad-scale agricultural clearing. Seven Beard (1990) vegetation associations occur within the Purpose Permit Area, being vegetation associations 8, 128, 435, 522, 936, 1413 and 2009 (FVC, 2026). The significance of clearing a particular vegetation association can be determined by comparing current and pre-European extents (Table 3-6). Vegetation associations retaining less than 30% of their pre-European extent generally experience accelerated species loss at an ecosystem level and are regarded as being ‘vulnerable’, while vegetation types retaining less than 10% of their original extent are regarded as being ‘endangered’. All seven vegetation associations within the Purpose Permit Area retain well in excess of 30% of their pre-European extent at all scales of assessment (Bioregion, Subregion and LGA). The lowest retention recorded is Beard Association 8 at the Southern Cross (COO02) sub-region scale at 93.36%, which is still well above the 30% threshold. The proposed clearing of up to 2,909 ha will not materially alter these retention percentages.	Not at Variance

Clearing Principle	Justification of Variance	Variance
Principle (f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	No Ramsar wetlands or wetlands of international or national significance are located within the vicinity of the proposed Purpose Permit Area. A network of minor ephemeral drainage lines intersects the Purpose Permit Area. It is considered unlikely that the native vegetation to be cleared will impact wetlands and watercourses. No known groundwater dependent flora was recorded within the Purpose Permit Area and therefore, none of the recorded vegetation units are considered representative of groundwater dependent vegetation (FVC, 2026). Groundwater monitoring will be implemented to detect any changes to the local groundwater regime.	Not at Variance
Principle (g) Native vegetation should not be cleared if the clearing of vegetation is likely to cause appreciable land degradation.	The proposed Purpose Permit Area is located predominantly within the Coolgardie System which consists of uplands and undulating plains associated with ultramafic greenstones, supporting eucalypt woodlands and halophytic shrublands. This land system may be prone to land degradation as a result of clearing, presenting as salinisation and soil erosion. However, the small scale of clearing, proposed management measures and rehabilitation commitments means it is considered unlikely that the proposed clearing will result in salinisation or soil erosion.	Not at Variance
Principle (h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	The proposed Purpose Permit Area does not overlap any ESAs. The nearest ESA is the Kangaroo Hills Timber Reserve, which is located approximately 7km east of the proposed Purpose Permit Area.	Not at Variance
Principle (i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in	The proposed Purpose Permit Area is not located within any major drainage lines or watercourses. Therefore, clearing is not expected to impact surface water flow and/or water quality within any watercourse. A network of minor ephemeral drainage lines intersects the Purpose Permit Area; however, these are localised features and clearing is not expected to materially impact regional surface water flow or water quality. Surface water management measures will be implemented if required to divert surface water flow away from mining infrastructure and avoid unnecessary disturbance to natural surface drainage.	Not at Variance

Clearing Principle	Justification of Variance	Variance
the quality of surface or underground water.	One low-potential terrestrial GDE intersects the proposed Purpose Permit Area, however clearing is unlikely to impact on groundwater quality provided that groundwater contamination from the use of hydrocarbons and chemicals will be actively managed.	
Principle (j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.	The proposed Purpose Permit Area is not located within any major drainage lines or watercourses. Therefore, clearing is not expected to alter the hydrological regime of the area leading to an increase in the frequency or intensity of flooding.	Not at Variance

6 STAKEHOLDER ENGAGEMENT

6.1 Stakeholder Engagement Principles

M260's objective for stakeholder consultation in relation to the Bullabulling Gold Project is to ensure that all stakeholders affected by the implementation of this NVCP are appropriately identified, consulted, and their input considered. Furthermore, their input has been considered with respect to the development of mine closure strategies and the defining of post-mining land uses (PMLUs). The stakeholder engagement process requires identification of, and consultation with, relevant stakeholders throughout the life of a project to enable effective communication of information regarding mining activity and provide an opportunity for stakeholder feedback so that agreed environmental expectations can be established.

A range of methods may be used to facilitate consultation and capture input from stakeholders, depending on the specific stakeholder and purpose, including:

- Direct (ad hoc) engagement via phone calls, emails, letters, and face to face meetings to consult regarding specific issues or items. Targeted audience: all key stakeholders.
- Direct scheduled engagement via workshops/discussion groups, reference groups, community consultation committees to collaborate on shared projects or responsibilities. Targeted audience: all key stakeholders.
- Indirect engagement via website, mail outs, media releases for general information to interested parties.
- Site visit, open days, phone calls, community liaison committees, to empower specific stakeholders.

M260 ensures that stakeholder communication occurs regularly and transparently to provide timely updates on mining activities and closure planning. This process facilitates stakeholder feedback and addresses concerns promptly. All engagement activities are documented in a Stakeholder Engagement Register to maintain accountability and traceability. M260 are committed to engaging all key stakeholders throughout operations and into closure including the local shire, regulatory agencies and relevant native title claimants.

6.2 Stakeholder Engagement Register

Table 6-1 provides details of the stakeholder engagement that has been conducted leading up to the submission of this proposal.

Table 6-1: Stakeholder Engagement Register

Date of Engagement	Description of Engagement	Stakeholders (Names and or Titles)	Stakeholder Comments/ Issues (Reference)	Applicant Response and/or Resolution	Stakeholder Response
23/05/2025	MGAC Board Meeting, Luke McFadyen attended MGAC Board meeting and presented annual plan, as required under the NTLUA.	Marlinyu Ghoorlie: Board Members M260: Luke McFadyen	Nil	Nil	Nil
18/07/2025	Marlinyu Ghoorlie: Relationship Committee, Minerals 260 provided an update to the committee about site activities and general plan for the asset.	Marlinyu Ghoorlie: Relationship Committee and Houston Legal M260: Luke McFadyen and Matthew Blake	Nil	Nil	Nil
15/08/2025	In person meeting, Introduction for Russell Brooks (M260 Chief Development Officer) and Geoff Curtis. M260 provided an update on exploration activities and Project planning.	Marlinyu Ghoorlie: Mark Champion, Victor Smith and Geoff Curtis M260: Luke McFadyen and Russell Brooks	Nil	Nil	Nil
03/09/2025	In person meeting to discuss preferred approach for Bullabulling heritage surveys to support all mining activities, including but not limited to drilling and mining infrastructure (pits. waste rock dumps, tailings storage facility, processing and non-processing infrastructure).	Marlinyu Ghoorlie: Brian Champion, Mark Champion, Victor Smith M260: Luke McFadyen and Russell Brooks	Nil	Nil	Nil
06/10/2025 - 08/10/2025	Bullabulling Ethnographic Survey, Engagement included discussion around proposed mining activities and associated infrastructure, supported by preliminary layout	Marlinyu Ghoorlie: Brian Champion Snr, Brian Champion Jnr, Robin Sambo, Vaughan O'Loughlin, Ollan Samuel Dimer, Wyvern Dimer,	Nil	Nil	Nil

	maps verified infield with survey participants.	Chris Dimer, Troy Trott, Mark Champion and Victor Smith. M260: Luke McFadyen and Russell Brooks			
22/10/2025	In person meeting, M260 presented plans to lodge an expanded Mining Lease and additional Miscellaneous Licences. Proposed infrastructure areas discussed included the village and service corridor. Cross-sections and maps were used to support consultation.	Marlinyu Ghoorlie: Brian Champion, Mark Champion and Victor Smith M260: Luke McFadyen and Russell Brooks	Nil	Nil	Nil
06/11/2025	In person meeting, M260 presented planned work relating to the Hannan Paleochannel seeking endorsement to proceed. MG are supportive of the works discussed, noting that heritage surveys were to be completed in the area over coming trips.	Marlinyu Ghoorlie: Brian Champion, Mark Champion and Victor Smith M260: Russell Brooks	Nil	Nil	Nil
16/12/2025	In person meeting, M260 presented forthcoming approval submissions for the accommodation village, including the MDCP layout and stakeholder engagement comments. Other discussion points included key mining features (pits, waste rock landforms) and the potential for interaction with heritage places. M260 will work through any interactions, mitigations and regulatory processes with MG in 2026.	Marlinyu Ghoorlie: Brian Champion, Mark Champion and Victor Smith M260: Luke McFadyen Russell Brooks	Nil	Nil	Nil
17/02/2026	In person meeting: M260 presented potential interactions with cultural heritage places identified during surveys in 2025/26. MG outlined the hierarchy of mitigation and M260 mentioned an intent to submit a Heritage Notice for a Site Identification Survey,	Marlinyu Ghoorlie: Victor Smith M260: Luke McFadyen, Russell Brooks and Nick Jones	Nil	Nil	Nil
16/03/2026	Discussion and email: providing advanced notice to MG regarding	Marlinyu Ghoorlie:	Nil	Nil	Nil

	two 5C groundwater abstraction licence applications currently under assessment by DWER, to be advertised for public comment in the West Australian and Kalgoorlie Miner newspaper.	Mark Champion and Victor Smith M260: Russell Brooks			
19/03/2026	Marlinyu Ghoorlie: Relationship Committee, Minerals 260 provided a Project update to the committee, site works completed to March-26 and the forthcoming Project activities and approvals schedule (NVCP, MDCP and Part V Works Approval)	Marlinyu Ghoorlie: Tania Champion, Leechelle Hammat, Darryl Trott, Darren Indich Snr, Maxine Dimer, Ricky Dimer & Simon Champion M260: Luke McFadyen and Russell Brooks	Nil	Nil	Nil
31/03/2026	In person meeting: M260 presented the proposed Native Vegetation Clearing Permit 1 application. Supporting information included purpose permit details ,tenure, mapping, supporting studies and adherence to the clearing principles.	Marlinyu Ghoorlie: Victor Smith M260: Luke McFadyen, Russell Brooks and Nick Jones	Nil	Nil	Nil
08/09/2025	Discussed the proposed Project planning and clearing permit development	DMPE	Nil	Nil	Nil
13/11/2025	Pre MDCP submission meeting. Describing proposed activities associated with the MDCP.	DMPE	DMPE advised submitting the MDCP for assessment. Noting this MDCP will form part of the greater Project in future.	M260 will develop and submit a MDCP for this purpose.	Nil.
20/11/2025 - Ongoing	Introduction to the Bullabulling Gold Project, current and future planned activities including the Accommodation Village and building permits to be submitted to the Shire.	Coolgardie Shire	Supportive of project development and associated opportunities for local communities.	Nil.	Nil.
27/01/2026 19/02/2026 10/03/2026 11/03/2026	Consultation around potential borefield infrastructure and development of an access agreement.	Calooli Station M260: Russell Brooks and Tom Walch	Nil	Nil	Nil

19/03/2026 – Ongoing	Consultation around planned pastoral operations and potential interactions during development	Bullabulling Station: Adrian Lally M260: Nick Jones	Nil	Nil	Nil

7 RISK ASSESSMENT AND MANAGEMENT

7.1 Risk Identification

An environmental risk assessment was completed to identify and evaluate the risks associated with this NVCP. The risk assessment was undertaken in accordance with Guideline for preparing Mining Development and Closure Proposals (DMPE, 2025). The risk assessment matrix presented in Table 7-1. Where possible M260 have avoided or eliminated the risk of environmental harm identified through mining activities. Mitigation and management measures will be adapted over time to maintain 'As Low as Reasonably Practicable' (ALARP) risk levels.

Table 7-1: Risk assessment matrix

Risk Matrix		Most Credible Consequence Level				
		Insignificant	Minor	Moderate	Major	Severe
Likelihood	Almost Certain	Medium	High	High	Extreme	Extreme
	Likely	Medium	Medium	High	Extreme	Extreme
	Possible	Low	Medium	Medium	High	Extreme
	Unlikely	Low	Low	Medium	High	High
	Rare	Low	Low	Medium	Medium	High

7.2 Risk Treatment

The risks pathways identified, risk treatments have been proposed to mitigate potential impacts to the environmental and social surroundings. These risk treatment strategies follow the management and mitigation hierarchy of hazard control, as defined by DMPE including:

1) Where reasonably practicable, eliminate or avoid the risk, by not undertaking the activity. For example, changing the project layout to avoid clearing of threatened flora or changing pit designs to avoid disturbance of potentially acid forming material.
2) Reduce the risk by substituting a different activity which poses a lower risk. For example, backfilling a pit void with waste rock instead of constructing a waste rock landform.
3) Control the risk with an engineered solution. For example, having a specifically designed adverse materials management cell in a waste rock landform, or the use of automatic (instead of manual) shut-off valves.
4) Mitigate the risk using administrative procedures. For example, reducing speeds on mine roads, daily checks of a TSF or warning signals/signs.

7.3 Risk Register

The environmental risk assessment is presented in Table 7-2.

Table 7-2: Environmental Risk Register

Risk ID	Key Environmental factor	Environmental Indicator	Domain	Risk Pathway	Phase of mine life	Inherent Risk			Risk treatment	Residual Risk		
						Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
1	Flora, vegetation and fauna	Flora and vegetation	Vegetation Clearing and other ground disturbing activities	Unauthorised clearing / ground disturbing activities resulting in impacts to significant flora and fragmentation of vegetation communities resulting in flora population decline.	Construction & Operations	Minor	Possible	Medium	- Clearing conducted in accordance with the granted NVCP conditions and approved Purpose Permit Area boundaries. - Ground Disturbance Forms to be completed which requires sign off prior to clearing. -Delineation of clearing boundaries to ensure activities are within approved Purpose Permit Area boundaries. -Mining Act approval is obtained prior to any land disturbance.	Minor	Unlikely	Low
2	Flora, vegetation and fauna	Fauna	Vegetation clearing and other ground disturbing activities	Unauthorised clearing / ground disturbing activities resulting in loss or fragmentation of significant fauna habitat including Malleefowl (*Leipoa ocellata*) and Southern Whiteface (*Aphelocephala leucopsis*).	Construction & Operations	Minor	Possible	Medium	- Pre-clearance fauna surveys to identify active nesting areas and significant fauna habitat features. - No disturbance to active Malleefowl mounds without approval under the BC Act. - Retention of woodland habitat corridors between clearing areas where practicable to maintain habitat connectivity. - Progressive rehabilitation with native woodland species to restore habitat connectivity. - Speed limits enforced on site roads; travel restricted during dawn and dusk where possible to reduce fauna vehicle strike. - Fauna mortality register maintained.	Minor	Unlikely	Low
3	Flora, vegetation and fauna	Flora and vegetation	Vegetation Clearing and other ground disturbing activities	Clearing of native vegetation resulting in impacts to Threatened or Priority flora species, including the five Priority 3 species recorded within the Purpose Permit Area (*Acacia crenulata*, *Cryptandra crispula*, *Eremophila microphylla*, *Eremophila veronica* and *Notisia intonsa*).	Construction & Operations	Minor	Possible	Medium	- No Threatened flora listed under the BC Act or EPBC Act have been recorded within the Purpose Permit Area. - Locations of Priority flora recorded in GIS; avoidance of known populations where practicable during detailed design. - Pre-clearance surveys to identify and record Priority flora populations within proposed clearing areas. - Ground Disturbance Forms to be completed and signed off prior to clearing to confirm pre-clearance survey requirements are met. - Delineation of clearing boundaries to ensure clearing is within the approved Purpose Permit Area.	Minor	Unlikely	Low
4	Flora, vegetation and fauna	Flora and vegetation	Vegetation Clearing and other ground disturbing activities	Clearing of native vegetation resulting in impacts to Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs)	Construction & Operations	Minor	Unlikely	Low	- No TECs listed under the BC Act or EPBC Act have been identified within the Purpose Permit Area. - No PECs listed by DBCA have been identified within the Purpose Permit Area. - Flora and vegetation surveys undertaken to assess the presence of ecological communities within the Purpose Permit Area.	Minor	Unlikely	Low
5	Flora, vegetation and fauna	Flora and vegetation	Vegetation Clearing and other ground disturbing activities	Clearing of native vegetation that may be significant as a remnant in the context of the broader landscape clearing extent.	Construction & Operations	Minor	Unlikely	Low	- The Purpose Permit Area is located within the Coolgardie bioregion which retains approximately 95% of its pre-European vegetation extent. - Vegetation associations within the Purpose Permit Area are well represented at the local and regional scale, with all associations retaining greater than 30% of their pre-European extent. - The surrounding landscape has not been extensively cleared; the area retains high levels of native vegetation cover.	Minor	Rare	Low
6	Inland Waters	Surface Water	Vegetation Clearing and other ground disturbing activities	Clearing of native vegetation associated with watercourses or wetlands within the Purpose Permit Area, potentially impacting riparian vegetation, watercourse stability and associated ecological values.	Construction & Operations	Minor	Possible	Medium	- No Ramsar wetlands or wetlands of national importance intersect the Purpose Permit Area. - A network of minor drainage lines intersects the Purpose Permit Area; clearing of vegetation associated with these features will be minimised where practicable. - Surface hydrology management measures will be installed to prevent impacts to surrounding drainage features.	Minor	Unlikely	Low

Risk ID	Key Environmental factor	Environmental Indicator	Domain	Risk Pathway	Phase of mine life	Inherent Risk			Risk treatment	Residual Risk		
						Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
									- Breaks and culverts will be incorporated into infrastructure design to maintain surface water flow paths. - Cleared areas adjacent to drainage lines will be prioritised for progressive rehabilitation.			
7	Terrestrial Environmental Quality	Soil Resources	Vegetation clearing and other ground disturbing activities	Clearing of native vegetation resulting in land degradation including wind and water erosion, soil compaction, loss of soil structure, and increased susceptibility to erosion on exposed surfaces.	Construction & Operations	Moderate	Possible	Medium	- Topsoil stripped from all cleared surfaces to a depth of up to 200 mm and stockpiled separately based on soil landscape area characteristics. - Sodic topsoils (from Clayey plains, Low slopes, Low rises and hills SLAs) will be used on flat rehabilitation surfaces only. - Non-sodic topsoils (from Undulating plains, Drainage lines SLAs) will be prioritised for sloped rehabilitation areas. - Topsoil stockpiles sign posted, recorded spatially, placed away from drainage lines, and regularly inspected for weed infestation. - Dust management procedures followed; clearing will not occur during high wind conditions; active roads watered for dust suppression. - Progressive rehabilitation of cleared areas when no longer required for operational use.	Minor	Unlikely	Low
8	Flora, vegetation and fauna	Flora and Vegetation	Vegetation clearing and other ground disturbing activities	Clearing of native vegetation resulting in indirect impacts to the environmental values of nearby conservation areas through dust, altered hydrology, weed introduction, or habitat fragmentation.	Construction & Operations	Minor	Unlikely	Low	- No DBCA-managed lands or conservation reserves are located within the Purpose Permit Area. - The closest significant environmental feature is the Kangaroo Hills Timber Reserve, located approximately 7km east of the Project. - Dust management and weed hygiene measures will be implemented to prevent offsite impacts.	Minor	Unlikely	Low
9	Inland Waters	Surface Water and Groundwater	Vegetation clearing and other ground disturbing activities	Clearing of native vegetation resulting in increased sediment mobilisation, altered runoff patterns, and potential deterioration of surface or groundwater quality within and downstream of the Purpose Permit Area.	Construction & Operations	Minor	Possible	Medium	- Surface water management measures will be installed to control runoff from cleared areas and prevent sediment discharge to surrounding drainage features. - One low-potential terrestrial GDE intersects the Purpose Permit Area; groundwater monitoring will be established to detect changes to groundwater levels and quality in the vicinity. - Borefield groundwater abstraction will be managed in accordance with Groundwater Licence (GWL) conditions issued by DWER. - If groundwater drawdown is detected in the vicinity of the GDE, vegetation condition monitoring will be implemented. - Weed and erosion management measures implemented to maintain water quality in drainage lines.	Minor	Unlikely	Low
10	Inland Waters	Surface Water	Vegetation clearing and other ground disturbing activities	Clearing of native vegetation and construction of infrastructure resulting in altered drainage patterns, increased surface water runoff and potential exacerbation of flooding within and downstream of the Purpose Permit Area.	Construction & Operations	Minor	Possible	Medium	- Implement erosion and sediment management measures - Drainage management measures integrated into construction planning.	Minor	Unlikely	Low
11	Flora, vegetation and fauna	Weeds and Pathogens	Vegetation clearing and other ground disturbing activities	Clearing activities and increased vehicle movements leading to the introduction and spread of weed species within and adjacent to the Purpose Permit Area, resulting in degradation of native vegetation communities and habitat values.	Construction & Operations	Minor	Possible	Medium	- Baseline flora surveys identified limited weed species present within the Purpose Permit Area; no Weeds of National Significance (WoNS) identified. - Findings incorporated into the Weed Register. - Clearing activities to be conducted in accordance with the Weed Management Plan and Procedures. - All vehicles entering site will follow the Equipment Hygiene Procedure. - Weed identification and management included in Environmental Inductions. - Annual weed inspections completed across operational areas and topsoil stockpiles.	Minor	Unlikely	Low

Risk ID	Key Environmental factor	Environmental Indicator	Domain	Risk Pathway	Phase of mine life	Inherent Risk			Risk treatment	Residual Risk		
						Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
12	Flora, vegetation and fauna	Flora and Vegetation	Vegetation clearing and other ground disturbing activities	Clearing outside of the approved Purpose Permit Area boundary or in excess of the approved clearing extent, resulting in unassessed and unapproved impacts to native vegetation and associated environmental values.	Construction & Operations	Minor	Possible	Medium	- Clearing conducted in accordance with the granted NVCP conditions and approved Purpose Permit Area boundaries. - Ground Disturbance Forms to be completed which require sign off prior to clearing. - Delineation of clearing boundaries to ensure activities are within approved Purpose Permit Area boundaries. - Disturbance areas are surveyed post clearing, recorded spatially, documented on site plans and reported in accordance with approval conditions. - Incidents of unauthorised clearing are reported (internally/externally) and areas of unauthorised cleared vegetation are rehabilitated immediately.	Minor	Unlikely	Low

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APPENDIX 1. FLORA AND VEGETATION SURVEY - BULLABULLING GOLD PROJECT (FVC, 2026)



FLORA AND VEGETATION SURVEY

BULLABULLING GOLD PROJECT

MINERALS 260

JANUARY 2026

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EXECUTIVE SUMMARY

Minerals 260 Limited (M260) is advancing the Bullabulling Gold Project (the project) which is one of Australia's largest near-term gold projects.

Green Values Australia (Green Values), on behalf of M260, commissioned Focused Vision Consulting Pty Ltd (FVC) to undertake a reconnaissance flora and vegetation assessment of areas associated with the project's Stage 2 development area (the survey area). Following the initial commissioning, in response to evolving requirements for the development, the extent of areas requiring assessment for flora and vegetation values was expanded. The collective project area addressed in this report comprises of the survey area, an adjacent area surveyed in 2021 by Botanica, and several areas assessed at a desktop level.

FVC undertook a field survey for a reconnaissance flora and vegetation assessment in August 2025. All stages of the study, including desktop assessment, field survey, data processing and reporting, were conducted in accordance with relevant guidance, and were carried out by suitably qualified and experienced personnel.

The key results and conclusions from the flora and vegetation assessment of the project area are as follows:

- No Threatened flora listed under the *Biodiversity Conservation Act 2016* (BC Act) or under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) have been previously recorded in the project area, nor were any recorded during the 2025 field survey.
- Five Priority 3 species were recorded within the project area during the 2025 and 2021 (Botanica 2021d) surveys; *Acacia crenulata, Cryptandra crispula, Eremophila microphylla*, *Eremophila veronica* and *Notisia intonsa.*
- In addition to the five Priority 3 flora recorded in the project area during the 2025 and 2021 field surveys, an additional nine Priority flora are considered 'Likely to occur' elsewhere in the project areas, including within the unsurveyed portions of the project area, and the certainty of these conclusions range from low to high, depending on the certainty of extrapolated vegetation mapping in areas not ground-truthed.
- Two flora specimens that were unable to be identified to species level may represent significant species; *Acacia* sp1. (considered likely to be a new, undescribed species) and Poaceae sp. (considered possibly representative of Priority 3 species, *Austrostipa turbinata*).
- No weeds classed as Declared Pest (DP) plants under the Biosecurity and Agricultural Management Act (BAM Act) or Weeds of National Significance (WoNS) were recorded during the survey.
- Twenty-five vegetation units have been described (**Table 10**) and mapped across the project areas, including 16 Eucalyptus Woodlands, one Allocasuarina and Acacia Woodland, one Acacia and Melaleuca Shrubland two Melaleuca Shrublands, one Chenopod Low Shrubland, two Mixed Low Shrublands, one Herbland and one mosaic (a combination of EsAcEa and AaaLcTk).
- Vegetation condition across the survey area was found to range from 'Degraded' to 'Excellent', with the majority (47.53%) in 'Very Good' condition.
- No Threatened Ecological Communities (TECs) or Priority Ecological Communities (PEC) have been identified as occurring in the project area, nor is it considered that any occur.
- The following vegetation units mapped and described within the project area (or portions of these units) have been determined to be of significance, or of potential significance:
    - The following vegetation units (or portions of) may be considered regionally significant:
        - AvMmPd, AaMhPg, ElAaSaf, EsAbEs, EsAaLa, EsAhTs, EsAcEa, EsEiEs , EsEiSa and Mosaic, due to supporting Priority flora
        - EcEs, EcMpEo, ElAaSaf, EsAaLa, EsAaOp, EsAaSs, EsAbEs, EsAcEa, EsEiEi, EsEiEs, EsEiSa, EsEsAv and Mosaic, due to restricted regional representation and/or distribution

- The following vegetation units maybe considered locally significant:
    - AaaLcTk, AvAc, AvSc, DfLbRp, EcMpEo, EsAaSs, EcEs and MhScSs, due to occurring as small, isolated communities
    - AvAc, AvSc, DfLbRp, EcEs, EcMpEo and MhScSs due to having a limited local extent and/or distribution.

The assessment was scoped to address a reconnaissance flora and vegetation assessment, using the relatively recent and directly adjacent 2021 Botanica survey results as a primary basis, combined with the field survey results and available local and regional flora and vegetation data and information from databases and the literature, predominantly previous surveys. As targeted flora surveys have been limited, vegetation mapping in some sections of the project area has been extrapolated due to not having been ground-truthed, and the areas accessed have been surveyed at a reconnaissance (rather than detailed) level of detail, the appropriateness of further surveys should be considered. Such consideration should be in reference to the spatial extent of proposed impacts/project footprint, the nature of the proposed impacts and on the specific impact assessment and permitting requirements for the project.

1 INTRODUCTION

1.1 BACKGROUND

Minerals 260 Limited (M260) is advancing the Bullabulling Gold Project (the project) which is one of Australia's largest near-term gold projects. The project consists of 48 tenements of various types including two Exploration, 16 General, 19 Miscellaneous and 11 Mining Leases.

Green Values Australia (Green Values), on behalf of M260, commissioned Focused Vision Consulting Pty Ltd (FVC) to undertake a reconnaissance flora and vegetation assessment of areas associated with the Stage 2 development area (the survey area). Following the initial commissioning, in response to evolving requirements for the development, the extent of areas requiring assessment for flora and vegetation values was expanded. The survey area, the location of an area surveyed in 2021 by Botanica, and other areas assessed at a desktop level are all collectively referred to as the project area, and are shown in **Figure1**.

This report presents the findings of the field assessment of the survey area and desktop assessment, including the unsurveyed areas within the project area.

The outcome of the survey and information in this report will be used to support upcoming and future environmental approvals and permitting.

1.2 LOCATION

The project area is located approximately 18.88 kilometres (km) south-west of Coolgardie, in the district of Coolgardie Western Australia (**Figure 1**). The project area covers a total of 10,823.32 hectares (ha) and the 2025 survey area covers a total of 5,431.45 ha.

1.3 SCOPE OF WORK

The scope of work was to delineate key flora and vegetation values of the project area. This was undertaken using a combination of assessments carried out in accordance with the *Technical Guide Flora and Vegetation Surveys for Environment Impact Assessment* (EPA 2016a).

The assessments and tasks requested in the initial and subsequent scopes of work culminating in this report were as follows (**Figure 1**):

- Desktop assessment of the project area in reference to available database and related information, literature and previous survey reports, with a focus on the report resulting from the Botanica (2021d) assessment in a portion of the project area.
- Reconnaissance (desktop and field) flora and vegetation assessment of the survey area.
- Desktop extrapolation of the vegetation mapping, and potentially occurring Threatened and Priority flora and ecological communities in the sections of the project area not within the FVC (2025) or Botanica (2021d) survey areas, with a level of certainty applied to the extrapolation in the various areas, where carried out.
- Determination of any survey gaps and recommendations for further survey, where/if required.
- Reporting on the findings of the desktop and field assessments.

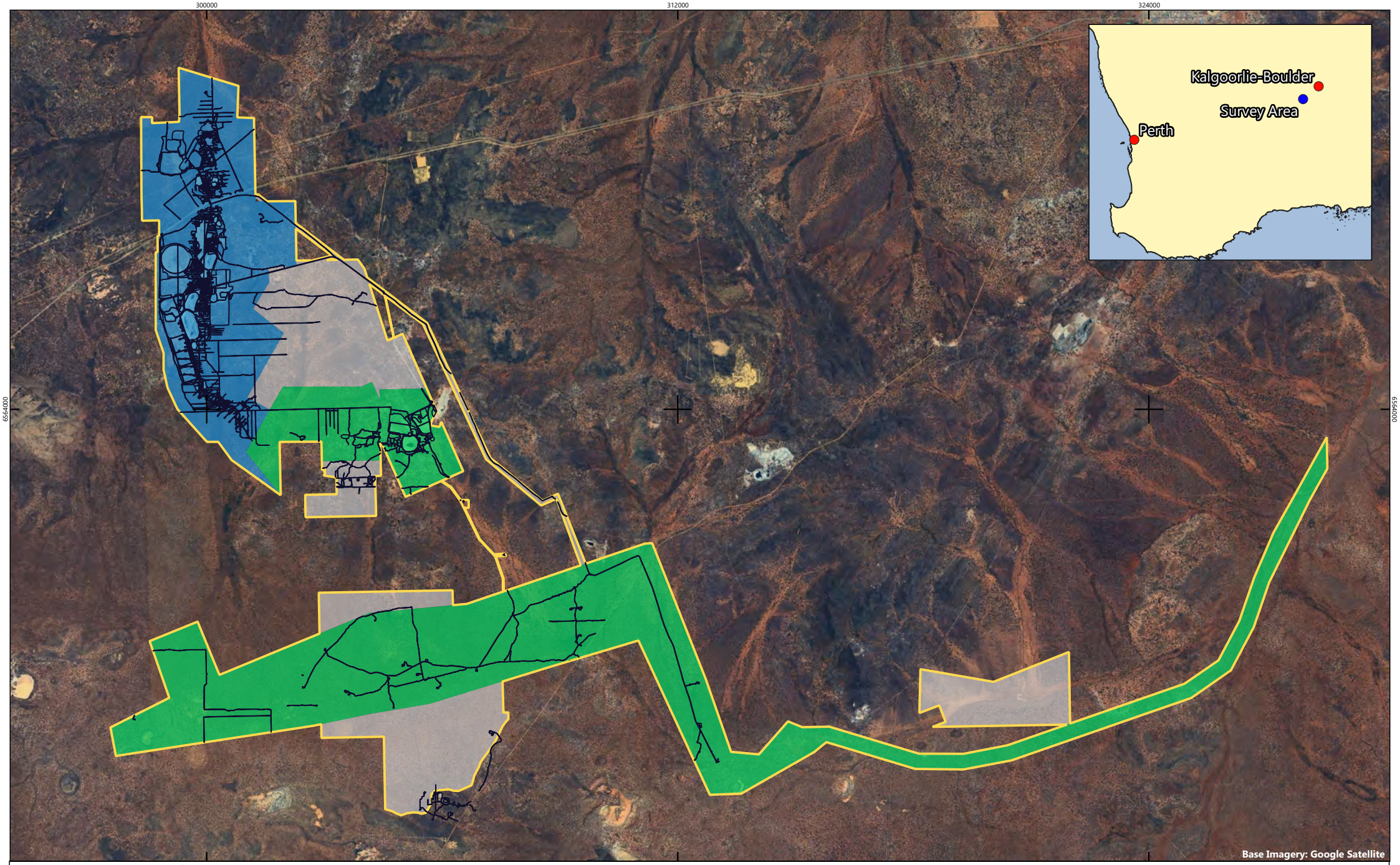


Figure 1 - Project Area and Survey Areas

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2 LEGISLATIVE CONTEXT

The biological assessments were conducted in accordance with the following legislation:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- Western Australian *Environmental Protection Act 1986* (EP Act)
- Western Australian *Biodiversity Conservation Act 2016* (BC Act).

The assessments complied with requirements for environmental survey and reporting in Western Australia, as outlined in:

- EPA (2008) *Guidance Statement No. 33: Environmental Guidance for Planning and Development*
- EPA (2016a) *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment*
- EPA (2016b) *Environmental Factor Guideline – Flora and Vegetation*

2.1 THREATENED AND PRIORITY FLORA

The Department of Biodiversity, Conservation and Attractions (DBCA) is involved in assigning conservation status to species that are geographically restricted to a few known populations or threatened by local processes. Allocating conservation status to plant species assists in protecting populations and conserving species from potential threats (DBCA 2025b).

The BC Act provides a statutory basis for the listing of Threatened species, specially protected species, critical habitat and key threatening processes (DBCA 2024a). Whilst not awarded any statutory protection, DBCA also maintains the Priority species list, for species of conservation concern. Therefore, both Threatened and Priority species are important focuses of surveys conducted to inform the Environmental Impact Assessment (EIA) process, and their definitions are presented in **Appendix A**.

Under the EPBC Act, actions that have, or are likely to have, a significant impact on a Matter of National Environmental Significance (MNES) require approval from the Federal Minister for the Environment (Department of the Environment 2013). Species at risk of extinction are recognised as Threatened at a Commonwealth level and are categorised according to the EPBC Act as summarised in **Appendix A**.

Any species listed in State and Commonwealth legislation as being of significance is said to be a significant species. This incorporates species that are endangered, vulnerable and rare, or covered by international conventions. Significance is not limited to species covered by State and Commonwealth legislation and includes Priority species, species of local significance and species showing significant range extensions or at the edge of their known range.

2.2 THREATENED AND PRIORITY ECOLOGICAL COMMUNITIES

Ecological communities are naturally occurring assemblages of organisms that occur in a particular type of habitat, as defined in the BC Act. A Threatened Ecological Community (TEC) is defined as an ecological community that is listed under either the BC Act or the EPBC Act as a Critically Endangered, Endangered or Vulnerable ecological community, which is subject to processes that threaten to destroy or significantly modify the ecological community across its range (DBCA 2023b, DBCA 2023 c).

Additional to TECs, Priority Ecological Communities (PEC) are ecological communities that are considered to be potentially conservation significant (and potentially TECs) that do not currently meet survey criteria or that are not adequately defined, are rare but not threatened, have been recently removed from the TEC list or require regular monitoring, and are listed by DBCA as PECs (DBCA 2023a). Definitions and categories of TECs listed under the EPBC Act and/or the BC Act and PECs are summarised in **Appendix A**.

2.3 VEGETATION OF SIGNIFICANCE

Alongside and in addition to significance according to statutory and DBCA listings, vegetation may be considered significant at an International, National, State, Regional or Local level. Whilst not applicable to statutory protection afforded to Threatened flora, TECs, Environmentally Sensitive Areas (ESAs) and Ramsar Wetlands, the significance, or potential significance of vegetation is an important consideration in the environmental impact assessment process. The assessment of vegetation of significance (or potential significance) highlights vegetation and vegetation units that should be considered further as part of project-specific impact assessment, impact avoidance and further surveys, where appropriate.

Vegetation that is significant and protected by statutory processes, and vegetation that may be of significance and may require further consideration in various contexts is described below.

2.3.1 Internationally Significant Vegetation

Vegetation is of international significance where it:

- is part of, or within, a 50 m buffer of a Ramsar Wetland of International Importance (DCCEEW 2021).

2.3.2 Nationally Significant Vegetation

Vegetation is of National significance where it:

- is classified as a listed TEC of National (EPBC) significance
- supports a population of National (EPBC) significant Threatened flora, plus a 50 m buffer (where the vegetation in the buffer is continuous with the vegetation supporting the population).

2.3.3 State Significant Vegetation

Vegetation is of State significance where it:

- is classified as a listed TEC of State significance
- intersects with a population of Threatened flora afforded protection under the BC Act
- is within a gazetted ESA.

Vegetation may be of State significance where it:

- occurs within the State-managed conservation estate (areas protected under the *Conservation and Land Management Act 1984*) or areas that have been formally recommended by DBCA for inclusion in the State Conservation Estate (EPA 2008)
- is part of, or within, a 50 m buffer of a State-listed Conservation Category Wetland.

2.3.3.1 Regionally Significant Vegetation

Vegetation is of regional significance where it:

- is classified as a PEC listed by DBCA (2023a)
- intersects with a population of Priority flora listed by DBCA (2025b).

Vegetation may be of regional significance where it:

- has a restricted regional representation and/or distribution (EPA 2016b)
- plays a role in maintaining the function and ecological integrity of a significant ecosystem (EPA 2016b)
- plays a role as a refuge, either:
    - with distribution limited to restricted biotic or abiotic conditions that are also restricted regionally (e.g. mesas, sheltered gorges, breakaways, isolated hills, islands, GDEs, mound springs, permanent wetlands in arid areas, paleodrainage vegetation not yet affected by salinity)
    - supports a high degree of floral endemism.

- is represented by less than 30% (or 10% in constrained areas) of its pre-European extent (Commonwealth of Australia 2001).

2.3.3.2 Locally Significant Vegetation

Vegetation communities may be considered Locally Significant where they:

- occur as small, isolated communities (Government of Western Australia 2000; Del Marco *et al.* 2004)
- have a restricted local extent (proportion) (EPA 2016b) and/or are locally restricted to only one or a few locations (Del Marco *et al.* 2004).

2.4 VEGETATION CLEARING, EXTENT AND STATUS

Clearing of native vegetation is regulated in WA under the EP Act and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. Any clearing of native vegetation is an offence, unless carried out under a clearing permit or if the clearing is for an exempt purpose (DER 2015). A clearing permit may be required under Part V of the EP Act, whereby permit applications to clear native vegetation must be assessed against the '10 Clearing Principles' as outlined in the Regulations (DER 2014). Where clearing of native vegetation is proposed to occur, there are several key criteria applied to the assessment of clearing permit applications, in the interests of biodiversity conservation (DER 2014).

The EPA objective in relation to flora and vegetation is: *to protect flora and vegetation so that biological diversity and ecological integrity are maintained* (EPA 2016a). The EPA considers it is important that ecological communities are maintained above a threshold level of 30% of the original pre-clearing extent of each community in 'unconstrained' areas and 10% within 'constrained' areas (EPA 2008). Additionally, the National Objectives and Targets for Biodiversity Conservation 2001-2005 (Commonwealth of Australia 2001) recognises that the retention of at least 30% of the pre-clearing extent of each vegetation association is necessary for Australia's biological diversity to be protected (DER 2014). Species loss appears to accelerate exponentially at an ecosystem level when current extent falls below 30% of pre-clearing extent (EPA 2008). A level of 10% of the original extent of a vegetation community is regarded as being a level representing Endangered status, and clearing which would increase the threat level to a vegetation community should be avoided (EPA 2008).

2.5 ENVIRONMENTALLY SENSITIVE AREAS

Environmentally Sensitive Areas (ESA) are areas that require special protection due to aspects such as landscape, fauna or historical value and are generally considered to be areas of high conservation value. ESAs are declared in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*, which was gazetted on 8 April 2005 (State of Western Australia 2005).

There are several types of ESAs relating to flora and vegetation, declared under Part V of the EP Act, which include:

- a defined wetland and the area within 50 m of that wetland
- the area covered by vegetation within 50 m of rare (Threatened) flora, to the extent where the vegetation is continuous with the vegetation in which the rare (Threatened) flora is located
- the area covered by a TEC
- Bush Forever sites (Government of Western Australia 2000).

2.6 INTRODUCED FLORA

Over 1,300 introduced (weed) species have been recognised to occur within Western Australia (EPA 2007). Weeds are plants that are not indigenous to an area and have been introduced either directly or indirectly through human activity. They establish in natural ecosystems and adversely modify natural processes, having the potential to dominate and simplify the ecosystems and thus decrease habitat value provided for native fauna. Weeds pose a threat to many native flora species due to their ability to rapidly grow and out-compete for available water, space, sunlight, and nutrients (EPA 2007).

2.6.1 Weeds of National Significance

Under the National Weed Strategy, there are currently 32 weed species listed as Weeds of National Significance (WoNS) (CISS 2025). Each weed listed was considered for inclusion based on the following criteria:

- invasive tendencies
- impacts
- potential for spread
- socioeconomic and environmental values.

2.6.2 Declared Pest Plants

The Western Australian Organism List (WAOL) details organisms listed as Declared Pests (DP), including pest plants, under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) (DPIRD 2022). Under the BAM Act, DPs are listed under one of the following categories:

- **C1 (exclusion)**, that applies to pests not established in Western Australia; control measures are to be taken to prevent their entry and establishment
- **C2 (eradication)**, that applies to pests that are present in Western Australia but in low numbers or in limited areas where eradication is still a possibility
- **C3 (management)**, that applies to plants that should have some form of management applied that will alleviate the harmful impacts of the plant, reduce the numbers or distribution of the plant, or prevent or contain the spread of the plant (DPRID 2017).

2.6.3 Environmental Weeds

Introduced species have also been ranked by several attributes including invasiveness, distribution, and environmental impacts in the various regions in the *Environmental Weed Strategy* (CALM 1999). To advance the above categorisation, the Invasive Plant Prioritisation Process for DBCA was developed in 2008 (DPAW 2013).

3 EXISTING ENVIRONMENT

3.1 CLIMATE

The project area occurs within the Coolgardie bioregion which has an arid to semi-arid Mediterranean climate, characterised by hot, dry sometimes wet summers and cool to mild wet winters (CALM 2003). The nearest operating Bureau of Meteorology (BoM) recording station is located at Kalgoorlie-Boulder Airport WA (Station number 012038) where rainfall and temperature data has been recorded since 1939, respectively (BoM 2025). The average annual rainfall at this station is 250.20 millilitres (mm) with annual mean maximum temperatures ranging from 18.8 °C in winter to 33.7°C in summer (BoM 2025) (**Figure 2**). In the months prior to the August 2025 field assessment, May, June and July recorded below average rainfall, while February, March and April recorded above average rainfall (**Figure 2**).

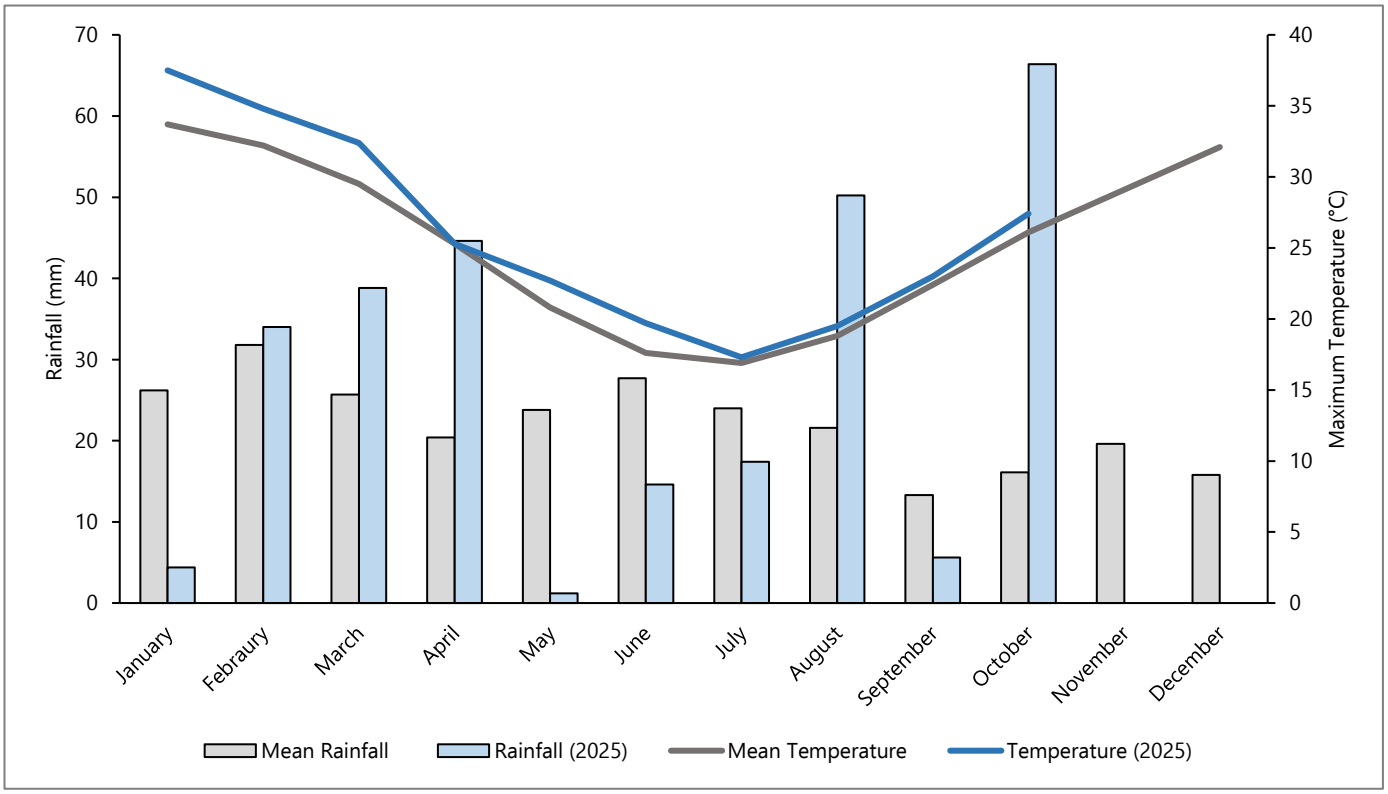


Figure 2 – Climate Data of the Project Area (Kalgoorlie-Boulder Airport 012038) (BoM 2025)

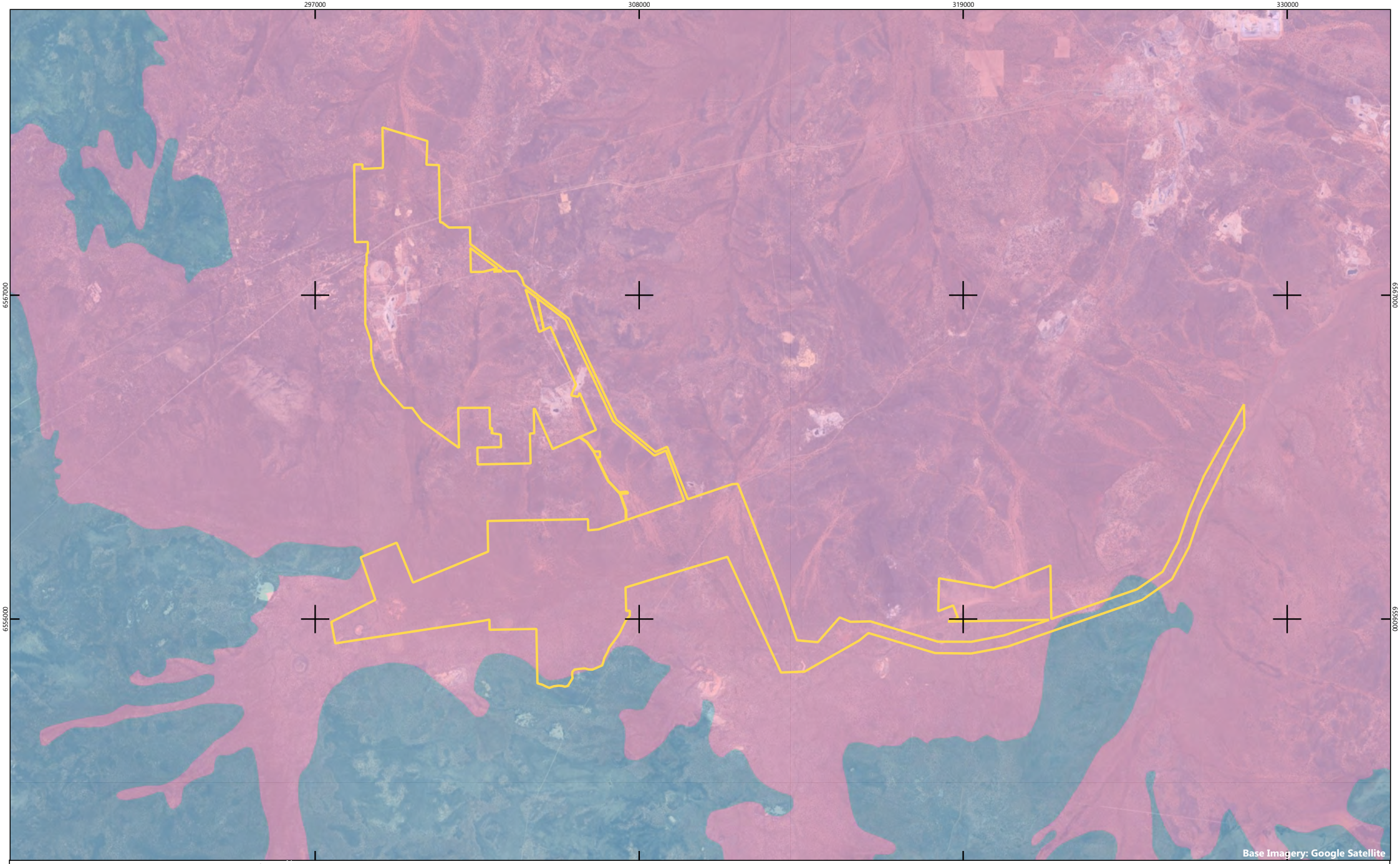
3.2 IBRA REGION

The Interim Biogeographic Regionalisation for Australia (IBRA) defines 89 regions based on climate, geology, landforms and characteristic vegetation and fauna (DCCEEW 2021). The project area lies within the Coolgardie (COO) IBRA region and, at a finer scale, within the Eastern Goldfields (COO03) subregion and a small portion lies within the Southern Cross (COO02) subregion (Mitchell *et al.* 2002) **Figure 3**.

The Coolgardie bioregion consists of an undulating landscape broken up by greenstone and granite low hills. Diverse eucalyptus woodlands, rich in endemic species occur on low greenstone hills, alluvial soils on valley floors, around saline playas of the region's occluded drainage system and on broad plains of calcareous soils. Granite outcrops support 'granite grass', wattle shrubland and York Gums. The playa salt lakes support dwarf shrublands of samphire. The upper levels in the landscape support scrubs and mallee rich in endemic Proteaceae in the west and acacias in the east (McKenzie *et al.* 2003).

The Eastern Goldfields subregion is comprised of sandplains that support Mallees, Acacia thickets and shrub-heaths. Diverse Eucalyptus woodlands occur on salt lakes, on ranges and in valleys (Cowan 2001). The areas of salt lakes support dwarf shrublands of samphire and the basic granulites of the Fraser Range support Woodlands and Dodonaea shrubland (Cowan 2001).

The Southern Cross subregion is comprised of valleys that lie on Quaternary duplex and graduational soils and include chains of saline playa-lakes that support diverse Eucalyptus woodlands. Areas around the salt lakes are rich in endemic eucalypts that occur on low green stone hills, valley alluvials and broad plains of calcareous earths. The surface of the salt lakes support dwarf shrublands and samphire species. Sand sheets found around granite outcrops support Mallees and scrub-heaths (rich in endemic acacias and Myrtaceae species). Granite basement outcrops that occur mid-level in the landscape support *Borya constricta* and stands of *Acacia acuminata* and *Eucalyptus loxophleba*. Yellow sandplains, gravelly sandplains and laterite breakaways occur in the upper levels of the landscape as a result of eroded remnants of a lateritic duricrust, this supports Mallees and scrub-heaths (rich in endemic Acacias and Myrtaceae species). These Mallees and scrub-heaths also occur on sand lunettes associated with playa along the valley floors (Cowan *et al.* 2001).



0 2 4 6 8 km

GDA 2020 MGA Zone 51

Legend

- Project Area
- Eastern Goldfield
- Southern Cross

Figure 3 - IBRA Sub-Regions

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3.1 LAND SYSTEMS

Land systems are composed of repeating forms of topography, soils and vegetation, which are described as a series of land units (Christian and Stewart 1953). Land system mapping for the region supporting the project area has been prepared by the Department of Agriculture Western Australia (Van Vreeswyk *et al.* 2004). The project area intersects 20 land systems within the Coolgardie bioregion, which are shown in **Figure 4** and described in **Table 1**.

Table 1 – Land Systems of the Project Area (DPRID 2025)

Land System	Description
Banner Disturbed land phase	Disturbed land
Bannar Land System	Level to gently undulating gravelly sandy plains with acacia and allocasuarina scrublands, commonly with scattered native pines and emergent mallees
Bunyip system	Gilgaied drainage tract, draining greenstone hills supporting mixed halophytic shrublands occasionally with a black oak overstorey
Coolgardie Disturbed land phase	Disturbed land
Coolgardie Land System	Uplands and undulating plains associated with ultramafic greenstones, supporting eucalypt woodlands and halophytic shrublands
Cronin Land System	Occluded saline pans and ephemeral swamps in paleotrunk valleys, supporting eucalypt-melaleuca thickets, with eolian sand sheets to the southeast of drainage foci
Doney Disturbed land phase	Disturbed land
Doney system	Calcareous alluvial plains with eucalypt woodlands adjacent to salt lake systems
Euchre Land System	Low granite breakaways with alluvial plains and sandy tracts, supporting eucalypt woodlands and acacia shrublands
Gransal Disturbed land phase	Disturbed land
Gransal system	Stony plains and low rises based on granite supporting mainly halophytic low shrublands
Gumland Disturbed land phase	Disturbed land
Gumland system	Extensive pedeplains supporting eucalypt woodlands with halophytic and non-halophytic shrub understoreys
Illaara Disturbed land phase	Disturbed land
Illaara system	Plains with ironstone gravel or calcrete mantles supporting eucalypt woodlands and mulga-casuarina shrublands
Johnston Disturbed land phase	Disturbed land
Johnston Land system	Gently undulating plains with occasional granite rises, supporting eucalypt woodlands and non-halophytic shrublands
Lakeside system	Sandplains with occasional sand dunes and prominent claypans, supporting mallee eucalypts and spinifex
Moriarty system	Low greenstone rises and stony plains supporting chenopod shrublands with patchy eucalypt overstoreys
Sedgeman Land System	Low granite domes and outcrop with gritty-surfaced plains, supporting eucalypt stands and acacia-dominated shrublands



Figure 4 - Land Systems

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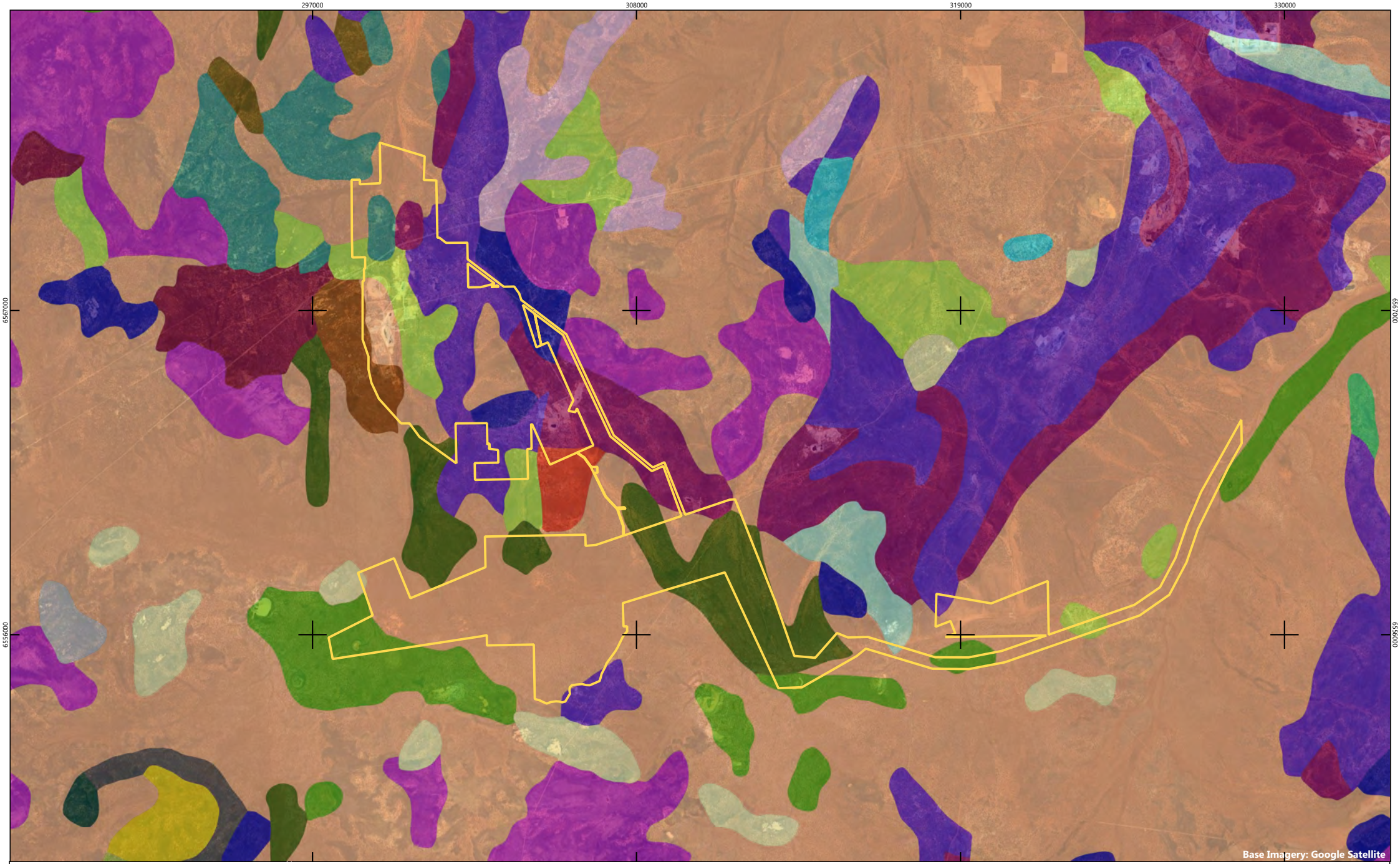
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3.2 GEOLOGY

The project area occurs within the Kalgoorlie Province, which occurs on the central eastern portion of the Yilgarn Craton known as the 'Eastern Goldfields Terrains'. The geology of the Kalgoorlie Province is characterised by calcareous and red loamy earths with some salt lake soils, deep red sands, yellow sandy earths, shallow loams and loamy duplexes (Tille 2006). The Archaean bedrock of the Yilgarn Craton consists of granitic rocks and greenstones (Tille 2006). At a finer scale, thirteen geological units which intersect the project area are described in **Table 2** and shown in **Figure 5** (Surface Geology of Australia).

Table 2 – Geological Units of the Project Area (Surface Geology of Australia)

Mapping Symbols	Geological Unit	Description
Abe	mafic extrusive rocks 74248	Basalt, high-Mg basalt, minor mafic intrusive rocks; some andesite; agglomerate; mafic schist; amphibolite; dolerite; komatiitic basalt; carbonated basalt; basaltic andesite; mafic rock interleaved with minor granitic rock
Ade	mafic intrusive rocks 74263	Mafic intrusive rocks, medium to coarse-grained; layered mafic to ultramafic intrusions - dolerite, gabbro, olivine gabbro, peridotite, pyroxenite, leucogabbro, quartz dolerite, quartz gabbro, gabbronorite
Ag	felsic intrusives 74292	Undifferentiated felsic intrusive rocks, including monzogranite, granodiorite, granite, tonalite, quartz monzonite, syenogranite, diorite, monzodiorite, pegmatite. Locally metamorphosed, foliated, gneissic. Local abundant mafic and ultramafic inclusions.
Agh	hi-Ca granite 74296	Monzogranite, granodiorite, tonalite, quartz monzonite; in places recrystallised and foliated; some mixed granite and country rock assemblages; high-Ca granite
Aglb	Bullabulling Monzogranite	Foliated, partly recrystallised monzogranite with scattered microcline phenocrysts; low-Ca granite
Aty	amphibolite 74334	Amphibolite, mafic schist, mafic rock intercalated with granite, para-amphibolite; metabasalt, metagabbro, metapyroxenite and metadolerite; Youanmi Terrane
Aue	ultramafic and minor mafic rocks 74475	Tremolite-chlorite-talc amphibolite, metapyroxenite, pyroxenite, peridotite, serpentinite, ultramafic schists, komatiite, high-Mg basalt; also chalcedony, silica, jasper, silcrete, silica cap rock on ultramafic rocks
Awe	undivided sedimentary and volcanic rocks 74481	Undivided sedimentary (non-volcanic) and felsic volcanic rocks
Czl	ferruginous duricrust 38498	Pisolitic, nodular or vuggy ferruginous laterite; some lateritic soils; ferricrete; magnesite; ferruginous and siliceous duricrusts and reworked products, calcrete, kaolinised rock, gossan; residual ferruginous saprolite
Czs	sand plain 38499	Sand or gravel plains; quartz sand sheets commonly with ferruginous pisoliths or pebbles, minor clay; local calcrete, laterite, silcrete, silt, clay, alluvium, colluvium, aeolian sand
Qa	alluvium 38485	Channel and flood plain alluvium; gravel, sand, silt, clay, locally calcreted
Qdlu	lunette dunes 72955	Quartz and gypsum dunes and mounds (kopi); may include minor silt, sand, gravel, and clay flats adjacent to playas; locally includes some playa sediments
Qrc	colluvium 38491	Colluvium, sheetwash, talus; gravel piedmonts and aprons over and around bedrock; clay-silt-sand with sheet and nodular kankar; alluvial and aeolian sand-silt-gravel in depressions and broad valleys in Canning Basin; local calcrete, reworked laterite.



0 2 4 6 8 km

GDA 2020 MGA Zone 51

Legend

Project Area	Afe	Aghi	Ase	Ave	Czs
Abe	Ag	Aghp	Asy	Awe	Qa
Aby	Agh	Agl	Aty	Awy	Qdlu
Ade	Agha	Aglb	Aue	Czl	Qrc

Figure 5 - Geology

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3.3 VEGETATION

The objective of the EPA in relation to flora and vegetation is: *To protect flora and vegetation so that biological diversity and ecological integrity are maintained* (EPA 2016b). As discussed in **Section 2.3** EPA have minimum thresholds they like to keep for constrained and unconstrained areas to prevent exponential species loss.

The following key criteria (as discussed in **Section 2.4**) are applied to vegetation clearing from a biodiversity perspective, which justifies the retention targets (EPA 2008):

- The 'threshold level' below which species loss appears to accelerate exponentially within an ecosystem level, is regarded as being at a level of 30% (of the pre-European, i.e. pre-1750 extent of the vegetation type).
- A level of 10% of the original extent of a vegetation community is regarded as being a level representing Endangered status.
- Clearing which would increase the threat level to a vegetation community should be avoided.

3.3.1 Pre-European Vegetation

Pre-European vegetation in Western Australia has been broadly characterised by Beard (1975, 1990) which described and mapped the vegetation of the Coolgardie IBRA region at a scale of 1:1,000,000 (Shepherd *et al.* 2002). Seven Beard (1990) vegetation associations (vegetation association 8, 128, 435, 522, 936, 1413 and 2009) are situated in the project area, and their remaining extents at range scales are presented in **Table 3** and spatially in **Figure 6** (Beard 1975; DPIRD 2023).

Table 3 – Pre-European Vegetation associations of the Project Area (DPRID 2023)

Vegetation Association	Description
8	Goldfields; gimlet, redwood etc. *E. salubris, E. oleosa*. Riverine; rivergum *E. camaldulensis*
128	Rock
435	Wattle, casuarina and teatree acacia-Allocasuarina-melaleuca alliance.
522	Goldfields; gimlet, redwood etc. *E. salubris, E. oleosa*. Riverine; rivergum *E. camaldulensis*
936	Goldfields; gimlet, redwood etc. *E. salubris, E. oleosa*. Riverine; rivergum *E. camaldulensis*
1413	Wattle, casuarina and teatree acacia-Allocasuarina-melaleuca alliance
2009	Goldfields; gimlet, redwood etc. *E. salubris, E. oleosa*. Riverine; rivergum *E. camaldulensis*

As discussed in **Section 2.3** the EPA have an objective to maintain vegetation associations above a 30% retention threshold for unconstrained areas (EPA 2016a). Vegetation associations 8, 128, 435, 522, 936 1413 and 2009 exceed the 30% retention threshold at a State, IBRA region and subregion and local government context, meeting the EPA objective of retention of vegetation for the purpose of biodiversity conservation (**Table 4**).

Table 4 - Pre-European Vegetation Associations of the Project Area (Government of Western Australia 2019)

Context	Vegetation Association	Pre-European Extent (ha)	Current Extent (ha)	Extent Remaining (%)
State Western Australia	8	694,638.14	346,425.77	49.87
	128	329,836.19	288,813.54	87.56
	435	994,575.28	762,428.26	76.66
	522	709,714.81	709,228.05	99.93
	936	698,752	676,689.18	96.84
	1413	1,679,916.32	1,286,855.48	76.60
	2009	7,058.46	6,877.94	97.44
IBRA Region Coolgardie	8	280,248.26	275,589.11	98.34
	128	184,549.90	183,891.19	99.64
	435	738,211.22	732,467.35	99.22
	522	688,406.97	687,920.22	99.93
	936	586,792.23	584,336.14	99.58
	1413	1,061,212.28	1,042,553.77	98.24
	2009	7,058.46	6,877.94	97.44
IBRA Sub-region Southern Cross (COO02)	8	54,162.12	50,566.94	93.36
	128	156,192.81	155,552.26	99.59
	435	732,093.31	726,349.44	99.22
	522	480,231.80	480,206.00	99.99
	936	275,894.49	275,876.53	99.99
	1413	953,237.73	934,825.95	98.07
	2009	819.37	819.37	100.00
IBRA Sub-region Eastern Goldfields (COO03)	8	226,086.14	225,022.17	99.53
	128	26871.74	26,853.58	99.93
	435	6,117.91	6,117.91	100.00
	522	208,175.17	207,714.22	99.78
	936	310,897.74	308,459.61	99.22
	1413	107,974.55	107,727.82	99.77
	2009	6,239.08	6,058.57	97.11
LGA Shire of Coolgardie	8	160,584.43	159,527.64	99.34
	128	96,232.93	96,215.07	99.98
	435	365,870.49	365,870.49	100.00
	522	313,238.77	312,787.98	99.86
	936	359,112.73	356,674.60	99.32
	1413	334,488.08	334,256.37	99.93
	2009	7,058.46	6877.94	97.44

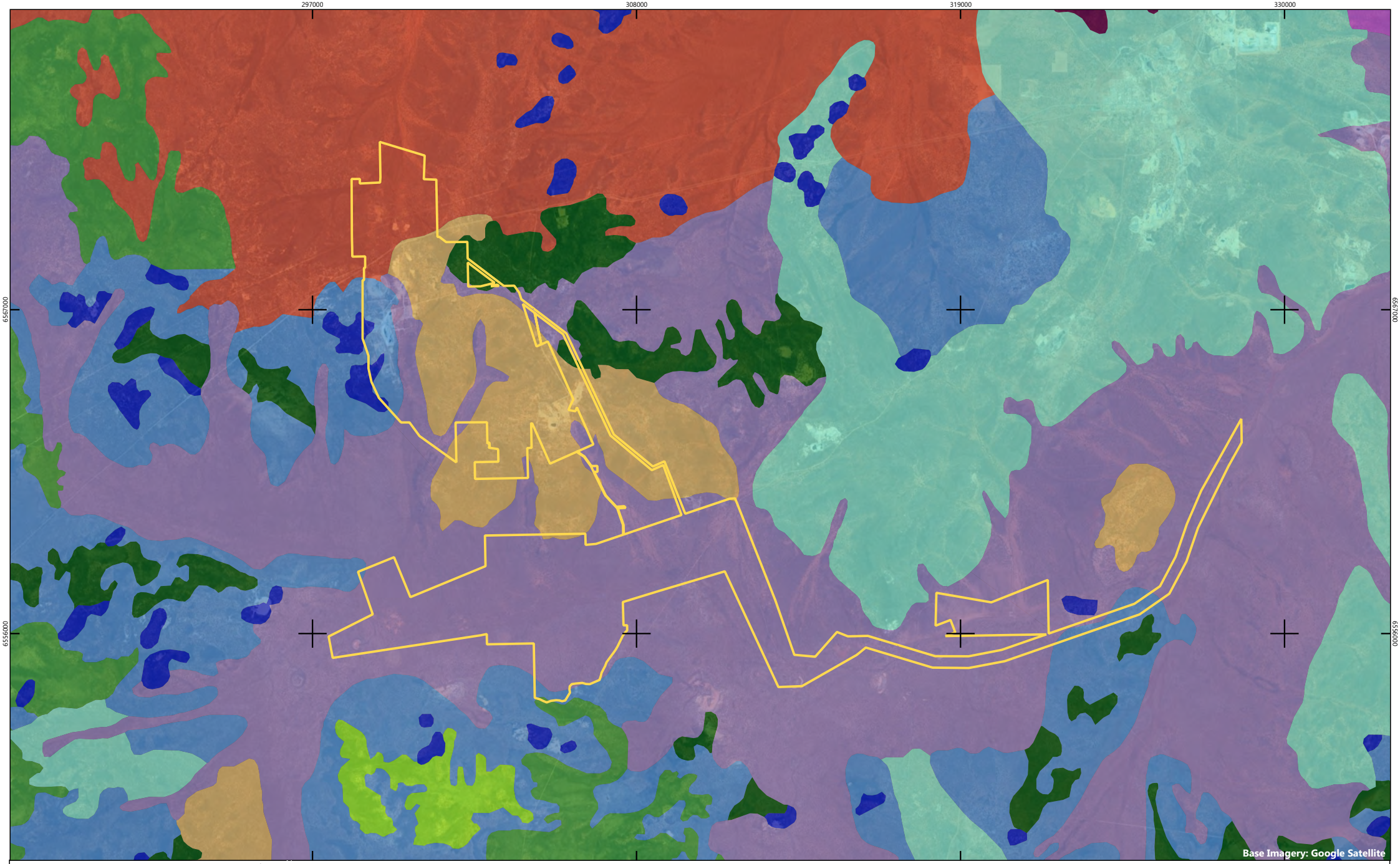


Figure 6 - Pre-European Vegetation

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3.3.2 Groundwater Dependent Vegetation

The functioning and composition of Groundwater Dependent Ecosystems (GDEs) are often highly responsive to changes in groundwater availability (Murray *et al.* 2003). Therefore, the groundwater regime is a key factor influencing the composition of flora and fauna, ecological processes, and ecosystem services (Hatton and Evans 1998; Evans and Clifton 2001).

Key elements of the groundwater regime that influence the health of GDEs (and the groundwater dependent vegetation (GDV) occurring within them) in relation to vegetation are:

- Groundwater level: groundwater-dependent plants require groundwater or the associated capillary fringe to be at least episodically or periodically within the root zone.
- Groundwater flux: the rate of groundwater flow needs to be sufficient to maintain plant water status, which provides key information regarding a plant's response to hydraulic changes in the environment (Nehemy *et al.* 2019).
- Groundwater quality: tolerance to changes in groundwater quality, such as pH and salinity levels, varies between plant species and is also dependent upon other environmental factors (Evans and Clifton 2001).

Phreatophytes, or groundwater-dependent plants, can be categorised as either:

- Obligate phreatophytes: plants that are completely or highly dependent on groundwater. This reliance can be continual, seasonal or episodic. Obligate phreatophytes are highly sensitive to changes in the groundwater regime and will respond negatively to significant or rapid groundwater drawdown.
- Facultative phreatophytes: plants that utilise groundwater opportunistically, most notably during times of drought (Lamontagne *et al.* 2005).

In addition to plant species composition, hydrogeological information (hydrological regimes and soil types) assists in characterising GDEs (DWER 2017). Regional GDE mapping, groundwater hydrology, geology and characteristic GDV are therefore considered in combination, in order to attempt to determine the presence of GDEs.

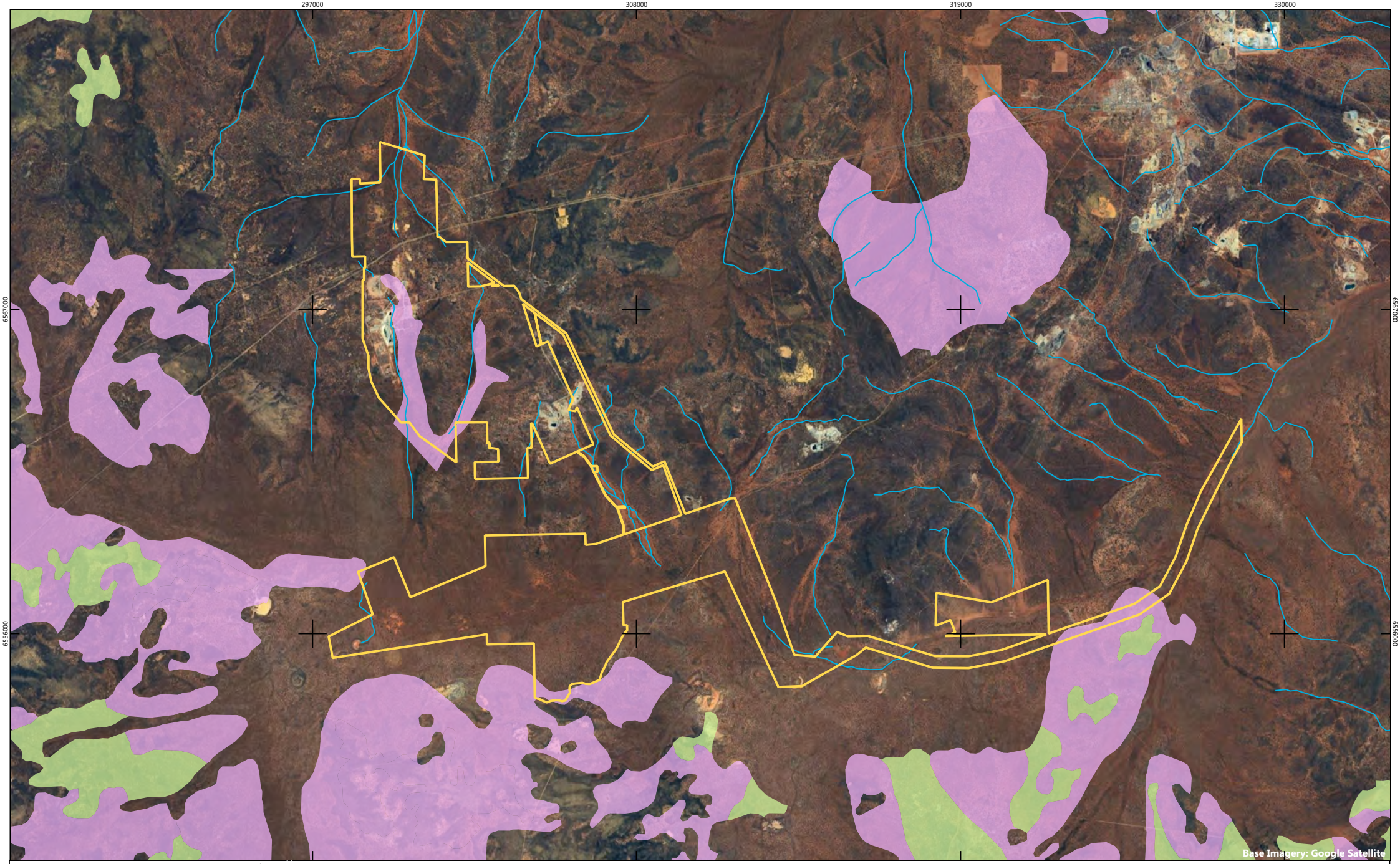
Four potential terrestrial GDEs intersect the north-western and eastern portions of the project area (BoM 2025) (**Figure 7**). These potential GDEs have been classified as low and cover a total of 789.08 ha (7.29%) of the project area. The potential GDEs occur in areas mapped as pre-European vegetation associations 8,435, 522, 936 and 2009, representing woodlands of various Eucalyptus species and thickets of Acacia, Allocasuarina and Melaleuca.

3.4 SURFACE WATER

The project area is within the Salt Lake Basin in the Lake Lefroy and Raeside-Ponton catchment area. No Ramsar or wetlands of importance intersect the project area (DBCA 2018). A network of minor drainage lines intersects the project area (**Figure 7**).

3.5 RESERVES, CONSERVATION AREAS AND ENVIRONMENTALLY SENSITIVE AREAS

Four conservation reserves intersect the project area. Reserve No 17101 intersects the western portion of project area, covering a total of 152.52 ha (1.41%). Reserve No 15005 intersects the project area covering a total 1293.24 ha (11.95%). Reserve No 8191 intersects the north-west corner of the project area covering a total of 0.68 ha (0.006%) (Landgate 2025), and Timber reserve intersects the project area covering a total of 44.45 ha (0.41%) (DBCA 2024b) (**Figure 8**).



0 2 4 6 8 km

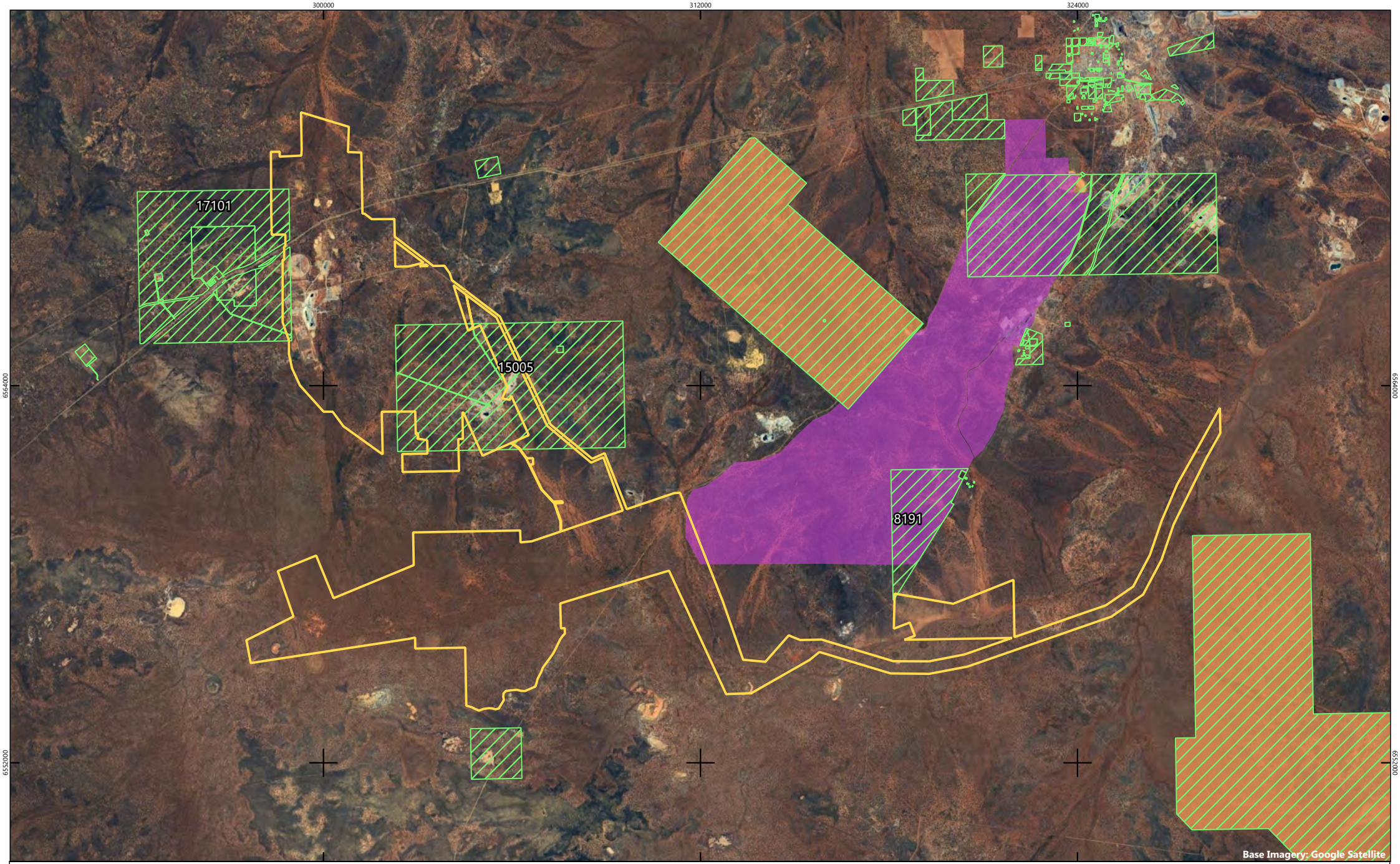
GDA 2020 MGA Zone 51

Legend

- Project Area
- Minor Drainage
- Low potential GDE
- Moderate potential GDE

Figure 7 - Groundwater Dependent Vegetation and Surface Water

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0 1 2 3 4 km

GDA 2020 MGA Zone 51

Legend

- Project Area
- Section 5(1)(g) Reserve
- Timber Reserve
- Unnamed Reserves

Figure 8 - Reserves and Conservation Areas

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4 METHODOLOGY

4.1 DESKTOP ASSESSMENT

4.1.1 Literature Review

A literature review of previous flora and vegetation surveys was undertaken as part of the desktop assessment. These surveys and their results have been summarised in **Section 5.1.1**.

One of the reports included in the literature review (Botanica 2021d) presents the findings of a survey conducted within the project area, adjacent to the 2025 survey area, and formed the main basis of the current survey results.

4.1.2 Database Searches

Database searches were undertaken prior to the field survey to compile a list of flora (including Threatened and Priority flora) and Threatened and Priority Ecological Communities potentially occurring within the project area (**Table 5**). Additional flora data were collated from the literature review (see **Section 5.1.1**).

Table 5 – Database Searches

Database Name	Date Received	Search Target	Search Area
Threatened and Priority Ecological Communities database search (DBCA 35-0625EC)	4 July 2025	TECs and PECs	50 km buffer around the project area (study area)
Threatened and Priority Flora List (TPFL) database search (DBCA 10-0725FL)		Threatened and Priority Flora	
Dandjoo (DBCA 2025a) (**Appendix B**)	30 June 2025	Threatened and Priority Flora and inventory of potential flora	
Protected Matters Search Tool (PMST) for MNES (DCCEEW 2025) (**Appendix C**)	18 June 2025	Commonwealth listed Threatened Flora and TECs	

Prior to the field assessment, Threatened and Priority flora and ecological communities identified from the desktop assessment were evaluated for their likelihood of occurrence within the project area using the criteria outlined in **Table 6** and **Table 7**.

Table 6 – Likelihood of Occurrence Assessment Criteria

Criteria	Explanation
Suitable habitat	The likelihood of suitable habitat being present within the project area was based on known habitat information gathered from Florabase (WAH 1998-) and literature sourced from the Species Profile and Threats Database (SPRAT) (DCCEEW 2024) (e.g., recovery plans, conservation advice).
Age of previous records	The age of previous records for significant species resulting from the desktop assessment was evaluated to determine how likely the species was to still occur in the project area (i.e., habitat of species recorded decades ago may no longer occur or a species may be locally extinct).
Proximity of previous records	The proximity of previous significant flora and vegetation results in relation to the project area contributed to the likelihood of occurrence results, with those previously recorded close by considered more 'Likely to occur' within the project area. It is noted that species identified from the PMST have not necessarily been recorded within proximity to the project area and may have resulted due to habitat possibly occurring within the area.
Current condition of project area	Highly modified and degraded environments usually represent a lower likelihood of the occurrence of significant flora, whilst intact remnants are known to harbour significant species and communities that may have otherwise been cleared or impacted throughout their range.

Table 7 – Likelihood of Occurrence Category Definitions

Category	Criteria
Occurs	The taxon has previously been recorded within the project area.
Likely to occur	There are existing records of the taxon in proximity to the project area (within 10 km), and: • The taxon is strongly linked to a specific habitat, which is present in the project area; or • The taxon has more general habitat preferences and suitable habitat is present within the project area.
May occur	There are existing records of the taxon occur within the general locality of the project area (within 50 km), and: • The taxon is strongly linked to specific habitat, of which a small amount is present within the project area; or • The taxon has general habitat preference, of which some suitable habitat is present; or • Suitable habitat is present in the project area; however, the taxon is recorded infrequently in the locality of the project area.
Unlikely to occur	There are existing records beyond 50 km of the project area, and one or more of the following applies: • The taxon is strongly linked to a specific habitat that is absent from the project area. • Suitable habitat is present within the project area, however, no existing records occur within the locality of the project area. • Some suitable habitat is present within the project area; however, the taxon is infrequently recorded in locality of the project area. • The age of the latest record is greater than 20 years old.

A level of certainty was applied to each of the likelihood of occurrence conclusions reported for flora considered 'Likely to occur' or that 'May occur' in the unsurveyed sections of the project area. This was due to these areas not having been ground-truthed, which resulted in a limitation for the post-survey reassessment of the likelihood of occurrence ratings applied. The level of certainty was applied based on the corresponding certainty of the extrapolated vegetation mapping and therefore, the occurrence of suitable habitat for the respective significant flora within the unsurveyed areas.

4.2 FIELD ASSESSMENT

A reconnaissance and targeted flora and vegetation assessment was undertaken by experienced Ecologists specialised in botanical assessments, Taryn Brebner and Sarah Beckwith, between 11-15 August 2025. The purpose of the survey was to assess the flora species, vegetation units and vegetation condition within the survey area, and was undertaken and reported in accordance with Technical Guidance (EPA 2016a).

As the survey commissioned was a reconnaissance flora and vegetation assessment, in accordance with EPA (EPA 2016a), field data were collected using relevés, a low intensity survey technique used to quickly capture dominant flora and vegetation structure and condition data. A total of 26 relevés were assessed, and the locations are presented in **Figure 9**. The following information was collected at each relevé:

- observer
- date
- GPS location (MGA94)
- representative photograph
- soil type and colour
- topography
- vegetation condition/degradation/disturbances (e.g. grazing, weed invasion, fire)
- flora species observed, including average height and projected foliage cover of dominant species within each stratum

- vegetation community, described in accordance with Level 5 of the National Vegetation Information System (NVIS) (The National Vegetation Information Technical Working Group 2017)
- vegetation condition, assessed against the currently accepted scale; an adaptation of the Keighery (1994) condition scale.

Observations and opportunistic data collection were also carried out continuously within and throughout the survey area and other accessible sections of the project area. Continuous track logs of all personnel were captured to demonstrate survey effort and site coverage (**Figure 9**).

Field data were collected using electronic tablet devices with customised data forms and mobile spatial mapping capability, within the software program, Mappt™ (Takor Group 2021).

Habitat preferences for all target species were determined during the desktop assessment and study planning tasks, to enable targeted searching in the field. Opportunistic targeted searching for Threatened and Priority flora was also carried out while traversing between relevés. Any observed flora suspected to be of Threatened or Priority status was marked using GPS-enabled devices to enable inclusion in the report maps and spatial data layers. Where taxa suspected or known to be Priority flora were located in the field, dedicated targeted searches were undertaken to quantify populations and to map their extents.

The vegetation units of the survey area were defined by data collected both within relevés and opportunistically between, and how they related to other environmental features such as soil type and landform. A map of the vegetation units was then developed using GIS and is presented in this report.

Vegetation condition of the survey area was assessed using the current bushland condition scale which is an adaptation of Keighery (1994) scale, as described in EPA (2016a). The spatial extent of the varying vegetation condition was mapped using GIS and is presented in this report.

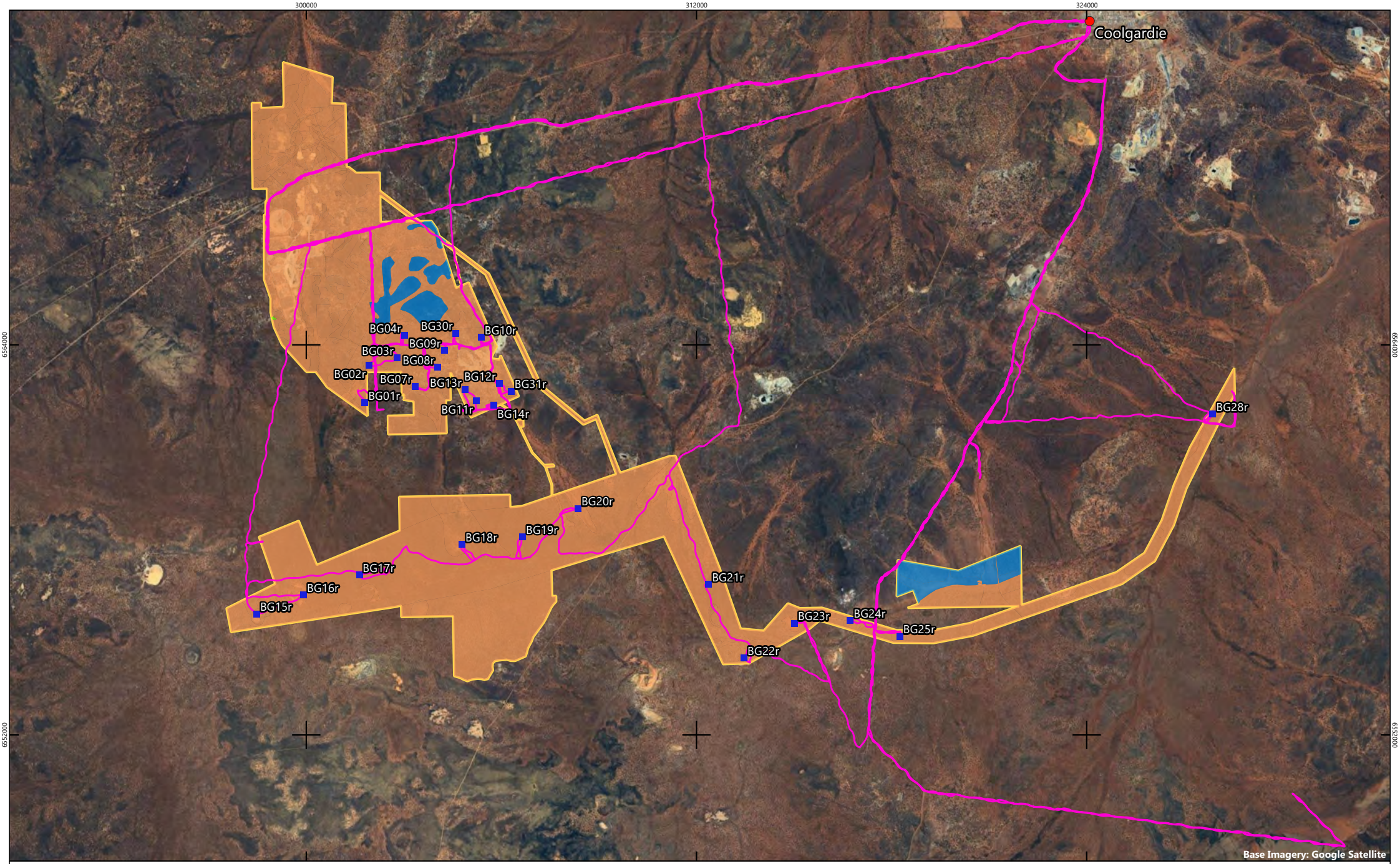


Figure 9 - Survey Effort and Level of Certainty

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4.3 DATA PROCESSING AND REPORTING

Flora identifications were undertaken by botanical taxonomists Dr Margaret Collins and Olga Nazarova. Where species could not be confidently identified, or where specimens were suspected to be Threatened, Priority-listed, or exhibited unusual taxonomic characteristics, they were verified by a second botanist. Nomenclature used in this report follows the current WAH (WAH 1998-) standards, as recommended by EPA (EPA 2016a).

All FVC recorded species were cross-checked with distribution data from the Australian Virtual Herbarium (AVH), comparing the closest WAH record to the centroid of the survey area (311705.08 mE, 6558235.88 mN) (Australian Virtual Herbarium (AVH) 2025)). Where the nearest records were located more than 100 km from the centroid, additional investigation was conducted to assess the proximity of existing records to the survey area, in order to evaluate potential range extensions.

Quadrat data is utilised for statistically-based floristic analysis as part of detailed flora and vegetation studies, resulting in dendrograms and allowing cluster analysis and other methods for analysis of similarities. Since the reconnaissance assessments (the current (2025) FVC survey and Botanica (2021d)) recorded relevés rather than quadrats, floristic analysis comprised of qualitative comparison of floral species composition, vegetation structure, landforms and soil types to group similar relevés together and infer corresponding vegetation types. The vegetation units of the FVC recorded relevés were then compared to vegetation units described and mapped by Botanica (2021d) to determine alignment with and incorporation into the vegetation units.

Once all of the vegetation units were defined and mapped in the survey area and where possible, merged with units from the Botanica (2021d) survey, the mapped extents of each vegetation unit and condition were extrapolated where possible into the unsurveyed areas within the project area. Majority of the extrapolated mapping into the unsurveyed areas is considered high as they are continuous landforms and or vegetation units and condition from surveyed areas, there is several patches of medium certainty due to some areas not being of continuous landform and or vegetation unit and condition.

This technical report has been prepared by suitably qualified and experienced personnel, in accordance with EPA (2016a).

4.4 SURVEY LIMITATIONS

The current assessment (2025 field survey, data collation and reporting) was assessed against limitations imposed by variables as outlined in the *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016a) and the findings are summarised in **Table 8**.

Table 8 – Potential Survey Limitations and Constraints

Aspect	Constraint?	Commentary
Availability of regional data, previously available information	No	The project area is within the Coolgardie Bioregion, a well-understood location in terms of ecological values. Several studies have been completed within the vicinity of the project area and wider region, including the recent, immediately adjacent survey conducted by Botanica (2021d). Regional data relating to soils, flora, vegetation and such values of conservation significance are also available in public databases and in the literature, all included in the desktop assessment.
Scope (detail)	Yes	The scope of work requested to be fulfilled was a reconnaissance flora and vegetation assessment, with relevé sampling and limited target survey for significant flora, of an initial, small survey area. As project needs evolved, the area requiring assessment was expanded and included an adjacent area that had also been the subject of a reconnaissance flora and vegetation assessment in 2021. The qualitative mapping and defined vegetation units of the adjacent 2021 survey formed the basis of the vegetation units and mapping following the 2025 field assessment. Twenty-six relevés were sampled across the survey area, targeting different vegetation units, as able to be accessed. A reconnaissance level of survey was considered adequate to determine and map the key floristic values of the survey area and apply these via extrapolation to the broader project area. The conclusions regarding likelihood of occurrence of significant flora across the project area has been carried out via thorough desktop assessment using a risk-based approach and considering multiple parameters to anticipate the extent of suitable habitat for each potentially-occurring significant flora. The reported likelihood of occurrence of each significant flora throughout the project area is further supported by levels of certainty for areas not ground-truthed (either for targeted survey or vegetation mapping), which provides precautionary conclusions in response to the level of detail applied to the overall assessment. Further survey efforts using detailed and/or targeted methodologies may be required dependent on specific impact assessment and permitting requirements.
Competency/ experience of personnel	No	The personnel leading and undertaking the field studies have significant experience in botanical assessments, including in the Coolgardie region. The botanical field team lead (Taryn Brebner, Ecologist) has seven years of experience in surveys conducting floristic assessments throughout WA including within the Coolgardie region. Personnel with relevant qualifications and experience contributed to the various study tasks, such as flora identifications, qualitative floristic analysis, vegetation mapping, reporting and review (**Table 13**).
Survey effort/detail/ intensity	No	The selected scope for the botanical assessment was a reconnaissance flora and vegetation assessment including limited targeted flora surveys. A total of 26 relevés were sampled within the survey area. Survey effort in most of the initially scoped survey area portions was adequate, although, due to access constraints and expansion of the survey areas extent, adequate effort was not applied to some areas. However, with the combined survey results from the current (2025) survey and recent (Botanica 2021d) assessment, in association with regional data and literature information, adequate extrapolation and botanical values definition has been achieved. Further survey efforts may be required dependent on specific impact assessment and permitting requirements.
Seasonal timing and climatic conditions	No	The timing of the assessment (August) was shortly prior to the spring season, which is not typically optimal for the identification of flowering, annual and ephemeral flora. However, the survey was conducted with two to four weeks to the commencement of the peak flowering season and conditions on site were observed to be fine with flora in the early stages of flowering. Forty-five annual species were recorded accounting for 27% of the total flora species recorded The field survey timing was appropriate for a reconnaissance flora and vegetation field survey.

Aspect	Constraint?	Commentary
Access	No	Portions of the survey area (13.46%) were unable to be accessed due to locked gates and impassible tracks. In the context of a survey of the survey area alone, these access constraints are not considered a limitation to a reconnaissance assessment of the survey area as defined, particularly due to access to the remainder of the survey area achieved and the homogeneity of the vegetation within the southern portion of the survey area. Access achieved in the broader sections of the project area not included in the 2025 survey area or the 2021 Botanica survey area may represent a limitation for the wider project, dependent on the specific impact assessment and permitting requirements for the project.
Mapping reliability	Yes	Mapping reliability within the survey area is considered high due to the limited amount of extrapolation required. The reliability of mapping in the extended project area is considered high for areas mapped by Botanica (2021d) and majority of the unsurveyed area is considered high with a couple of portions considered medium (3.76% of the project area) and one small patch is considered low (0.01% of the project area).
Disturbances	No	Disturbance in the survey area consists mainly of historical tracks and mining activity. In the context of the survey area and broader project area, the disturbances present in the survey area, the project area and nearby surrounds do not represent a limitation of the current survey.
Survey completeness	Somewhat	The survey was scoped as a single-phase reconnaissance survey of an area smaller than the reported area. Relevé placement and accessed traverses showed adequate spatial coverage across the defined survey area. Completion of this scope of work in the respective areas is considered to have been completed to an adequate level of detail. Assessment of the entire project area in reference to a reconnaissance or detailed assessment of flora and vegetation values, including targeted survey, would be considered incomplete. The importance of the gap in survey completeness would be dependent on the spatial extent of proposed impacts/project footprint, and on the specific impact assessment and permitting requirements for the project.

5 RESULTS

5.1 DESKTOP ASSESSMENT

5.1.1 Literature Review

A literature review was undertaken as part of the desktop assessment to identify previous flora and vegetation assessments that have been conducted within or in the vicinity of the project area. The flora and vegetation surveys were reviewed to provide a broader locality context and to identify key findings including significant flora and the presence of TECs and PECs. A summary of the literature review is provided in **Table 9**.

Table 9 – Previous Surveys Within and Surrounding the Project Area

Reference	Survey Methodology	Distance to Project Area	Key Results
Reconnaissance Flora/Vegetation Survey & Targeted Flora Survey of the Bullabulling Project Prepared for Norton Gold Fields Pty Ltd (Botanica Consulting Pty Ltd (Botanica) 2021d)	Reconnaissance Flora and Vegetation Survey & Targeted Flora Survey November 2021	Within the project area	• 251 vascular flora species • No Threatened flora • 2 Priority flora: o *Notisia intonsa* (P3) o *Acacia crenulata* (P3) • No WoNS or DPs • 12 broad vegetation units • No TECs or PECS • Vegetation condition ranged from 'Completely Degraded' too Excellent'
Spring Level 2 Flora and Vegetation Survey and Level 1 Fauna Assessment Bullabulling Gold Project Prepared for Bullabulling Gold Limited (RPS Group 2012a)	Detailed Flora and Vegetation Survey and Basic Fauna June 2012	Within the project area	• 262 vascular flora species • No Threatened flora • 7 Priority flora o *Gnephosis intonsa* (P1) (now *Notisia intonsa* (S. Morre) (P3)) o *Lepidium merrallii* (P2) o *Acacia crenulata* (P3) o *Austrostipa blackii* (P3) (now delisted) o *Gnephosis* sp. Norseman (K.R. Newbey 8096) (P3) (now *Gnephosis brevifolia* and not listed) o *Spartothamnella* sp. Helena and Aurora Range (P.G. Armstrong 155-109) (P3) (now known as *Teucrium disjunctum* and is not listed) o *Styphelia* sp. Bullfinch (M. Hislop 3574) (P3) (now *Styphelia saxicola* (P3) • No WoNS or DPs • 12 vegetation units • No Tecs or PECs • Vegetation condition ranged from 'Excellent' to 'Completely Degraded'
South Kalgoorlie Operations Detailed Flora/Vegetation Survey and Basic Fauna Assessment (Botanica 2023)	Detailed Flora and Vegetation Survey September 2023	~37 km east	• 125 vascular flora species • No Threatened or Priority flora • No WoNS or DPs • Seven vegetation units • No TECs or PECs recorded • Vegetation condition rated as 'Completely Degraded' to 'Excellent', with most rated as 'Very Good' (55.8%)

Reference	Survey Methodology	Distance to Project Area	Key Results
Flora and Vegetation Assessments for the Fimiston Gold Mine Operations (Phoenix Environmental Sciences Pty Ltd (Phoenix) 2022)	Detailed Flora and Vegetation Assessment May, October and December 2021	~44 km north-east	• 106 vascular flora species • Nine introduced flora, two DPs, **Echium plantagineum* and **Opuntia elata* and one WoNS, **Lycium ferocissimum* • No Threatened flora • One Priority 2 flora species, *Eremophila praecox* recorded • 22 vegetation units • No TECs or PECs recorded • Vegetation condition rated from 'Completely Degraded' to 'Excellent', most rated as 'Good' (56.3%)
Sandy Ridge Project, IWDF Access Road Borrow Pit Sites Flora and Vegetation Survey (PGV Environmental 2018)	Detailed Flora and Vegetation Survey November 2017	~53 km south-west	• 107 vascular flora species from 25 families and 60 genera • No weeds recorded • No Threatened flora • Nine records of a *Lepidosperma* species that has affinities to the Priority 4 species, *Lepidosperma lyonsii* • 21 vegetation units • No TECs or PECs recorded • Vegetation condition found to be in 'Excellent' condition
Coolgardie Landfill Flora, Vegetation and Fauna Habitat Assessment (Draft) (Strategen Environmental Consultants Pty Ltd (Strategen) 2019)	Detailed Flora and Vegetation Survey December 2018	~13 km north	• 25 vascular flora taxa from 11 families • No Threatened or Priority flora • No weeds recorded • One vegetation unit • Vegetation condition was in 'Very Good' and 'Completely Degraded' condition • No TECs or PECs recorded
Reconnaissance Flora and Vegetation Survey for the Mt Marion Project Area- June 2019 (Native Vegetation Solutions (NVS) 2019)	Reconnaissance Flora and Vegetation Survey May 2021, January-March 2013, November 2015, September and November 2017 and July 2018	~23 km east	• 198 vascular flora taxa from 38 families and 84 genera • No Threatened flora • One Priority flora, *Diocirea acutifolia* (now *Eremophila acutifolia* and since delisted) • Three weed species, no WoNS or DP plants recorded • 30 vegetation units • Vegetation was in 'Degraded' to 'Excellent' condition • No TECs or PECs recorded
Kundana Reconnaissance Flora/ Vegetation Survey and Basic Fauna Survey (Botanica 2020)	Reconnaissance Flora and Vegetation Survey September 2020	~34 km north-east	• 60 vascular flora taxa from 19 families and 30 genera • No Threatened or Priority flora plants recorded • Seven vegetation units • No TECs or PECs recorded • Vegetation was in 'Good' condition
White Foil Project Detailed Flora/ Vegetation Survey and Basic Fauna Survey (Botanica 2021a)	Detailed Flora and Vegetation Survey November 2020	~30 km north-east	• 62 vascular flora taxa from 24 families and 34 genera • No Threatened or Priority flora • No weeds • Three vegetation units • No TECs or PECs recorded • Vegetation was in 'Completely Degraded' to 'Good' condition

Reference	Survey Methodology	Distance to Project Area	Key Results
Memorandum: Targeted Priority Flora Survey-Castle Hill (Botanica 2021c)	Targeted Priority Flora Survey September 2021	~43 km north	• Two records of *Eremophila praecox* records were recorded • Previous records of *Calandrinia* ? *lefroyensis*/ *quartzitica* could not be confirmed and no additional records were made o Suitable habitat is not present in the survey area
Castle Hill Project Detailed Flora/ Vegetation Survey and Basic Fauna Survey (Botanica 2021b)	Detailed Flora and Vegetation Survey October-November 2020	~43 km north	• 145 vascular flora taxa from 32 families and 70 genera • No Threatened flora • One tentative Priority 2 species, *Eremophila* ? *praecox* • No weeds • Twelve vegetation units • No TECs or PECs recorded • Vegetation was in 'Good to 'Very Good condition
Detailed Flora and Vegetation Survey Lot 500 Great Eastern Highway, Yilkari (Onshore Environmental Consultants Pty Ltd (Onshore Environmental) 2020)	Detailed Flora and Vegetation Survey November 2019	~34 km north-east	• 104 vascular flora taxa from 25 families and 51 genera • No Threatened or Priority flora • Ten introduced species, none of which are DP or WoNS species • Seven vegetation units • No TECs or PECs recorded • Vegetation was majority in 'Very Good' condition
Reconnaissance Flora and Vegetation Survey of the Jaurdi Gold Project (M16/529) (NVS 2020a)	Reconnaissance Flora and Vegetation Survey May 2020	~35 km north	• 63 vascular flora taxa from 16 families and 24 genera • No Threatened flora • One Priority 2 flora, *Eremophila praecox* • No introduced species • Three vegetation units • No TECs or PECs recorded • Vegetation was in 'Completely Degraded' to 'Very Good' condition
Targeted Threatened Flora and Malleefowl Mound Survey-Panther Project (NVS 2020c)	Targeted Flora Survey April 2020	~38 km north	• No Threatened or Priority flora • Suitable habitat for *Eremophila praecox* (P2) present
Targeted Threatened Flora and Malleefowl Mound Survey of M16/560-April 2020 (NVS 2020b)	Targeted Flora Survey April 2020	~34 km north	• No Threatened or Priority flora • Suitable habitat for *Eremophila praecox* (P2) present

5.1.2 Threatened and Priority Flora

The DBCA database search, Dandjoo Species Report (**Appendix B**) and MNES PMST (**Appendix C**) identified 135 Threatened and Priority flora species that have previously been recorded, or potentially could occur within the project area (**Appendix D**). These comprise of six Threatened species listed under the EPBC Act (three Endangered and three Vulnerable) and under the BC Act (four Endangered and two Vulnerable). One-hundred and twenty-nine are listed as Priority flora including 34 Priority 1, 24 Priority 2, 59 Priority 3 and 12 Priority 4 taxa (**Appendix D**). The DBCA records are spatially presented in **Figure 10**.

A pre-survey desktop assessment considered the expected presence of suitable habitat, age of previous records, proximity of previous records and current condition of the project areas in the context of each of the Threatened and Priority flora resulting from the database search results. This indicated that 43 of these taxa have the potential to be supported within the project area, comprising of 30 that 'May occur' and 13 considered 'Likely to occur' (**Appendix D**). Of these, one (*Gastrolobium graniticum*) is Threatened, listed as Endangered under the EPBC Act and Vulnerable under the BC Act. Ten are Priority 1, six are Priority 2, 23 are Priority 3 and three are Priority 4 flora.

5.1.3 Threatened and Priority Ecological Communities

A review of DBCA's TEC and PEC database and the PMST report (DCCEEW 2025) did not identify any TECs, PECs or their buffers as occurring within the study area, which is the project area plus a 50 km buffer.

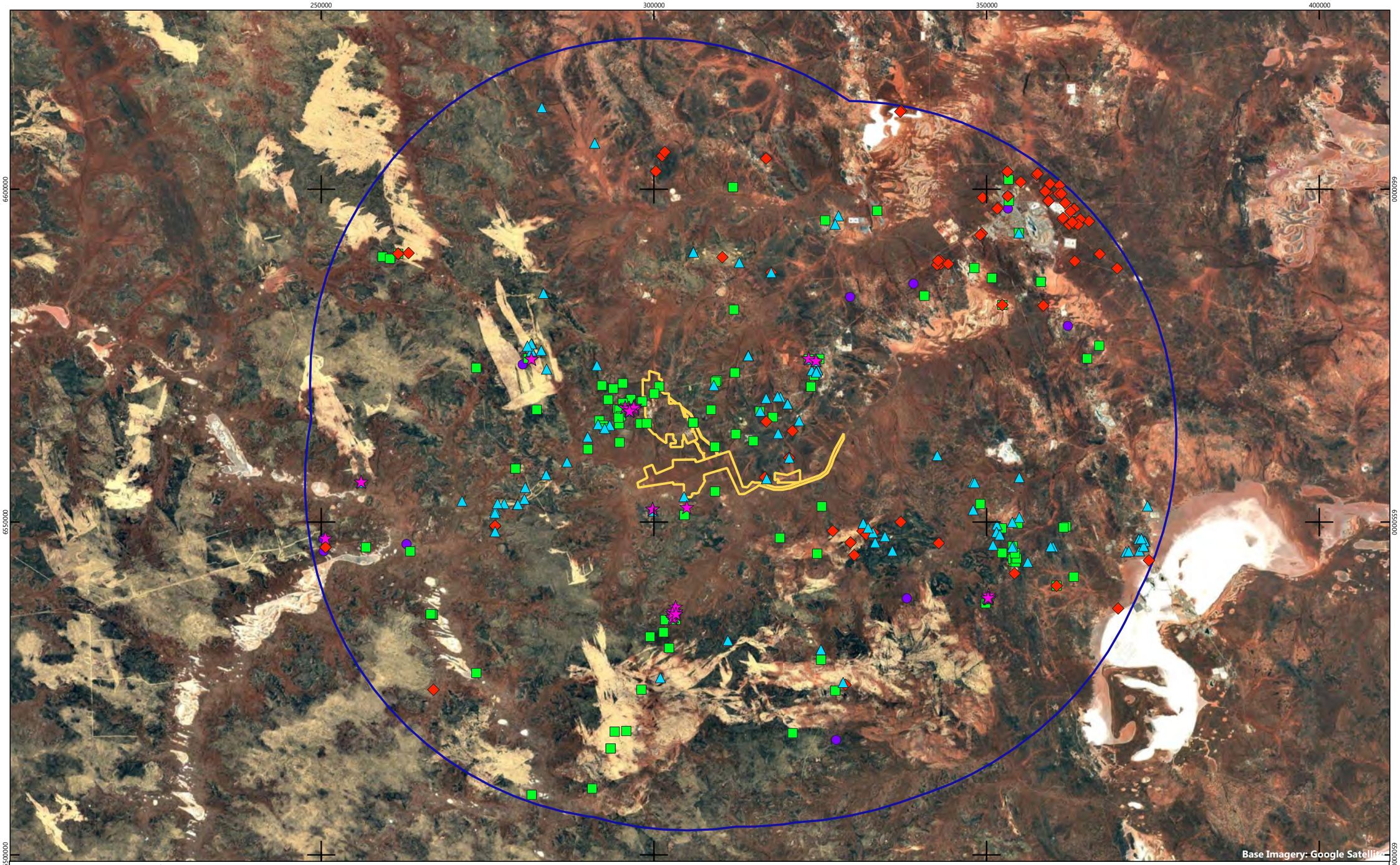


Figure 10 - DBCA Threatened and Priority Flora

5.2 FIELD ASSESSMENT

5.2.1 Flora

A total of 165 flora species, from 85 genera and 39 families were recorded within the survey area. The dominant families represented were Asteraceae (27 taxa), Chenopodiaceae (17 taxa), Fabaceae (16 taxa), Proteaceae (14 taxa) and Scrophulariaceae (14 taxa) with *Acacia*, *Eremophila* and *Eucalyptus* being the dominant genera within the survey area (**Appendix F**). Of the 165 recorded flora species, seven (4.24%) are introduced (weeds). The full list of vascular flora taxa (which includes opportunistic species records, additional to flora species recorded within relevés) is presented in **Appendix E**, individual relevé data is presented in **Appendix F** and flora by vegetation unit are listed in **Appendix H**.

Of the flora specimens collected, 25 (15.15% of the 165 recorded taxa) could not be identified with certainty to species level and two could only be identified to family level, due to the paucity of material available or distinguishing features for identification.

No Threatened flora species listed under the EPBC Act and/or under the BC Act were recorded within the survey area. Four Priority 3 flora were recorded in the survey area *Cryptandra crispula, Eremophila microphylla*, *Eremophila veronica* and *Notisia intonsa* (**Figure 11**). Two Priority 3 flora were previously recorded by Botanica in the project area during the 2021 survey *Acacia crenulata* and *Notisia intonsa* (**Figure 11**).

None of the flora recorded within the survey area are exhibiting an extension of their existing known range of occurrence and therefore, none are occurring as range extensions.

None of the seven recorded weed species within the survey area are DPs or WoNS.

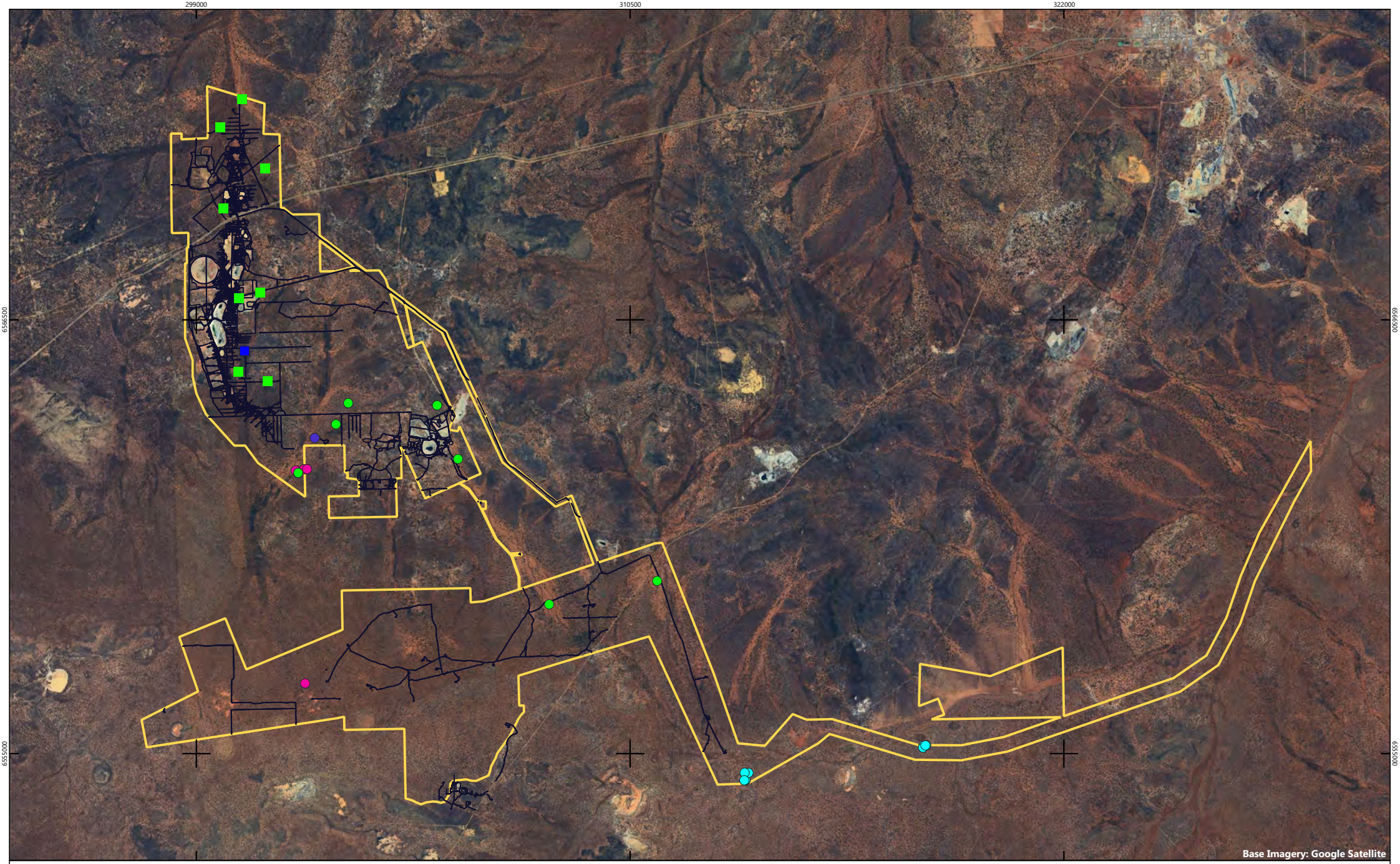


Figure 11 - Recorded Priority Flora Locations

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5.2.2 Vegetation

5.2.2.1 Vegetation Units

A total of 25 native vegetation units have been defined and mapped across the project area based on the current 2025 survey and the 2021 survey conducted by Botanica (2021d). Eleven of the 25 units were defined and mapped by Botanica (2021d) with a further 14 defined and mapped by the current (2025) survey.

The vegetation units of the project area consist of 16 Eucalyptus Woodlands, one Allocasuarina and Acacia Woodland, one Acacia and Melaleuca Shrubland two Melaleuca Shrublands, one Chenopod Low Shrubland, two Mixed Low Shrublands, one Herbland and one mosaic (a combination of EsAcEa and AaaLcTk). One other classification, 'Cleared' was mapped in areas devoid of vegetation.

A summary of the recorded units is presented in **Table 10**, and their spatial extents across the project areas are shown in the **Figure 12** series.

None of the vegetation units in the project area are considered to represent any TEC or PECs.

5.2.2.2 Groundwater Dependent Vegetation

No known groundwater dependent flora was recorded within the project area and therefore, none of the recorded vegetation units are considered representative of groundwater dependent vegetation.

Table 10 – Summary of Vegetation Units Recorded in the Survey Area and Project Area

Vegetation Unit Code	Vegetation Type and Description	Representative Photo	Representative FVC Relevé/s	Survey Area (ha)·	Survey Area (%)	Project Area (ha).	Project Area (%)
EsAbEs	Mixed *Eucalyptus* spp. Open Woodland over *Acacia burkittii* and *A. hemiteles* Tall Sparse Shrubland over Mixed Open Shrubland		BG01r, BG03r, BG09r, BG10r, BG11r, BG14r, BG30r, BG31r	198.92	3.66	441.39	4.08
EsEiSa	*Eucalyptus salubris* Open Woodland over *Eremophila ionantha*, *E. scoparia* and *Senna artemisioides* subsp. *filifolia* Open Shrubland		BG17r, BG19r, BG21r	3896.71	71.74	5233.50	48.35
DfLbRp	*Ranunculus pentandrus* var. *platycarpus, Lemooria burkittii* and *Duma florulenta* Open Herbland		BG28r	4.98	0.09	4.98	0.05
AvMmPd	*Atriplex vesicaria, Maireana marginata* and *Plantago debilis* Low Shrubland		BG16r, BG20r	108.84	2.00	226.36	2.09

Vegetation Unit Code	Vegetation Type and Description	Representative Photo	Representative FVC Relevé/s	Survey Area (ha)·	Survey Area (%)	Project Area (ha).	Project Area (%)
EcEs	*Eucalyptus celastroides* and *E. salubris* Open Forest		BG07r	2.52	0.05	3.59	0.03
EsEsAv	*Eucalyptus salmonophloia* and *E. salubris* Open Woodland over *Eremophila scoparia* Sparse Shrubland over *Atriplex vesicaria* Low Open Shrubland		BG08r, BG18r	237.04	4.36	289.61	2.68
MhScSs	*Melaleuca halmaturorum* and *M. pauperiflora* subsp. *fastigiata* Tall Shrubland over *Sclerolaena cuneata* and *Atriplex vesicaria* Low Open Shrubland and *Lycium australe* over *Streptoglossa* sp. Open Herbland		BG23r	19.63	0.36	19.63	0.18
AvSc	*Atriplex vesicaria, Disphyma crassifolium* subsp. *clavellatum* and *Sclerolaena cuneata* Low Open Shrubland		BG24r	10.45	0.19	10.45	0.10

Vegetation Unit Code	Vegetation Type and Description	Representative Photo	Representative FVC Relevé/s	Survey Area (ha)·	Survey Area (%)	Project Area (ha).	Project Area (%)
AvAc	*Atriplex vesicaria* and *A. codonocarpa* Low sparse chenopod Shrubland		BG15r	9.12	0.17	9.12	0.08
MhMp	*Melaleuca halmaturorum* and *Melaleuca pauperiflora* subsp. *fastigiata* Tall Shrubland		BG22r	53.59	0.99	53.59	0.50
^EsEiEs	*Eucalyptus salmonophloia, Eucalyptus transcontinentalis* and *Eucalyptus salubris* Open Woodland over *Eremophila interstans* subsp. *interstans* and *Santalum spicatum* Tall Open Shrubland over *Eremophila interstans* subsp. *virgata, E. ionantha* and *E. scoparia* Shrubland over *Austrostipa scabra, Maireana triptera* and *Ptilotus obovatus* Open Tussock Grassland/ Low Open Shrubland		BG04r, BG12r, BG13r	327.15	6.02	1925.71	17.79
EsAhTs	*Eucalyptus salubris, Eucalyptus aequioperta* and *Melaleuca pauperiflora* subsp. *Fastigiata* Open Woodland over *Acacia hemiteles* Tall Open Shrubland over *Dodonaea viscosa* subsp. *angustissima* and *Senna artemisioides* subsp. *filifolia* over Halgania andromedifolia, *Triodia ?scariosa* and *Westringia rigida* Sparse Hummock Grassland/Shrubland		BG25r	182.15	3.35	182.15	1.68

Vegetation Unit Code	Vegetation Type and Description	Representative Photo	Representative FVC Relevé/s	Survey Area (ha)·	Survey Area (%)	Project Area (ha).	Project Area (%)
^EsAaLa	*Eucalyptus salubris* and *Eucalyptus salmonophloia* Open Woodland over *Acacia acuminata, Eremophila alternifolia* and *Santalum spicatum* Tall Shrubland over *Acacia hemiteles*, *Eremophila decipiens* subsp. *decipiens* and *Lycium australe* Shrubland over *Maireana pyramidata*, *Ptilotus obovatus* and *Sclerolaena diacantha* Low Open Shrubland over *Goodenia mimuloides* and *Cephalipterum drummondii* Open Forbs		BG02r	96.49	1.78	152.43	1.41
^AaMhPg	*Acacia acuminata, Melaleuca hamata* and *Alyxia buxifolia* Tall Open Shrubland over *Prostanthera grylloana, Olearia pimeleoides* and *Leucopogon* sp. Clyde Hill (M.A. Burgman 1207) Low Open Shrubland	Image not available	NA	0	0	29.89	0.28
^AaaLcTk	*Allocasuarina acutivalvis* subsp. *acutivalvis* and *Acacia resinimarginea* Tall Open Shrubland over *Leucopogon* sp. Clyde Hill (M.A. Burgman 1207) and *Thryptomene kochii* Low Open Shrubland	Image not available	NA	0	0	2.57	0.02
^EcMpEo	*Eucalyptus celastroides* subsp. *celastroides* Low Open Woodland over *Melaleuca pauperiflora* subsp. *fastigiata* Tall Shrubland over *Eremophila oppositifolia* subsp. *angustifolia, Eremophila ternata* and *Dodonaea adenophora* Shrubland over *Pogonolepis muelleriana* Sparse Forbs	Image not available	NA	0	0	1.92	0.02

Vegetation Unit Code	Vegetation Type and Description	Representative Photo	Representative FVC Relevé/s	Survey Area (ha)·	Survey Area (%)	Project Area (ha).	Project Area (%)
^ElAaDa	*Eucalyptus loxophleba* subsp. *lissophloia, Eucalyptus griffithsii* and *Eucalyptus capillosa* subsp. *capillosa* Low Open Woodland over, *Acacia crenulata, Acacia acuminata* and *Acacia tetragonophylla* Tall Open Shrubland over *Dodonaea adenophora, Eremophila granitica* and *Eremophila oppositifolia* subsp. *angustifolia* Open Shrubland over *Prostanthera grylloana* and *Olearia pimeleoides* Low Sparse Shrubland	Image not available	NA	174.56	3.21	200.78	1.86
^ElAaSaf	*Eucalyptus loxophleba* low open woodland over *Acacia acuminata, Acacia gibbosa* and *Eremophila alternifolia* Tall Open Shrubland over *Senna artemisioides* subsp. *filifolia, Eremophila ionantha* and *Eremophila interstans* subsp. *virgata* Open Shrubland over *Austrostipa elegantissima*, *Schoenia cassiniana* and *Waitzia acuminata* Sparse Tussock Grassland/Sparse Forbs	Image not available	NA	0	0	142.43	1.32
^EsAaSs	*Eucalyptus clelandii, Eucalyptus griffithsii* and *Eucalyptus loxophleba* subsp. *lissophloia.* Open Woodland over *Acacia acuminata, Eremophila oppositifolia* subsp. *angustifolia* and *Alyxia buxifolia* Tall Open Shrubland over *Scaevola spinescens, Acacia erinacea* and *Eremophila glabra* subsp. *glabra* Shrubland *Olearia muelleri* Low Sparse Shrubland	Image not available	NA	6.72	0.12	880.69	8.14
^EsEiEi	*Eucalyptus salmonophloia* and *Eucalyptus salubris* Woodland over *Eremophila interstans* subsp. *virgata* and *Santalum acuminatum* Tall Open Shrubland over *Eremophila ionantha, Exocarpos aphyllus* and *Acacia hemiteles* Open Shrubland over *Austrostipa scabra* Sparse Tussock Grassland	Image not available	NA	0	0	37.31	0.34

Vegetation Unit Code	Vegetation Type and Description	Representative Photo	Representative FVC Relevé/s	Survey Area (ha)·	Survey Area (%)	Project Area (ha).	Project Area (%)
^EsEcEt	*Eucalyptus salubris* Low Open Woodland over *Eremophila caerulea* subsp. *caerulea, Eremophila ternata* and *Eremophila microphylla* over Mixed Chenopod Low Sparse Shrubland	Image not available	NA	0	0	5.57	0.05
^EgAaaOp	*Eucalyptus griffithsii* and *Eucalyptus oleosa* subsp. *oleosa* Low Open Woodland over *Allocasuarina acutivalvis* subsp. *acutivalvis, Acacia resinimarginea,* and *Melaleuca hamata* Tall Open Shrubland over *Olearia pimeleoides, Westringia cephalantha* and *Beyeria sulcata* var. *brevipes* Low Open Shrubland over *Triodia tomentosa* Sparse Tussock Grassland	Image not available	NA	0	0	32.26	0.30
^EsAcEa	Mixed *Eucalyptus* spp. Open Woodland over *Acacia crenulata, Alyxia buxifolia* and *Melaleuca leiocarpa* Tall Open Shrubland over *Exocarpos aphyllus* Open Shrubland over Mixed Forbs	Image not available	NA	0	0	12.89	0.12
^Mosaic	Combination of EsAcEa and AaaLcTk	Image not available	NA	0	0	235.71	2.18
Cleared	Areas devoid of vegetation (roads/tracks/infrastructure) and rehabilitated areas			102.60	1.89	688.81	6.36
			Total	**5,431.47***	**100***	**10,823.32***	**100***

^Vegetation units mapped by Botanica (2021d) *Discrepancies in total due to rounding

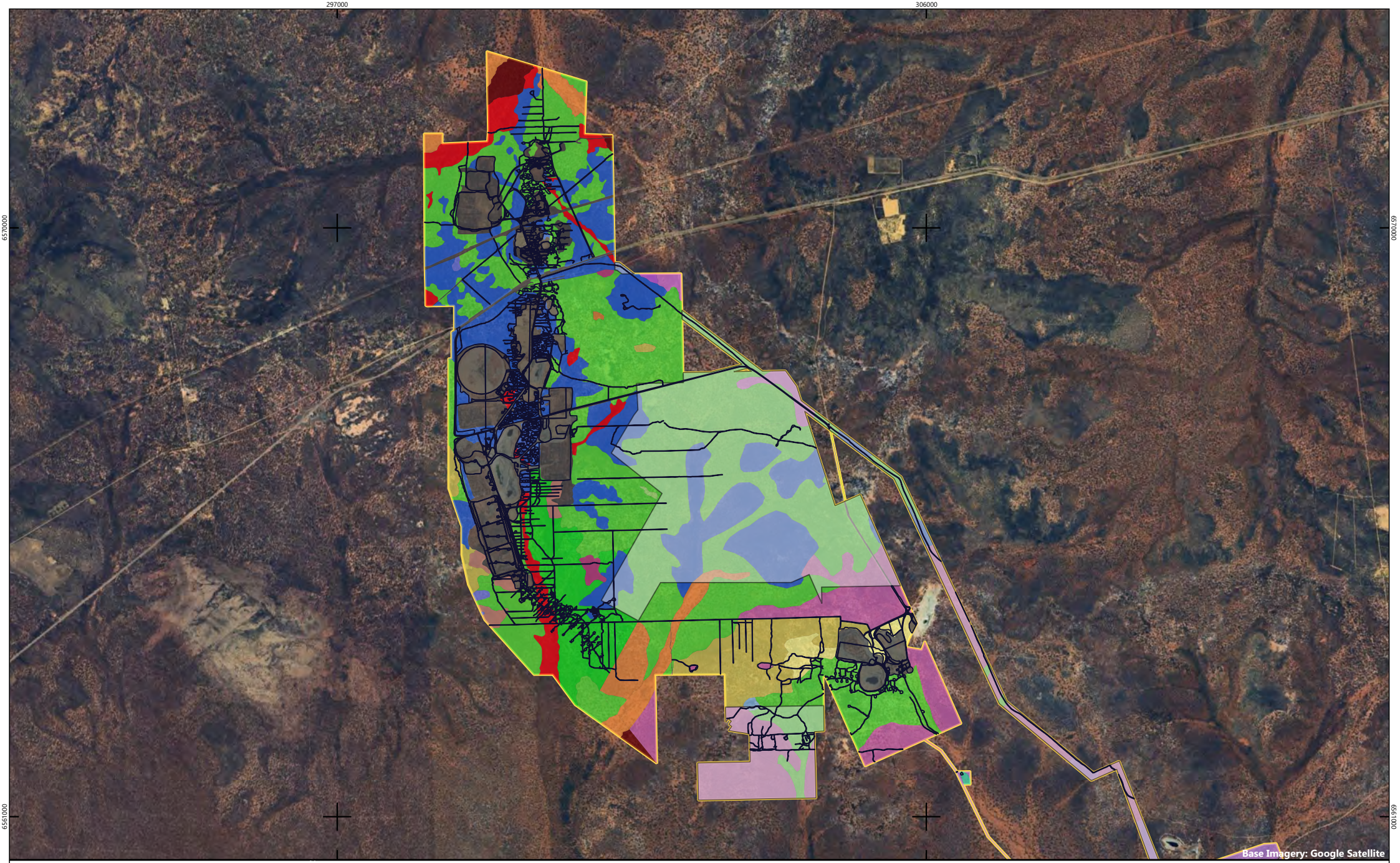
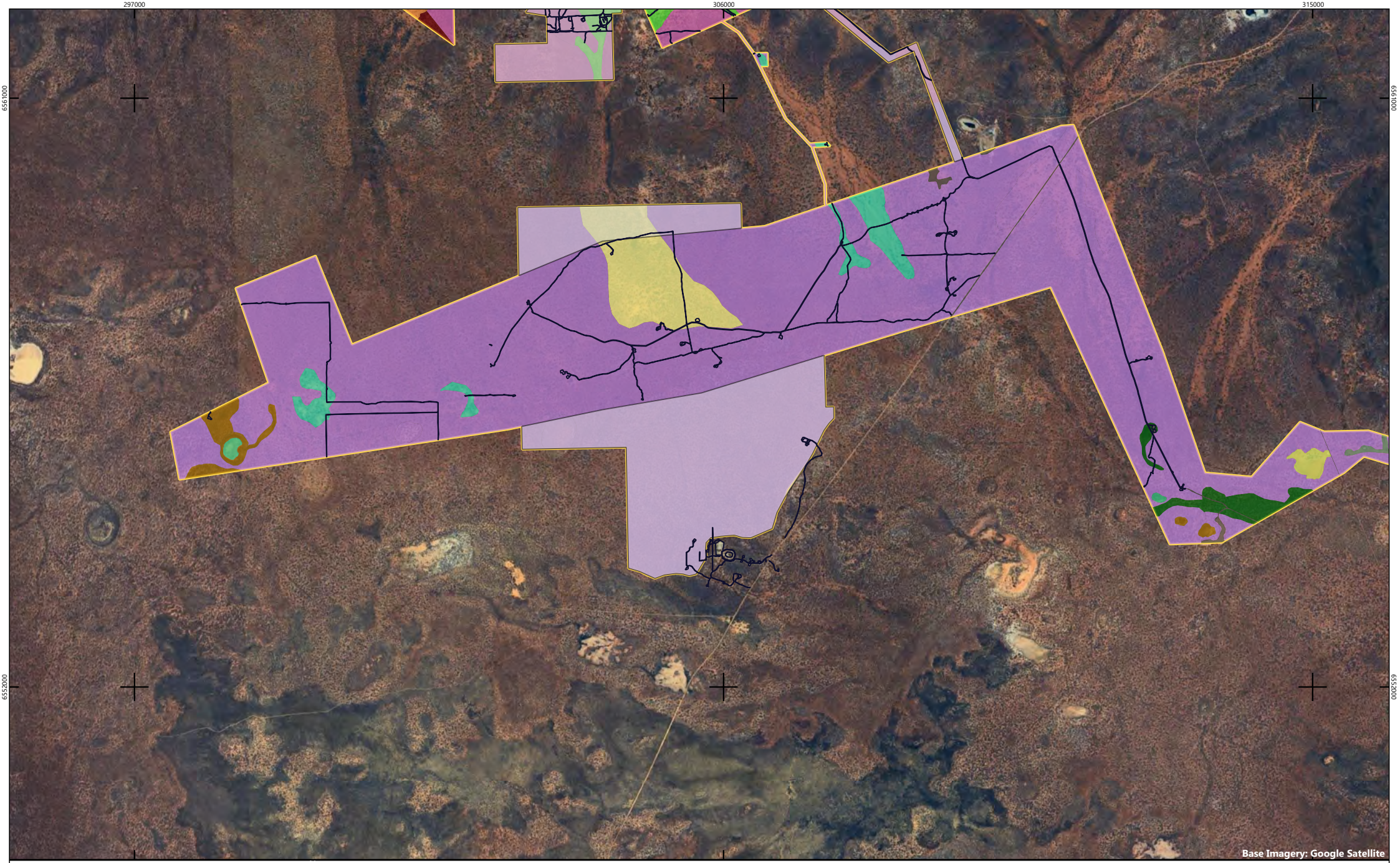


Figure 12a - Vegetation Units

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BOPL25001 01/12/2025



0 1 2 3 4 km

GDA 2020 MGA Zone 51

Legend

- Project Area
- Disturbance
- Unsurveyed Areas
- AvAc
- AvMmPd
- AvSc
- Cleared
- EsAaLa
- EsAbEs
- EsAhTs
- EsEiEi
- EsEiEs
- EsEiSa
- EsEsAv
- MhMp
- MhScSs

Figure 12b - Vegetation Units

FOCUSED VISION consulting

BOPL25001 01/12/2025



0 1 2 3 4 km

GDA 2020 MGA Zone 51

Legend

- Project Area
- Disturbance
- Unsurveyed Areas
- AvAc
- AvMmPd
- AvSc
- Cleared
- DfLbRp
- EsAhTs
- EsEiSa
- MhMp
- MhScSs

Figure 12c - Vegetation Units

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BQPL25001 01/12/2025

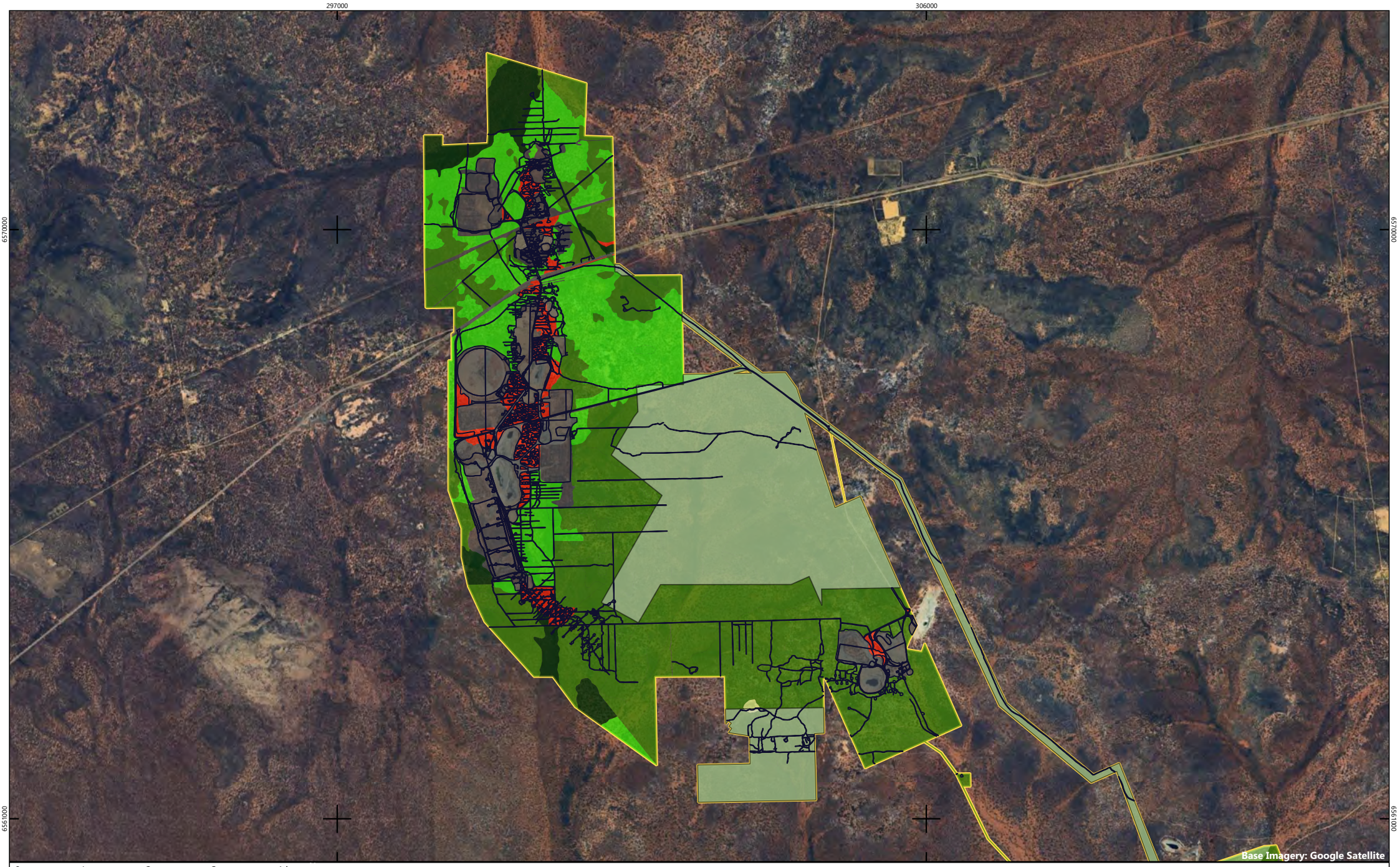
5.2.2.3 Vegetation Condition

The condition of the vegetation within the project area was found to range from 'Excellent' to 'Degraded', with the majority (47.53%) in 'Very Good' condition. The areas of the varying vegetation condition are summarised in **Table 11** and presented in the **Figure 13** series.

Table 11 – Summary of Vegetation Condition in the Survey and Project Area

Vegetation Condition Rating	Survey Area (ha)	% of Survey Area	Project Area (ha).	Project Area (%)
Excellent	0.00	0.00	178.82	1.65
Very Good - Excellent	21.68	0.40	21.68	0.20
Very Good	2,460.26	45.30	5,144.36	47.53
Good-Very Good	2,727.90	50.22	3,707.41	34.25
Good	49.99	0.92	851.76	7.87
Poor-Good	18.44	0.34	19.50	0.18
Poor	11.32	0.21	11.32	0.10
Degraded-Poor	31.94	0.59	31.94	0.30
Degraded	7.33	0.14	167.72	1.55
Cleared/Rehabilitated	102.60	1.89	688.81	6.36
Total	**5,431.47***	**100**	**10,823.32**	**100***

*Discrepancies in total due to rounding



0 1 2 3 4 km

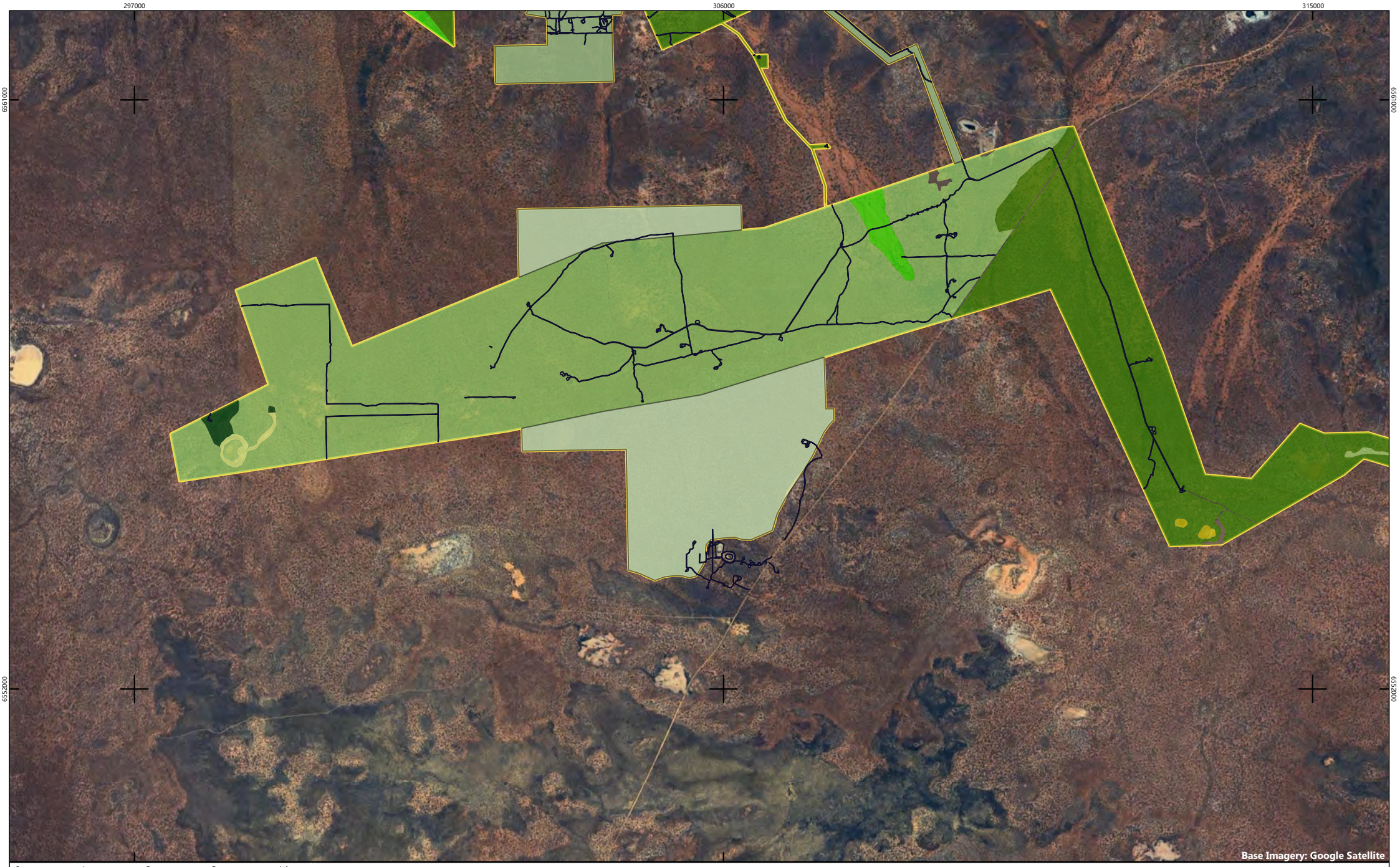
GDA 2020 MGA Zone 51

Legend

- Project Area
- Disturbance
- Unsurveyed Areas
- Cleared/Rehabilitation
- Degraded
- Poor-Good
- Good
- Good-Very Good
- Very Good
- Excellent

Figure 13a - Vegetation Condition

FOCUSED VISION consulting



0 1 2 3 4 km

GDA 2020 MGA Zone 51

Legend

- Project Area
- Disturbance
- Unsurveyed Areas
- Cleared/Rehabilitation
- Poor
- Poor-Good
- Good
- Good-Very Good
- Very Good
- Very Good-Excellent

Figure 13b - Vegetation Condition

FOCUSED VISION consulting



0 1 2 3 4 km

GDA 2020 MGA Zone 51

Legend

- Project Area
- Disturbance
- Unsurveyed Areas
- Cleared/Rehabilitation
- Degraded
- Degraded-Poor
- Poor
- Good-Very Good
- Very Good

Figure 13c - Vegetation Condition

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6 DISCUSSION

6.1 FLORA

6.1.1 Recorded Flora

A total of 165 taxa were recorded during the 2025 field survey, including seven (4.24%) weed species, none of which are DP plants or WoNS. The five dominant families represented were Asteraceae, Chenopodiaceae, Fabaceae, Proteaceae and Scrophulariaceae, which is a typical composition of the flora of the Coolgardie bioregion.

None of the recorded flora are exhibiting an extension beyond their currently documented range, in accordance with records of the WAH (1998-).

Twenty-five of the recorded flora were unable to be identified to species level and two were unable to be identified to genus level; two of which may potentially represent significant species. *Acacia* sp1. (collection code SBP10) has a high potential of being an undescribed (new) species. A specimen was recorded opportunistically in one location within vegetation unit EsEiSa. A specimen identified as Poaceae sp. (collection code BG24r.14) may potentially be representative of a Priority 3 species, *Austrostipa turbinata,* although the likelihood of this is considered low. The collected specimen was recorded in one location within vegetation unit AvSc.

No Threatened flora were recorded within the project area during the 2025 or 2021 (Botanica 2021d) field survey. Four Priority 3 flora (*Cryptandra crispula, Eremophila microphylla*, *Eremophila veronica* and *Notisia intonsa*) were recorded from ten locations during the 2025 survey, and two Priority 3 flora (*Acacia crenulata* and *Notisia intonsa*) were recorded from 11 locations by Botanica during the 2021 survey.

Acacia crenulata is a bushy shrub or tree growing between 0.7 to 3 m in height and produces yellow flowers. This species prefers clay, sandy-clay and yellow sandy soils on rocky rises, granite outcrops and breakaways (WAH 1998-). This record is known from 25 WAH records from west of Kalgoorlie to east of Merredin (WAH 1998-). The DBCA database search returned 10 records from 1964 to 2019, and the closest record is 4.94 km north-west of the project area (**Figure 10**). This species was not recorded during the 2025 survey; however, Botanica did record this species in 2021 within vegetation units EsAaSs and EsEiEs. Therefore, this species is considered 'Likely to occur' in the survey area and 'Likely to occur' elsewhere in the project area, including in the unsurveyed project area. The certainty of the concluded likelihood of occurrence in the unsurveyed areas is high.

Cryptandra crispula is a non-spinescent shrub that grows between 0.25 and 0.9 m high. This species typically occurs in brown sandy clay, yellow loamy sand, red soil and pebbles on dune ridges, hills and near salt lakes (WAH 1998-). This species is known from 15 WAH records located around the Kalgoorlie area (WAH 1998-), with the DBCA search returning six records from 1974-2016, the closest record being located approximately 16.44 km west of the project area (**Figure 10**). This species was recorded opportunistically in nine locations during the 2025 field survey within vegetation unit EsAhTs. As only limited targeted searching was conducted during the survey, it is considered that additional individuals of this species 'May occur' within the survey area. However, due to a clearly apparent lack of suitable habitat beyond the areas surveyed in 2025, is considered with high certainty that *Cryptandra crispula* is 'Unlikely to occur' in the unsurveyed project area.

Eremophila microphylla is an erect perennial shrub growing up to 1 m high and 1 m wide. Produces red or white flowers from November to December and March to May. This species occurs on red brown sandy loam and loamy clay soils on plains and slopes (WAH 1998-). This species is known from 18 WAH records located in two distinct populations. The first population is located west of Coolgardie town, and the other is within the Dundas region (WAH 1998-). The DBCA search returned 12 records from 1948-2017 with the closest record being 0.13 km west of the project area (**Figure 10**). This species was recorded opportunistically in 2025 in one location within vegetation unit EsEiEs. As only limited targeted searching was conducted during the survey, and this

vegetation unit accounts for a large portion of the project area, it is considered that further individuals and populations of *Eremophila microphylla* are 'Likely to occur'. Vegetation unit EsEiEs has been extrapolated as occurring in the unsurveyed portions of the project area, and therefore, this species is considered 'Likely to occur' within the unsurveyed project area, and the certainty of this conclusion is high.

Eremophila veronica is an erect spreading shrub the grows between 0.5 and 1 m in height and produces purple flowers from April to May. This species occurs on stony clay and clay loam soils on lateritic breakaways (WAH 1998-). This species is known from 16 WAH records with the majority located around the Coolgardie township. The DBCA database search returned 10 records from 1979-2017 with the closest record being 0.01 km east of the project area (**Figure 10**). This species was recorded opportunistically in six locations within vegetation units EsAbEs and EsEiEs. As only limited targeted searching was conducted during the survey, further individuals and populations of this species are considered 'Likely to occur' within the surveyed area, as well as in the unsurveyed project area, based on vegetation mapping extrapolation, and the certainty of this is high.

Notisia intonsa is a prostrate to ascending annual herb growing from 0.01 to 0.04 m in height and produces yellow-brown flowers from September to October. This species occurs in red brown clays and stony saline loams (WAH 1998-). This species is known from 29 WAH records spread 489.89 km from east of Lake Barlee to west of Ravensthorpe (WAH 1998-) with the DBCA database search returning six records from 1958-2000. The closest record is 0.13 km east of the project area (**Figure 10**). This species was recorded in eight locations by Botanica in 2021 within vegetation units ElAaSaf, EsAaLa, EsAcEa, EsEiEs and Mosaic. This species was recorded opportunistically during the 2025 survey in three locations and within four relevés BG04r, BG20r, BG10r and BG12r within vegetation units AvMmPd, EsAbEs, EsEiEs and EsEiSa. As only limited targeted searching was conducted during the survey, further individuals and populations of this species are 'Likely to occur' within the surveyed area, as well as in the unsurveyed project area, based on vegetation mapping extrapolation, and the certainty of this is high.

6.1.2 Likelihood of Occurrence of Significant Flora in the Project Area

Reassessment of the likelihood of occurrence of significant flora within the project area was carried out post-field assessment (**Appendix D**). This resulted in a revision of the likelihood of occurrence of eight taxa compared to the pre-survey predictions as per **Table 12** below.

All other significant flora maintained their pre-field assessment rating for their likelihood of occurrence in the project area.

Table 12 – Summary of Significant Flora with Revised Likelihoods of Occurrence Following Field Survey

Taxa	Status	Pre-Survey Likelihood	Post-Survey Likelihood	Rationale
Acacia coatesii	Priority 1	'Likely to occur'	'May occur'	Suitable geology is present; however, the vegetation unit this species was previously recorded in was not observed in the survey area.
Styphelia saxicola	Priority 3	'Likely to occur'	'May occur'	Suitable geology was present; however, the vegetation unit this species was previously recorded in was not observed in the survey area.
Phebalium clavatum	Priority 2	'Likely to occur'	'Unlikely to occur	No suitable habitat recorded within the survey area
Stackhousia muricata	Priority 3	'Likely to occur'	'Unlikely to occur	No suitable habitat recorded within the survey area
Eucalyptus urna subsp. *xesta*	Priority 3	'May occur'	'Unlikely to occur'	No suitable habitat recorded within the survey area
Cryptandra crispula	Priority 3	'May occur'	'Occurs'	Due to being recorded during the 2025 survey
Eremophila microphylla	Priority 3	'Likely to occur'	'Occurs'	Due to being recorded during the 2025 survey
Eremophila veronica	Priority 3	'Likely to occur'	'Occurs'	Due to being recorded during the 2025 survey
Notisia intonsa	Priority 3	'Likely to occur'	'Occurs'	Due to being recorded (confirmation of Botanica (2021d) records) during the 2025 survey

In addition to the five Priority 3 flora recorded in the project area during the 2025 FVC (recording four of the five taxa) and the 2021 Botanica (recording two of the five taxa) field surveys, an additional nine Priority flora are considered 'Likely to occur' within the unsurveyed project area, despite not being recorded within the 2025 or 2021 survey areas. The certainty of this conclusion ranges from low for one species, to high for four taxa, and a medium level of certainty is applicable to the remaining four taxa (**Appendix D**).

Acacia coatesii (P1) is a low domed, compact, rigid shrub or sub-shrub growing between 0.2 and 0.4 m in height and up to 1.5 m wide that produces yellow flowers in mid-August to early October. This species prefers open woodland dominated by *Eucalyptus clelandii* and *E. lesouefii* over open shrubland. It grows in shallow, red, sandy clay on flat or gently sloping ground towards the base of a low greenstone ridge (WAH 1998-). This species is known from five WAH records located just to the south of Coolgardie (WAH 1998-). The DBCA search returned five records from 1966 to 2013 with the closest record being 0.95 km north of the project area (**Figure 10**). This species was not recorded within the survey area and *Eucalyptus clelandii* and *E. lesouefii* were not recorded by

FVC in 2025 or Botanica in 2021, however this is potentially due to the low intensity of the surveys conducted, as *E. clelandii* was recorded as a dominant species in the RPS (2012b) survey which overlapped part of the area mapped by Botanica (2021d) and intersects vegetation unit EsAaSs. As this vegetation unit occurs on the border of the survey area, it is considered that this species 'May occur' in the survey area. This species is considered 'Likely to occur' in the unsurveyed project area and the certainty of this likelihood conclusion is medium. The certainty of the extrapolated mapping was not considered high, due to the extrapolated extent of the vegetation unit being separated from the surveyed extent by visible extents of other vegetation units.

Acacia websteri (P1) is a shrub growing between 1.5 and 5 m tall with fibrous bark and produces yellow flowers. This species prefers red sand, clay or loam soils in low-lying and flat areas (WAH 1998-) and is known from 21 WAH records located from east of Leonora to west of Lake Lefroy (WAH 1998-). The DBCA search returned 26 records from 1955-2020 with the closest record being 9.64 km north-west of the project area (**Figure 10**). This species was not recorded within the survey area; however, suitable habitat was recorded in large portions of the project area within vegetation units AvMpPd, DfLbRp, EsAaLa, EsAbEs, EsEiEs, EsEiSa. and MhScSs. This species is considered 'Likely to occur' in both the unsurveyed project area and survey area. The certainty of the likelihood conclusion in the unsurveyed areas is high, because extrapolation has occurred across continuous extents of vegetation units and landforms.

Melichrus sp. Coolgardie (K.R. Newbey 8698) (P1) is a perennial shrub growing up to 0.8 m in height and produces white to deep pink flowers from April to November. This species prefers yellow sand on hill slopes and plains and is known from 21 WAH records all within the Coolgardie and Yilgarn region (WAH 1998-). The DBCA search returned 16 records from 1962 to 2020, with the closest occurrence being 2.45 km south of the project area (**Figure 10**). This species was not recorded within the survey area; however, based on the appearance of aerial imagery where DBCA records are located, similar habitat is provided within vegetation unit EsEiSa, which occurs throughout the southern portion of the survey area, and therefore, this species is considered 'Likely to occur' in these areas. Sandy soils (and potential suitable habitat for this species) were also observed in the survey area within vegetation unit EsAaOp, and this vegetation unit has also been extrapolated in the desktop mapping of the unsurveyed project area. Therefore, the certainty of the 'Likely to occur' rating applied to *Melichrus* sp. Coolgardie (K.R. Newbey 8698) in the unsurveyed areas of the project area is medium, because the extrapolated extent of this vegetation unit is separated by other vegetation units.

Philotheca pachyphylla (P1) is an erect shrub that grows between 0.3-1.5 min height and produces white flowers from May or September. It's preferred habitat includes sand, red-loam, clay-loam on sandplains and hill tops (WAH 1998-). This species is known from 11 WAH records. These records are split into a couple of populations; one is east of Lake Johnston which is east of Norseman and the other east of Coolgardie (WAH 1998-). The DBCA database search returned seven records from 1962 to 2013, with the closest occurrence being 2.37 km west of the project area (**Figure 10**). This species was not recorded within the survey area, however suitable habitat (sand, loam, and clay-loam) was observed within vegetation units EcEs, EsAaLa, EsAbEs, EsEiEs, EsEiSa, and EsEsAv and additionally in the unsurveyed project area within vegetation units EsAaSs, EsAaLa, EsAbEs, EsEiEs and Mosaic. The certainty of the likelihood of occurrence conclusions for this species in the unsurveyed areas is high, as the majority of the vegetation units were extrapolated across continuous appearing landforms.

Austrostipa frankliniae (P2) is a perennial tussock grass growing between 0.8 and 1.0 m in height and produces flowers in late spring. This species prefers habitat is red brown sandy loam soils on plains (WAH 1998-). This species is known from nine records from west of Coolgardie to east of Dowerin (WAH 1998-). The DBCA database search returned two records from 2011, and the closest occurrence is 1.0 km north of the project area (**Figure 10**). This species was not recorded within the survey area; however suitable habitat was recorded in vegetation units EsEiEs and MhMp and additionally in the unsurveyed project area within vegetation unit Mosaic. The

certainty of the likelihood of conclusions in the unsurveyed area is medium, because this pocket is separated by other vegetation units.

Lepidium merrallii (P2) is an erect to spreading annual (possibly ephemeral) herb that grows between 0.03-0.15 m in height and prefers clay or loam soils (WAH 1998-). This species is known from three WAH records from conservation park to Coolgardie (WAH 1998-). The DBCA database search returned one record from 1895, and the closest DBCA occurrence is 11.66 km north of the project area (**Figure 10**). This species has been previously recorded within the project area by RPS group in 2011 and Phoenix environmental consulting in 2014. This species was not recorded during the survey, however due to this species being an annual and the survey being not being conducted at the optimum time of year it is possible that this species was not present during the survey. Suitable habitat (clay, loam) was observed during the survey and occurs throughout the majority of the survey and unsurveyed project area in all vegetation units except vegetation units EgAaaOp, EsAhTs and MhMp. The certainty of the likelihood of occurrence conclusions for the unsurveyed area is high, because the majority of the vegetation units were extrapolated from continuous extents of vegetation units, unbroken by other vegetation units and/or landforms.

Phebalium clavatum (P2) is an upright shrub that grows between 0.5 and 1.5 m in height and produces white flowers from August to September. This species is found on sandy soils on sandplains (WAH 1998-). This species is known from 16 WAH records from south of Coolgardie to north of Lake Johnson (west of Norseman) (WAH 1998-). The DBCA database search returned 12 records from 1920 to 2013, and the closest record is 2.44 km north of the project area (**Figure 10**). This species was not recorded within the survey area and suitable habitat was not observed within the survey area, however suitable habitat was previously recorded by Botanica within vegetation unit EgAaaOp. The certainty of the likelihood of occurrence conclusions for the unsurveyed area is medium, because the vegetation unit occurs as an isolated pocket and does not form part of a continuous vegetation unit or landform.

Styphelia saxicola is an erect shrub growing up to a height of 1.0 m and also 1.0 m in width. This species produces white/pale cream flowers, with a tinge of pale pink from April to September and prefers shallow soils, of rocky sites with laterite, granite or ironstone geology in vegetation typically of open shrubland (WAH 1998-). This species is known from 18 WAH records from west of Coolgardie to east of Lake Barlee (WAH 1998-). The DBCA database search returned two records from 1964 and 2013, and the closest occurrence is 2.40 km west of the project area (**Figure 10**). This species was not recorded during the survey and suitable vegetation of open shrubland was not recorded within the survey area. However, Botanica (2021d) recorded an open shrubland vegetation unit ElAaDa and one of the DBCA records is just outside the project area and aerial imagery indicates that it would be part of this vegetation unit, therefore, this species is considered 'Likely to occur' in the unsurveyed project area. The certainty of the likelihood of occurrence of conclusions for the unsurveyed area is low, because the aerial imagery indicates that the vegetation pocket is variable in comparison to the surrounding vegetation; however, this is potentially due to disturbance.

6.2 VEGETATION

A total of 25 vegetation units were defined within the survey area consisting of 16 Eucalyptus Woodlands, one Allocasuarina and Acacia Woodland, one Acacia and Melaleuca Shrubland two Melaleuca Shrublands, one Chenopod Low Shrubland, two Mixed Low Shrublands, one Herbland and one mosaic (a combination of EsAcEa and AaaLcTk). .

The survey was scoped to be a reconnaissance survey therefore, only relevés were sampled. Reconnaissance assessments limit floristic analysis, which relies on replicate samples of quadrat data in order to undertake multivariate analysis for cluster analysis, analysis of variance and dissimilarity (conversely, similarity) and provide a statistical basis for grouping of sites into vegetation units for the purposes of description and spatial mapping. However, such a limitation is less significant in areas of modified/degraded and/or homogeneous vegetation, where there is limited variability between the different units and/or the areas are well-surveyed.

Some portions of the survey area were found to be quite variable, with a few small pockets of varying vegetation, that were difficult to combine with units and mapping of the broader project area of or that was prepared by Botanica (2021d). Therefore, further surveys are recommended in these areas to improve vegetation mapping reliability.

The 2025 survey was also conducted in August which is slightly earlier than the optimal spring survey timing for the South-West Interzone Botanical Province. However, much of the flora was able to be identified (15.15% were unable to be identified to species level) and therefore, vegetation was able to be defined/mapped where accessed and ground-truthed, or where extrapolation of mapping was achievable with a high degree of certainty.

Vegetation condition within the project area was found to range from 'Degraded' to 'Excellent, with the majority (47.60%) in 'Very Good' condition. Cleared/Rehabilitated land comprised 6.31% of the project area, and vegetation in poorer condition typically occurs adjacent to developed areas and infrastructure, having been significantly impacted by past clearing, ongoing mining and exploration activities and associated weed invasion, erosion and other such secondary effects.

No TECs, PECs or their buffers occur within the study area, and it is concluded that none of the vegetation units of the survey area (or as previously defined or extrapolated for the project area) represent any ecological communities of listed conservation-significance.

6.3 VEGETATION OF SIGNIFICANCE OR POTENTIAL SIGNIFICANCE

The potential significance of the vegetation of the survey area has been considered at an International, National, State, regional and local level, in accordance with the criteria listed in **Section 2.3**. None of the vegetation units recorded are considered to be of International, National or State significance. The regional and local significance of the vegetation is discussed in the following sections.

6.3.1 Regionally Significant Vegetation

6.3.1.1 Priority Flora

Priority flora were recorded in eight vegetation units (AvMmPd, AaMhPg, ElAaSaf, EsAbEs, EsAaLa, EsAhTs, EsAcEa, EsEiEs , EsEiSa and Mosaic). Portions of these vegetation units, where Priority flora were recorded, are considered regionally significant.

6.3.1.2 Restricted Regional Representation and/or Distribution

Vegetation associations are considered significant if they are poorly represented regionally. Seven vegetation associations (Beard 1990) occur within the project area, all of which are well represented in the IBRA region and throughout Western Australia, except vegetation association 2009, which is limited in its distribution and represented in only three pockets, all near the project area. The largest pocket occurs within the northern section of the project area. The broad vegetation description of this vegetation association, as described in **Section 3.3.1** is similar to vegetation associations that occur in the surrounding area. Thirteen of the 25 vegetation units of the project area (EcEs, EcMpEo, ElAaSaf, EsAaLa, EsAaOp, EsAaSs, EsAbEs, EsAcEa, EsEiEi, EsEiEs, EsEiSa, EsEsAv and Mosaic) intersect the mapped extent of this vegetation association, which therefore, may be of regional significance.

6.3.2 Locally Significant Vegetation

6.3.2.1 Small and Isolated Communities

Vegetation units AaMhPg, AaaLcTk, AvAc, AvSc, DfLbRp, EcMpEo, EcEs, EgAaaOp, EsAaSs, EsAcEa, EsEiEi, EsEcEt, MhMp and MhScSs are considered small communities, each comprising less than 1% of the project area, with all recorded in small, isolated occurrences, except for vegetation units AaMhPg, EgAaaOp, EsEcEt, EsEiEi, EsAcEa and MhMp, which were recorded in several isolated occurrences.

These eight vegetation units are likely to be of significance due to their small and isolated occurrence within the project area, and therefore, these vegetation may be of local significance.

6.3.2.2 Communities of Limited Extent and/or Distribution

The eight vegetation units discussed in **Section 6.3.2.1** above each occupy less than 1% of the project area and hence, are limited in their extent and distribution. Exceptions are vegetation units AaaLcTk and EsAaSs which occur in the broader area. The extent of the remaining six vegetation units beyond the project area is not apparent, and finer scale resolution of these units, their composition and nearby extent would require further consideration to conclude their local significance in this regard. In conclusion, vegetation units AvAc, AvSc, DfLbRp, EcEs, EcMpEo and MhScSs may be considered to be of local significance.

6.3.3 Summary of Vegetation Significance

The significant vegetation units of the project area, along with the aspects determining their significance, are summarised in **Table 13**.

Table 13 – Summary of Level of Potential Significance of Vegetation in the Project Area

Scale	Significance Aspect	Vegetation Units
International Significance	Presence of Ramsar Wetlands	-
National Significance	Populations of Threatened (EPBC listed) species	-
	Presence of EPBC listed TECs	-
State Significance	Presence of State-listed Threatened flora	-
	Presence of State-listed TECs	-
	Land within in the Conservation Estate	-
	Presence of ESAs	-
Regional Significance	Presence of Priority flora	AvMmPd, AaMhPg, ElAaSaf, EsAbEs, EsAaLa, EsAhTs, EsAcEa, EsEiEs, EsEiSa and Mosaic
	Presence of PECs	-
	Presence of conservation category wetlands	-
	Presence of flora species exhibiting a range extension	-
	Presence of undescribed flora	-
	Having a restricted regional representation and distribution	EcEs, EcMpEo, ElAaSaf, EsAaLa, EsAaOp, EsAaSs, EsAbEs, EsAcEa, EsEiEi, EsEiEs, EsEiSa, EsEsAv and Mosaic
	Represented by less than 30% of the pre-European extent	-
Local Significance	Small, isolated communities	AaaLcTk, AvAc, AvSc, DfLbRp, EcMpEo, EsAaSs, EcEs and MhScSs
	Having a limited local extent and distribution	AvAc, AvSc, DfLbRp, EcEs, EcMpEo and MhScSs

7 CONCLUSIONS

The key results and conclusions from the flora and vegetation assessment of the project area are as follows:

- No Threatened flora listed under the BC Act or under the EPBC Act have been previously recorded in the project area, nor were any recorded during the 2025 field survey.
- Five Priority 3 species were recorded within the project area during the 2025 and 2021 (Botanica 2021d) surveys; *Acacia crenulata, Cryptandra crispula, Eremophila microphylla*, *Eremophila veronica* and *Notisia intonsa.*
- In addition to the five Priority 3 flora recorded in the project area during the 2025 and 2021 field surveys, an additional nine Priority flora are considered 'Likely to occur' elsewhere in the project areas, including within the unsurveyed portions of the project area, and the certainty of these conclusions range from low to high, depending on the certainty of extrapolated vegetation mapping in areas not ground-truthed.
- Two flora specimens that were unable to be identified to species level may represent significant species; *Acacia* sp1. (considered likely to be a new, undescribed species) and Poaceae sp. (considered possibly representative of Priority 3 species, *Austrostipa turbinata*).
- No weeds classed as DP plants under the BAM Act or WoNS were recorded during the survey.
- Twenty-five vegetation units have been described (**Table 10**) and mapped across the project areas, including 16 Eucalyptus Woodlands, one Allocasuarina and Acacia Woodland, one Acacia and Melaleuca Shrubland two Melaleuca Shrublands, one Chenopod Low Shrubland, two Mixed Low Shrublands, one Herbland and one mosaic (a combination of EsAcEa and AaaLcTk).
- Vegetation condition across the survey area was found to range from 'Degraded' to 'Excellent', with the majority (47.53%) in 'Very Good' condition.
- No TECs or PECs have been identified as occurring in the project area, nor is it considered that any occur.
- The following vegetation units mapped and described within the project area (or portions of these units) have been determined to be of significance, or of potential significance:
    - The following vegetation units (or portions of) may be considered regionally significant:
        - AvMmPd, AaMhPg, ElAaSaf, EsAbEs, EsAaLa, EsAhTs, EsAcEa, EsEiEs , EsEiSa and Mosaic, due to supporting Priority flora
        - EcEs, EcMpEo, ElAaSaf, EsAaLa, EsAaOp, EsAaSs, EsAbEs, EsAcEa, EsEiEi, EsEiEs, EsEiSa, EsEsAv and Mosaic, due to restricted regional representation and/or distribution
    - The following vegetation units maybe considered locally significant:
        - AaaLcTk, AvAc, AvSc, DfLbRp, EcMpEo, EsAaSs, EcEs and MhScSs, due to occurring as small, isolated communities
        - AvAc, AvSc, DfLbRp, EcEs, EcMpEo and MhScSs due to having a limited local extent and/or distribution.

The assessment was scoped to address a reconnaissance flora and vegetation assessment, using the relatively recent and directly adjacent 2021 Botanica survey results as a primary basis, combined with the field survey results and available local and regional flora and vegetation data and information from databases and the literature, predominantly previous surveys. As targeted flora surveys have been limited, vegetation mapping in some sections of the project area has been extrapolated due to not having been ground-truthed, and the areas accessed have been surveyed at a reconnaissance (rather than detailed) level of detail, the appropriateness of further surveys should be considered. Such consideration should be in reference to the spatial extent of proposed impacts/project footprint, the nature of the proposed impacts and on the specific impact assessment and permitting requirements for the project.

8 LIST OF PARTICIPANTS

The personnel who contributed to the project are summarised in **Table 14**.

Table 14 – Project Team

Name	Qualification	Years of Relevant Experience	Role
Kellie Bauer–Simpson Principal Ecologist	BSc. (Biological Science)	27	Project manager, report technical and authorisation review
Patricia Aylmore Principal Environmental Consultant	BSc. (Hons.) (Soil Science)	37	Report technical review
Megan Gray Senior Botanist/Ecologist	BSc. (Environmental Biology)	5	Data management, report technical review
Olga Nazarova Senior Botanist/Taxonomist	BSc. (Environmental Science; Marine Science)	4	Flora identifications
Taryn Brebner Botanist/Ecologist	BSc. (Environmental Management)	7	Project manager, study planning, field survey, data collation/analysis, report preparation
Sarah Beckwith Botanist/Ecologist	BSc. (Conservation Biology)	2	Desktop assessment, Field survey, data collection
Vaida Seikyte GIS Analyst	BSc. (Geography)	2	Spatial data management, GIS mapping, preparation of figures
Will Bauer–Simpson Technician	Cert. IV (Health and Safety)	14	Figures review and spatial data quality assurance
Linda Hosking Administration		20	Data entry, editorial support

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APPENDIX A - THREATENED AND PRIORITY SPECIES AND COMMUNITY CATEGORY LIST

EPBC ACT SPECIES AND COMMUNITY CATEGORIES

Categories of EPBC Act Threatened, Migratory and Marine Species

Conservation Code	Category
EX	**Extinct** Species where "there is no reasonable doubt that the last member of the species has died" (section 179(1) of the EPBC Act).
EW	**Extinct in the Wild** Species that "is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form" (section 179(2) of the EPBC Act).
CR	**Critically Endangered** Species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria" (section 179(3) of the EPBC Act).
EN	**Endangered** Species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria" (section 179(4) of the EPBC Act).
VU	**Vulnerable** Species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria" (section 179(5) of the EPBC Act).
MI	**Migratory species** Species that is listed on the migratory species list established under section 209 of the EPBC Act and comprises: - Migratory species which are native to Australia and are included in the appendices to the Bonn Convention - migratory species included in annexes established under the Japan-Australia Migratory Bird Agreement (JAMBA) and the China-Australia Migratory Bird Agreement (CAMBA) - native, migratory species identified in a list established under, or an instrument made under, an international agreement approved by the Minister, such as the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA)
CD	**Conservation dependent** Species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered (section 179(6) of the EPBC Act).
MA	**Marine Species** Species that is listed on the list of marine species established under section 248 of the EPBC Act. Listed marine species are only protected under the EPBC in a Commonwealth area.

Categories of EPBC Act Threatened Ecological Communities

Conservation Code	Category
CR	**Critically Endangered** Ecological community considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria" (section 182(1) of the EPBC Act).
EN	**Endangered** Ecological community considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria" (section 182(2) of the EPBC Act).
VU	**Vulnerable** Ecological community considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria" (section 182(3) of the EPBC Act).

DBCA SPECIES AND COMMUNITY CATEGORIES

Categories of Western Australian Flora and Fauna (DBCA 2023a)

Conservation Code		Category
Threatened (T) Species	CR	Critically Endangered Species Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as Critically Endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under the *Biodiversity Conservation (Listing of Native Species) (Fauna) Order 2024* for Critically Endangered fauna or the *Biodiversity Conservation (Listing of Native Species) (Flora) Order 2024* for critically endangered flora.
	EN	Endangered Species Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as Endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under the *Biodiversity Conservation (Listing of Native Species) (Fauna) Order 2024* for Endangered fauna or the *Biodiversity Conservation (Listing of Native Species) (Flora) Order 2024* for Endangered flora.
	VU	Vulnerable Species Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as Vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under the *Biodiversity Conservation (Listing of Native Species) (Fauna) Order 2024* for Vulnerable fauna or the *Biodiversity Conservation (Listing of Native Species) (Flora) Order 2024* for Vulnerable flora.
Specially Protected (SP) Species	MI	Migratory Species Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act). Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species. Published as migratory birds protected under an international agreement under the *Biodiversity Conservation (Listing of Native Species) (Fauna) Order 2024.*
	CD	Conservation Dependent Fauna of special conservation needs, species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act). Published as conservation dependent fauna under the *Biodiversity Conservation (Listing of Native Species) (Fauna) Order 2024.*
	OS	Other Specially Protected Fauna (OS) Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act). Published as other specially protected fauna under the *Biodiversity Conservation (Listing of Native Species) (Fauna) Order 2024.*

Conservation Code		Category
Extinct (EX) Species	EX	Extinct Species Species where "there is no reasonable doubt that the last member of the species has died", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act). Published as presumed extinct under the *Biodiversity Conservation (Listing of Native Species) (Fauna) Order 2024* for extinct fauna or the *Biodiversity Conservation (Listing of Native Species) (Flora) Order 2024* for extinct flora.
	EW	Extinct in the Wild Species Species that "is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act). Currently there are no Threatened fauna or Threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.
Priority (P) Species	P1	Priority 1: Poorly Known Species Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are urgently in need of further survey.
	P2	Priority 2: Poorly Known Species Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet the adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are urgently in need of further survey.
	P3	Priority 3: Poorly Known Species Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet the adequacy of survey requirements and known threatening processes exist that could affect them. Such species need further survey.
	P4	Priority 4: Rare, Near Threatened and Other Species in Need of Monitoring (a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for Vulnerable but are not listed as Conservation Dependent. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Categories of DBCA Listed Threatened and Priority Ecological Communities

Conservation Code	Category
CO	Collapsed Ecological Communities An ecological community listed by order of the Minister as collapsed under section 31(1) of the BC Act. As determined by criteria set out in section 32 of the BC Act, and published in the *Biodiversity Conservation (Threatened Ecological Communities) Order 2023*, an ecological community is eligible for listing as a collapsed ecological community at a particular time if, at that time; (a) there is no reasonable doubt that the last occurrence of the ecological community has collapsed; or (b) the ecological community has been so extensively modified throughout its range that no occurrence of it is likely to recover either: i. its species composition or structure; or ii. its species composition and structure.
CR	Critically Endangered Ecological Communities A Threatened Ecological Community listed in the category of Critically Endangered under section 27(1)(a) of the BC Act, as determined by criteria set out in section 28 of the BC Act and the ministerial guidelines and published in the *Biodiversity Conservation (Threatened Ecological Communities) Order 2023*,. A Critically Endangered ecological community faces an extremely high risk of becoming eligible for listing as a collapsed ecological community in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines.
EN	Endangered Ecological Communities A Threatened Ecological Community listed in the category of endangered ecological community under section 27(1)(b) of the BC Act, as determined by criteria set out in section 29 of the BC Act and the ministerial guidelines and published in the *Biodiversity Conservation (Threatened Ecological Communities) Order 2023*. A threatened ecological community faces a very high risk of becoming eligible for listing as a collapsed ecological community in the near future, as determined in accordance with criteria set out in the ministerial guidelines.
VU	Vulnerable Ecological Communities A Threatened Ecological Community listed in the category of vulnerable ecological community under section 27(1)(c) of the BC Act, as determined by criteria set out in section 30 of the BC Act and the ministerial guidelines and published in the *Biodiversity Conservation (Threatened Ecological Communities) Order 2023*. A vulnerable ecological community faces a high risk of becoming eligible for listing as a collapsed ecological community in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines
	Priority Ecological Communities
P1	Priority 1: Poorly Known Ecological Communities Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g., within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.
P2	Priority 2: Poorly Known Ecological Communities Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.

Conservation Code	Category
P3	Priority 3: Poorly Known Ecological Communities Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them. This category includes three sub-categories: (i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation. (ii) Communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years). (iii) Communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change, etc.
P4	Priority 4: Rare, Near Threatened or Recently Removed from the Threatened List Ecological communities that are adequately known and either rare but not threatened, near threatened, or have recently been removed from the threatened list. These communities require regular monitoring. (i) Rare: ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These communities are usually represented on conservation lands. (ii) Near threatened: ecological communities that are considered to have been adequately surveyed and that do not qualify as conservation dependent, but that are close to qualifying for a higher threat category. (iii) Ecological communities that have been removed from the list of threatened communities during the past five years.
P5	Priority 5: Conservation Dependent Ecological Communities Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

APPENDIX B – DBCA DANDJOO SEARCH REPORT

Dandjoo Species List Export

Created by Guest User on 30 Jun 2025

Source	Dandjoo – Department of Biodiversity, Conservation and Attractions
Method	User defined circle: [[120.94608, -31.0453]] 50.0 km.
Date time	2025-06-30T13:24:04.580530+08:00

Conservation status summary	Count
EN	1
None	444
P1	1
P2	3
P3	2
P4	1
VU	1
Total	**453**

Kingdoms	Count
Animalia	99
Plantae	354
Total unique species	**453**

#	Class	Family	Name	Establishment	Conservation
Animalia					
1	None	Cyzicidae	Ozestheria packardi (Brady, 1886)		
2	Aves	Acanthizidae	Acanthiza apicalis Gould, 1847 *(Broad-tailed Thornbill)*	native	
3	Aves	Acanthizidae	Acanthiza chrysorrhoa (Quoy & Gaimard, 1830) *(Yellow-rumped Thornbill)*	native	
4	Aves	Acanthizidae	Acanthiza uropygialis Gould, 1838 *(Chestnut-rumped Thornbill)*	native	
5	Aves	Acanthizidae	Gerygone fusca (Gould, 1838)	native	
6	Aves	Acanthizidae	Pyrrholaemus brunneus Gould, 1841 *(Redthroat)*	native	
7	Aves	Acanthizidae	Smicrornis brevirostris (Gould, 1838) *(Weebill)*	native	
8	Aves	Accipitridae	Tachyspiza cirrocephala (Vieillot, 1817) *(Collared Sparrowhawk)*	native	
9	Aves	Aegothelidae	Aegotheles cristatus (Shaw, 1790) *(Australian Owlet-nightjar)*	native	
10	Aves	Anatidae	Anas gracilis Buller, 1869	native	
11	Aves	Anatidae	Anas superciliosa Gmelin, 1789	native	
12	Aves	Anatidae	Chenonetta jubata (Latham, 1802)	native	
13	Aves	Anatidae	Cygnus atratus (Latham, 1790)	native	
14	Aves	Anatidae	Malacorhynchus membranaceus (Latham, 1802)	native	
15	Aves	Anatidae	Tadorna tadornoides (Jardine & Selby, 1828)	native	
16	Aves	Artamidae	Cracticus nigrogularis (Gould, 1837) *(Pied Butcherbird)*	native	
17	Aves	Artamidae	Cracticus torquatus (Latham, 1802)	native	
18	Aves	Artamidae	Gymnorhina tibicen (Latham, 1802) *(Australian Magpie)*		

19	Aves	Cacatuidae	Eolophus roseicapilla (Vieillot, 1817) *(Galah)*	native	
20	Aves	Campephagidae	Coracina novaehollandiae (Gmelin, 1789) *(Black-faced Cuckoo-shrike)*	native	
21	Aves	Campephagidae	Lalage sueurii (Vieillot, 1818)		
22	Aves	Casuariidae	Dromaius novaehollandiae (Latham, 1790) *(Emu)*	native	
23	Aves	Cinclosomatidae	Cinclosoma clarum Morgan, 1926	native	
24	Aves	Climacteridae	Climacteris rufus Gould, 1841	native	
25	Aves	Columbidae	Ocyphaps lophotes (Temminck, 1822) *(Crested Pigeon)*	native	
26	Aves	Columbidae	Phaps chalcoptera (Latham, 1790)	native	
27	Aves	Corvidae	Corvus coronoides Vigors & Horsfield, 1827 *(Australian Raven)*	native	
28	Aves	Corvidae	Corvus orru Bonaparte, 1850	native	
29	Aves	Cracticidae	Strepera versicolor (Latham, 1802) *(Grey Currawong)*	native	
30	Aves	Cuculidae	Chalcites basalis (Horsfield, 1821)		
31	Aves	Cuculidae	Chalcites osculans Gould, 1847 *(Black-eared Cuckoo)*	native	
32	Aves	Cuculidae	Heteroscenes pallidus (Latham, 1802)		
33	Aves	Estrildidae	Taeniopygia guttata (Vieillot, 1817) *(Zebra Finch)*	native	
34	Aves	Hirundinidae	Petrochelidon nigricans (Vieillot, 1817) *(Tree Martin)*	native	
35	Aves	Maluridae	Malurus leucopterus Dumont, 1824 *(White-winged Fairy-wren)*	native	
36	Aves	Maluridae	Malurus pulcherrimus Gould, 1844	native	
37	Aves	Maluridae	Malurus splendens (Quoy & Gaimard, 1830) *(Splendid Fairy-wren)*	native	
38	Aves	Meliphagidae	Acanthagenys rufogularis Gould, 1838 *(Spiny-cheeked Honeyeater)*	native	
39	Aves	Meliphagidae	Anthochaera carunculata (Shaw, 1790) *(Red Wattlebird)*	native	
40	Aves	Meliphagidae	Gavicalis virescens (Vieillot, 1817) *(Singing Honeyeater)*	native	
41	Aves	Meliphagidae	Lichmera indistincta (Vigors & Horsfield, 1827) *(Brown Honeyeater)*	native	
42	Aves	Meliphagidae	Manorina flavigula (Gould, 1840) *(Yellow-throated Miner)*	native	
43	Aves	Meliphagidae	Melithreptus brevirostris (Vigors & Horsfield, 1827) *(Brown-headed Honeyeater)*	native	
44	Aves	Meliphagidae	Nesoptilotis leucotis (Latham, 1802) *(White-eared Honeyeater)*		
45	Aves	Meliphagidae	Ptilotula ornata (Gould, 1838)	native	
46	Aves	Meliphagidae	Purnella albifrons Gould, 1841 *(White-fronted Honeyeater)*	native	
47	Aves	Meropidae	Merops ornatus Latham, 1802	native	
48	Aves	Oreoicidae	Oreoica gutturalis (Vigors & Horsfield, 1827)	native	
49	Aves	Pachycephalidae	Colluricincla harmonica (Latham, 1802) *(Grey Shrike-thrush)*	native	
50	Aves	Pachycephalidae	Pachycephala inornata Gould, 1841	native	
51	Aves	Pachycephalidae	Pachycephala occidentalis Ramsay, 1878	native	
52	Aves	Pachycephalidae	Pachycephala rufiventris (Latham, 1802)	native	
53	Aves	Pardalotidae	Pardalotus striatus (Gmelin, 1789) *(Striated Pardalote)*	native	
54	Aves	Petroicidae Mathews, 1920	Drymodes brunneopygia Gould, 1841 *(Southern Scrub-robin)*	native	
55	Aves	Petroicidae Mathews, 1920	Eopsaltria griseogularis Gould, 1838		
56	Aves	Petroicidae Mathews, 1920	Melanodryas cucullata (Latham, 1802)	native	
57	Aves	Petroicidae Mathews, 1920	Microeca fascinans (Latham, 1802) *(Jacky Winter)*	native	
58	Aves	Petroicidae Mathews, 1920	Petroica goodenovii (Vigors & Horsfield, 1827)	native	
59	Aves	Podargidae	Podargus strigoides (Latham, 1802)	native	
60	Aves	Pomatostomidae	Pomatostomus superciliosus (Vigors & Horsfield, 1827) *(White-browed Babbler)*	native	
61	Aves	Psittacidae	Psephotellus varius (Clark & AH, 1910) *(Mulga Parrot)*		
62	Aves	Psittaculidae	Barnardius zonarius (Shaw, 1805)		

63	Aves	Psittaculidae	Parvipsitta porphyrocephala (Dietrichsen, 1837)	native	
64	Aves	Psittaculidae	Polytelis anthopeplus (Lear, 1831) *(Regent Parrot)*	native	
65	Aves	Rallidae	Porzana fluminea Gould, 1843	native	
66	Aves	Recurvirostridae	Cladorhynchus leucocephalus (Vieillot, 1816)	native	
67	Aves	Recurvirostridae	Himantopus himantopus (Linnaeus, 1758)	native	
68	Aves	Rhipiduridae	Rhipidura leucophrys (Latham, 1802) *(Willie Wagtail)*	native	
69	Aves	Turnicidae	Turnix velox (Gould, 1841)	native	
70	Branchiopoda Latreille, 1817	Limnadiidae	Paralimnadia Sars, 1896		
71	Branchiopoda Latreille, 1817	Parartemiidae Daday, 1910	Parartemia Sayce, 1903		
72	Branchiopoda Latreille, 1817	Thamnocephalidae	Branchinella Sayce, 1903		
73	Branchiopoda Latreille, 1817	Triopsidae	Triops		
74	Insecta	Dytiscidae	Allodessus bistrigatus (Clark, 1862)		
75	Insecta	Hydrophilidae Latreille, 1802	Berosus (Berosus) nutans (W. J. Macleay, 1871)		
76	Insecta	Hydrophilidae Latreille, 1802	Enochrus (Methydrus) elongatulus (W. J. Macleay, 1871)		
77	Insecta	Lycaenidae	Jalmenus icilius Hewitson, 1865		
78	Insecta	Pseudococcidae Heymons, 1915	Sphaerococcus Maskell, 1892		
79	Ostracoda	None	Ostracoda		
80	Reptilia	Agamidae	Ctenophorus cristatus (Gray, 1841)	native	
81	Reptilia	Agamidae	Ctenophorus nuchalis (De Vis, 1884)	native	
82	Reptilia	Agamidae	Ctenophorus reticulatus (Gray, 1845)	native	
83	Reptilia	Agamidae	Ctenophorus salinarum (Storr, 1966)	native	
84	Reptilia	Diplodactylidae	Diplodactylus granariensis Storr, 1979	native	
85	Reptilia	Diplodactylidae	Hesperoedura reticulata (Bustard, 1969)	native	
86	Reptilia	Diplodactylidae	Lucasium maini (Kluge, 1962)	native	
87	Reptilia	Gekkonidae	Gehyra purpurascens Storr, 1982	native	
88	Reptilia	Gekkonidae	Gehyra variegata (DumÃ©ril & Bibron, 1836)	native	
89	Reptilia	Gekkonidae	Heteronotia binoei	native	
90	Reptilia	Gekkonidae	Underwoodisaurus milii Bory de Saint-Vincent, 1825	native	
91	Reptilia	Scincidae	Cryptoblepharus buchananii (Gray, 1838)	native	
92	Reptilia	Scincidae	Ctenotus atlas Storr, 1969	native	
93	Reptilia	Scincidae	Ctenotus uber Storr, 1969	native	
94	Reptilia	Scincidae	Ctenotus uber uber Storr, 1969	native	
95	Reptilia	Scincidae	Egernia depressa (GÃ¼nther, 1875)	native	
96	Reptilia	Scincidae	Egernia formosa Fry, 1914	native	
97	Reptilia	Scincidae	Eremiascincus richardsonii (Gray, 1845)	native	
98	Reptilia	Scincidae	Lerista muelleri (Fischer, 1881)	native	
99	Reptilia	Scincidae	Lerista picturata (Fry, 1914)	native	

Plantae

100	Liliopsida	Asparagaceae Juss.	Chamaexeros fimbriata (F.Muell.) Benth.	native	
101	Liliopsida	Asparagaceae Juss.	Chamaexeros macranthera Kuchel	native	
102	Liliopsida	Asparagaceae Juss.	Laxmannia paleacea F.Muell.	native	
103	Liliopsida	Asparagaceae Juss.	Lomandra effusa (Lindl.) Ewart	native	
104	Liliopsida	Asparagaceae Juss.	Thysanotus manglesianus Kunth	native	
105	Liliopsida	Asparagaceae Juss.	Thysanotus patersonii R.Br.	native	
106	Liliopsida	Asparagaceae Juss.	Thysanotus sparteus R.Br.	native	
107	Liliopsida	Asparagaceae Juss.	Thysanotus speckii Brittan	native	
108	Liliopsida	Boryaceae (Baker) M.W.Chase, Rudall & Conran	Borya constricta Churchill	native	
109	Liliopsida	Centrolepidaceae Endl.	Centrolepis humillima Benth.	native	
110	Liliopsida	Cyperaceae Juss.	Lepidosperma Labill.		

111	Liliopsida	Cyperaceae Juss.	Lepidosperma drummondii Benth.	native	
112	Liliopsida	Cyperaceae Juss.	Lepidosperma pruinosum KÃ¼k.	native	
113	Liliopsida	Cyperaceae Juss.	Lepidosperma resinosum (Lehm.) Benth.	native	
114	Liliopsida	Cyperaceae Juss.	Mesomelaena preissii Nees	native	
115	Liliopsida	Cyperaceae Juss.	Schoenus L.		
116	Liliopsida	Cyperaceae Juss.	Schoenus brevisetis (R.Br.) Poir.	native	
117	Liliopsida	Hemerocallidaceae R.Br.	Dianella revoluta R.Br.	native	
118	Liliopsida	Hemerocallidaceae R.Br.	Tricoryne tenella R.Br.	native	
119	Liliopsida	Juncaginaceae Rich.	Triglochin minutissima F.Muell.	native	
120	Liliopsida	Orchidaceae Juss.	Pterostylis pyramidalis Lindl.	native	
121	Liliopsida	Orchidaceae Juss.	Pterostylis sargentii C.R.P.Andrews	native	
122	Liliopsida	Orchidaceae Juss.	Pterostylis tryphera (D.L.Jones & C.J.French) D.L.Jones & C.J.French	native	
123	Liliopsida	Orchidaceae Juss.	Thelymitra campanulata Lindl.	native	
124	Liliopsida	Poaceae Barnhart	Aira caryophyllea L.	alien	
125	Liliopsida	Poaceae Barnhart	Aira cupaniana Guss.	alien	
126	Liliopsida	Poaceae Barnhart	Amphipogon strictus R.Br.	native	
127	Liliopsida	Poaceae Barnhart	Amphipogon turbinatus R.Br.	native	
128	Liliopsida	Poaceae Barnhart	Aristida contorta F.Muell.	native	
129	Liliopsida	Poaceae Barnhart	Austrostipa blackii (C.E.Hubb.) S.W.L.Jacobs & J.Everett	native	
130	Liliopsida	Poaceae Barnhart	Austrostipa elegantissima (Labill.) S.W.L.Jacobs & J.Everett	native	
131	Liliopsida	Poaceae Barnhart	Austrostipa eremophila (Reader) S.W.L.Jacobs & J.Everett	native	
132	Liliopsida	Poaceae Barnhart	Austrostipa nitida (Summerh. & C.E.Hubb.) S.W.L.Jacobs & J.Everett	native	
133	Liliopsida	Poaceae Barnhart	Austrostipa platychaeta (Hughes) S.W.L.Jacobs & J.Everett	native	
134	Liliopsida	Poaceae Barnhart	Austrostipa scabra (Lindl.) S.W.L.Jacobs & J.Everett	native	
135	Liliopsida	Poaceae Barnhart	Austrostipa trichophylla (Benth.) S.W.L.Jacobs & J.Everett	native	
136	Liliopsida	Poaceae Barnhart	Bromus catharticus Vahl	alien	
137	Liliopsida	Poaceae Barnhart	Bromus rubens L.	alien	
138	Liliopsida	Poaceae Barnhart	Eragrostis dielsii Pilg.	native	
139	Liliopsida	Poaceae Barnhart	Eragrostis pergracilis S.T.Blake	native	
140	Liliopsida	Poaceae Barnhart	Neurachne alopecuroidea R.Br.	native	
141	Liliopsida	Poaceae Barnhart	Pentameris airoides Nees	alien	
142	Liliopsida	Poaceae Barnhart	Pentameris airoides Nees subsp. airoides	alien	
143	Liliopsida	Poaceae Barnhart	Rostraria cristata (L.) Tzvelev	alien	
144	Liliopsida	Poaceae Barnhart	Rytidosperma caespitosum (Gaudich.) Connor & Edgar	native	
145	Liliopsida	Poaceae Barnhart	Triodia scariosa N.T.Burb.	native	
146	Liliopsida	Poaceae Barnhart	Vulpia myuros (L.) C.C.Gmel.	alien	
147	Liliopsida	Restionaceae R.Br.	Desmocladus Nees		
148	Liliopsida	Restionaceae R.Br.	Lepidobolus preissianus Nees	native	
149	Liliopsida	Xanthorrhoeaceae Dumort.	Xanthorrhoea thorntonii Tate	native	
150	Magnoliopsida	Aizoaceae Martinov	Disphyma crassifolium (L.) L.Bolus	native	
151	Magnoliopsida	Aizoaceae Martinov	Sarcozona praecox (F.Muell.) S.T.Blake	native	
152	Magnoliopsida	Amaranthaceae Juss.	Ptilotus exaltatus Nees	native	
153	Magnoliopsida	Amaranthaceae Juss.	Ptilotus gaudichaudii (Steud.) J.M.Black	native	
154	Magnoliopsida	Amaranthaceae Juss.	Ptilotus gaudichaudii var. parviflorus (Benth.) Benl	native	
155	Magnoliopsida	Amaranthaceae Juss.	Ptilotus holosericeus (Moq.) F.Muell.	native	
156	Magnoliopsida	Amaranthaceae Juss.	Ptilotus obovatus (Gaudich.) F.Muell.	native	
157	Magnoliopsida	Amaranthaceae Juss.	Ptilotus obovatus (Gaudich.) F.Muell. var. obovatus	native	
158	Magnoliopsida	Amaranthaceae Juss.	Ptilotus spathulatus (R.Br.) Poir.	native	
159	Magnoliopsida	Apiaceae Lindl.	Daucus glochidiatus (Labill.) Fisch., C.A.Mey. & Ave-Lall.	native	

160	Magnoliopsida	Apiaceae Lindl.	Platysace effusa (Turcz.) C.Norman	native	
161	Magnoliopsida	Apocynaceae Juss.	Alyxia buxifolia R.Br.	native	
162	Magnoliopsida	Apocynaceae Juss.	Leichhardtia australis R.Br.	native	
163	Magnoliopsida	Araliaceae Juss.	Trachymene ornata (Endl.) Druce	native	
164	Magnoliopsida	Asteraceae Bercht. & J.Presl	Actinobole uliginosum (A.Gray) H.Eichler	native	
165	Magnoliopsida	Asteraceae Bercht. & J.Presl	Asteridea athrixioides (Sond. & F.Muell.) Kroner	native	
166	Magnoliopsida	Asteraceae Bercht. & J.Presl	Brachyscome ciliaris (Labill.) Less.	native	
167	Magnoliopsida	Asteraceae Bercht. & J.Presl	Brachyscome iberidifolia Benth.	native	
168	Magnoliopsida	Asteraceae Bercht. & J.Presl	Brachyscome lineariloba (DC.) Druce	native	
169	Magnoliopsida	Asteraceae Bercht. & J.Presl	Calotis hispidula (F.Muell.) F.Muell.	native	
170	Magnoliopsida	Asteraceae Bercht. & J.Presl	Cephalipterum drummondii A.Gray	native	
171	Magnoliopsida	Asteraceae Bercht. & J.Presl	Chondropyxis halophila D.A.Cooke	native	
172	Magnoliopsida	Asteraceae Bercht. & J.Presl	Chrysocephalum puteale (S.Moore) Paul G.Wilson	native	
173	Magnoliopsida	Asteraceae Bercht. & J.Presl	Chthonocephalus pseudevax Steetz	native	
174	Magnoliopsida	Asteraceae Bercht. & J.Presl	Hyalosperma demissum (A.Gray) Paul G.Wilson	native	
175	Magnoliopsida	Asteraceae Bercht. & J.Presl	Isoetopsis graminifolia Turcz.	native	
176	Magnoliopsida	Asteraceae Bercht. & J.Presl	Kippistia suaedifolia F.Muell.	native	
177	Magnoliopsida	Asteraceae Bercht. & J.Presl	Millotia myosotidifolia (Benth.) Steetz	native	
178	Magnoliopsida	Asteraceae Bercht. & J.Presl	Millotia tenuifolia Cass.	native	
179	Magnoliopsida	Asteraceae Bercht. & J.Presl	Olearia Moench		
180	Magnoliopsida	Asteraceae Bercht. & J.Presl	Olearia exiguifolia (F.Muell.) Benth.	native	
181	Magnoliopsida	Asteraceae Bercht. & J.Presl	Olearia muelleri (Sond.) Benth.	native	
182	Magnoliopsida	Asteraceae Bercht. & J.Presl	Olearia pimeleoides (DC.) Benth.	native	
183	Magnoliopsida	Asteraceae Bercht. & J.Presl	Panaetia lessonii Cass.	native	
184	Magnoliopsida	Asteraceae Bercht. & J.Presl	Panaetia tepperi (F.Muell.) Jeanes	native	
185	Magnoliopsida	Asteraceae Bercht. & J.Presl	Podolepis canescens DC.	native	
186	Magnoliopsida	Asteraceae Bercht. & J.Presl	Podotheca gnaphalioides Graham	native	
187	Magnoliopsida	Asteraceae Bercht. & J.Presl	Pogonolepis muelleriana (Sond.) P.S.Short	native	
188	Magnoliopsida	Asteraceae Bercht. & J.Presl	Pogonolepis stricta Steetz	native	
189	Magnoliopsida	Asteraceae Bercht. & J.Presl	Rhodanthe Lindl.		
190	Magnoliopsida	Asteraceae Bercht. & J.Presl	Rhodanthe oppositifolia (S.Moore) Paul G.Wilson subsp. oppositifolia	native	
191	Magnoliopsida	Asteraceae Bercht. & J.Presl	Schoenia cassiniana (Gaudich.) Steetz	native	
192	Magnoliopsida	Asteraceae Bercht. & J.Presl	Senecio glossanthus (Sond.) Belcher	native	
193	Magnoliopsida	Asteraceae Bercht. & J.Presl	Senecio lautus Willd.	uncertain	
194	Magnoliopsida	Asteraceae Bercht. & J.Presl	Podolepis capillaris	native	
195	Magnoliopsida	Asteraceae Bercht. & J.Presl	Siloxerus pygmaeus (A.Gray) P.S.Short	native	
196	Magnoliopsida	Asteraceae Bercht. & J.Presl	Sonchus oleraceus L.	alien	
197	Magnoliopsida	Asteraceae Bercht. & J.Presl	Streptoglossa liatroides (Turcz.) Dunlop	native	
198	Magnoliopsida	Asteraceae Bercht. & J.Presl	Triptilodiscus pygmaeus Turcz.	native	
199	Magnoliopsida	Asteraceae Bercht. & J.Presl	Vittadinia A.Rich.		
200	Magnoliopsida	Asteraceae Bercht. & J.Presl	Waitzia acuminata Steetz	native	
201	Magnoliopsida	Asteraceae Bercht. & J.Presl	Waitzia fitzgibbonii (F.Muell.) X.A.Weber & Schmidt-Leb.	native	
202	Magnoliopsida	Boraginaceae Juss.	Halgania andromedifolia Behr & F.Muell.	native	
203	Magnoliopsida	Boraginaceae Juss.	Halgania integerrima Endl.	native	
204	Magnoliopsida	Brassicaceae Burnett	Carrichtera annua (L.) DC.	alien	
205	Magnoliopsida	Brassicaceae Burnett	Menkea australis Lehm.	native	
206	Magnoliopsida	Brassicaceae Burnett	Stenopetalum filifolium Benth.	native	
207	Magnoliopsida	Brassicaceae Burnett	Stenopetalum lineare DC.	native	
208	Magnoliopsida	Campanulaceae Juss.	Wahlenbergia gracilenta Lothian	native	
209	Magnoliopsida	Campanulaceae Juss.	Wahlenbergia gracilis (G.Forst.) A.DC.	native	
210	Magnoliopsida	Casuarinaceae R.Br.	Allocasuarina L.A.S.Johnson		
211	Magnoliopsida	Casuarinaceae R.Br.	Allocasuarina acutivalvis (F.Muell.) L.A.S.Johnson	native	
212	Magnoliopsida	Casuarinaceae R.Br.	Allocasuarina campestris (Diels) L.A.S.Johnson	native	

213	Magnoliopsida	Casuarinaceae R.Br.	Allocasuarina corniculata (F.Muell.) L.A.S.Johnson	native	
214	Magnoliopsida	Casuarinaceae R.Br.	Allocasuarina helmsii (Ewart & M.Gordon) L.A.S.Johnson	native	
215	Magnoliopsida	Casuarinaceae R.Br.	Allocasuarina huegeliana (Miq.) L.A.S.Johnson	mixed	
216	Magnoliopsida	Casuarinaceae R.Br.	Allocasuarina microstachya (Miq.) L.A.S.Johnson	native	
217	Magnoliopsida	Casuarinaceae R.Br.	Casuarina pauper L.A.S.Johnson	native	
218	Magnoliopsida	Chenopodiaceae Vent.	Atriplex L.		
219	Magnoliopsida	Chenopodiaceae Vent.	Atriplex nana Parr-Sm.	native	
220	Magnoliopsida	Chenopodiaceae Vent.	Atriplex nummularia subsp. spathulata Aellen	native	
221	Magnoliopsida	Chenopodiaceae Vent.	Atriplex vesicaria Benth.	native	
222	Magnoliopsida	Chenopodiaceae Vent.	Chenopodium curvispicatum Paul G.Wilson	native	
223	Magnoliopsida	Chenopodiaceae Vent.	Enchylaena tomentosa R.Br.	native	
224	Magnoliopsida	Chenopodiaceae Vent.	Eriochiton sclerolaenoides (F.Muell.) A.J.Scott	native	
225	Magnoliopsida	Chenopodiaceae Vent.	Maireana carnosa (Moq.) Paul G.Wilson	native	
226	Magnoliopsida	Chenopodiaceae Vent.	Maireana georgei (Diels) Paul G.Wilson	native	
227	Magnoliopsida	Chenopodiaceae Vent.	Maireana glomerifolia (F.Muell. & Tate) Paul G.Wilson	native	
228	Magnoliopsida	Chenopodiaceae Vent.	Maireana pentatropis (Tate) Paul G.Wilson	native	
229	Magnoliopsida	Chenopodiaceae Vent.	Maireana sedifolia (F.Muell.) Paul G.Wilson	native	
230	Magnoliopsida	Chenopodiaceae Vent.	Maireana tomentosa Moq. subsp. tomentosa	native	
231	Magnoliopsida	Chenopodiaceae Vent.	Maireana trichoptera (J.M.Black) Paul G.Wilson	native	
232	Magnoliopsida	Chenopodiaceae Vent.	Rhagodia drummondii Moq.	native	
233	Magnoliopsida	Chenopodiaceae Vent.	Rhagodia preissii Moq. subsp. preissii	native	
234	Magnoliopsida	Chenopodiaceae Vent.	Sclerolaena diacantha (Nees) Benth.	native	
235	Magnoliopsida	Chenopodiaceae Vent.	Sclerolaena drummondii (Benth.) Domin	native	
236	Magnoliopsida	Chenopodiaceae Vent.	Sclerolaena eurotioides (F.Muell.) A.J.Scott	native	
237	Magnoliopsida	Chenopodiaceae Vent.	Sclerolaena fusiformis Paul G.Wilson	native	
238	Magnoliopsida	Chenopodiaceae Vent.	Sclerolaena obliquicuspis (R.H.Anderson) Ulbr.	native	
239	Magnoliopsida	Chenopodiaceae Vent.	Sclerolaena patenticuspis (R.H.Anderson) Ulbr.	native	
240	Magnoliopsida	Chenopodiaceae Vent.	Tecticornia halocnemoides (Nees) K.A.Sheph. & Paul G.Wilson	native	
241	Magnoliopsida	Chenopodiaceae Vent.	Tecticornia syncarpa (Paul G.Wilson) K.A.Sheph. & Paul G.Wilson	native	
242	Magnoliopsida	Chenopodiaceae Vent.	Tecticornia undulata (Paul G.Wilson) K.A.Sheph. & Paul G.Wilson	native	
243	Magnoliopsida	Crassulaceae J.St.-Hil.	Crassula colorata (Nees) Ostenf.	native	
244	Magnoliopsida	Crassulaceae J.St.-Hil.	Crassula colorata (Nees) Ostenf. var. colorata	native	
245	Magnoliopsida	Crassulaceae J.St.-Hil.	Crassula colorata var. acuminata (Reader) Toelken	native	
246	Magnoliopsida	Crassulaceae J.St.-Hil.	Crassula exserta (Reader) Ostenf.	native	
247	Magnoliopsida	Crassulaceae J.St.-Hil.	Crassula tetramera (Toelken) A.P.Druce & Sykes	native	
248	Magnoliopsida	Dilleniaceae Salisb.	Hibbertia Andrews		
249	Magnoliopsida	Dilleniaceae Salisb.	Hibbertia exasperata (Steud.) Briq.	native	
250	Magnoliopsida	Droseraceae Salisb.	Drosera andersoniana Ewart & Jean White	native	
251	Magnoliopsida	Droseraceae Salisb.	Drosera menziesii DC.	native	
252	Magnoliopsida	Droseraceae Salisb.	Drosera moorei (Diels) Lowrie	native	
253	Magnoliopsida	Droseraceae Salisb.	Drosera neesii Lehm.	native	
254	Magnoliopsida	Elaeocarpaceae Juss.	Tetratheca efoliata F.Muell.	native	
255	Magnoliopsida	Elaeocarpaceae Juss.	Tetratheca spenceri R.Butcher & Cockerton	native	VU
256	Magnoliopsida	Ericaceae Juss.	Conostephium drummondii (Stschegl.) C.A.Gardner	native	
257	Magnoliopsida	Ericaceae Juss.	Leucopogon R.Br.		
258	Magnoliopsida	Ericaceae Juss.	Lysinema ciliatum R.Br.	native	
259	Magnoliopsida	Ericaceae Juss.	Styphelia coelophylla (DC.) Hislop, Crayn & Puente-Lel.	native	
260	Magnoliopsida	Ericaceae Juss.	Styphelia serratifolia (DC.) Hislop, Crayn & Puente-Lel.	native	
261	Magnoliopsida	Euphorbiaceae Juss.	Beyeria lechenaultii (DC.) Baill.	native	
262	Magnoliopsida	Euphorbiaceae Juss.	Monotaxis grandiflora Endl.	native	
263	Magnoliopsida	Euphorbiaceae Juss.	Ricinocarpos stylosus Diels	native	

264	Magnoliopsida	Fabaceae Lindl.	Acacia sp.		
265	Magnoliopsida	Fabaceae Lindl.	Acacia acuminata Benth.	mixed	
266	Magnoliopsida	Fabaceae Lindl.	Acacia andrewsii W.Fitzg.	native	
267	Magnoliopsida	Fabaceae Lindl.	Acacia burkittii Benth.	native	
268	Magnoliopsida	Fabaceae Lindl.	Acacia collegialis Maslin	native	
269	Magnoliopsida	Fabaceae Lindl.	Acacia consanguinea R.S.Cowan & Maslin	native	
270	Magnoliopsida	Fabaceae Lindl.	Acacia enervia Maiden & Blakely	native	
271	Magnoliopsida	Fabaceae Lindl.	Acacia epedunculata R.S.Cowan & Maslin	native	P1
272	Magnoliopsida	Fabaceae Lindl.	Acacia erinacea Benth.	native	
273	Magnoliopsida	Fabaceae Lindl.	Acacia fragilis Maiden & Blakely	native	
274	Magnoliopsida	Fabaceae Lindl.	Acacia hemiteles Benth.	native	
275	Magnoliopsida	Fabaceae Lindl.	Acacia heterochroa Maslin	native	
276	Magnoliopsida	Fabaceae Lindl.	Acacia heteroneura var. jutsonii (Maiden) R.S.Cowan & Maslin	native	
277	Magnoliopsida	Fabaceae Lindl.	Acacia inaequiloba W.Fitzg.	native	
278	Magnoliopsida	Fabaceae Lindl.	Acacia jennerae Maiden	native	
279	Magnoliopsida	Fabaceae Lindl.	Acacia lasiocalyx C.R.P.Andrews	mixed	
280	Magnoliopsida	Fabaceae Lindl.	Acacia ligulata Benth.	native	
281	Magnoliopsida	Fabaceae Lindl.	Acacia nigripilosa Maiden	native	
282	Magnoliopsida	Fabaceae Lindl.	Acacia nyssophylla F.Muell.	native	
283	Magnoliopsida	Fabaceae Lindl.	Acacia pachypoda Maslin	native	
284	Magnoliopsida	Fabaceae Lindl.	Acacia resinistipulea W.Fitzg.	native	
285	Magnoliopsida	Fabaceae Lindl.	Acacia tetragonophylla F.Muell.	native	
286	Magnoliopsida	Fabaceae Lindl.	Acacia uncinella Benth.	native	
287	Magnoliopsida	Fabaceae Lindl.	Acacia yorkrakinensis subsp. acrita R.S.Cowan & Maslin	native	
288	Magnoliopsida	Fabaceae Lindl.	Bossiaea spinescens Meisn.	native	
289	Magnoliopsida	Fabaceae Lindl.	Daviesia benthamii Meisn.	native	
290	Magnoliopsida	Fabaceae Lindl.	Daviesia incrassata Sm.	native	
291	Magnoliopsida	Fabaceae Lindl.	Daviesia pachyloma Turcz.	native	
292	Magnoliopsida	Fabaceae Lindl.	Eutaxia R.Br.		
293	Magnoliopsida	Fabaceae Lindl.	Gastrolobium graniticum (S.Moore) Crisp	native	EN
294	Magnoliopsida	Fabaceae Lindl.	Jacksonia racemosa Meisn.	native	
295	Magnoliopsida	Fabaceae Lindl.	Leptosema daviesioides (Turcz.) Crisp	native	
296	Magnoliopsida	Fabaceae Lindl.	Medicago minima (L.) Bartal.	alien	
297	Magnoliopsida	Fabaceae Lindl.	Mirbelia microphylla (Turcz.) Benth.	native	
298	Magnoliopsida	Fabaceae Lindl.	Mirbelia spinosa Benth.	native	
299	Magnoliopsida	Fabaceae Lindl.	Senna artemisioides subsp. filifolia Randell	native	
300	Magnoliopsida	Fabaceae Lindl.	Senna artemisioides subsp. x artemisioides	native	
301	Magnoliopsida	Fabaceae Lindl.	Senna artemisioides subsp. x coriacea (Benth.) Randell	native	
302	Magnoliopsida	Fabaceae Lindl.	Swainsona colutoides F.Muell.	native	
303	Magnoliopsida	Fabaceae Lindl.	Templetonia aculeata (F.Muell.) Benth.	native	
304	Magnoliopsida	Fabaceae Lindl.	Urodon capitatus Turcz.	native	P3
305	Magnoliopsida	Frankeniaceae Desv.	Frankenia densa Summerh.	native	
306	Magnoliopsida	Geraniaceae Juss.	Erodium cygnorum Nees	native	
307	Magnoliopsida	Goodeniaceae R.Br.	Goodenia havilandii Maiden & Betche	native	
308	Magnoliopsida	Goodeniaceae R.Br.	Goodenia occidentalis Carolin	native	
309	Magnoliopsida	Goodeniaceae R.Br.	Goodenia rosea (S.Moore) K.A.Sheph.	native	
310	Magnoliopsida	Goodeniaceae R.Br.	Scaevola spinescens R.Br.	native	
311	Magnoliopsida	Haloragaceae R.Br.	Glischrocaryon angustifolium (Nees) M.L.Moody & Les	native	
312	Magnoliopsida	Haloragaceae R.Br.	Haloragis trigonocarpa F.Muell.	native	
313	Magnoliopsida	Lamiaceae Martinov	Brachysola halganiacea (F.Muell.) Rye	native	P2
314	Magnoliopsida	Lamiaceae Martinov	Pityrodia hemigenioides (F.Muell.) Benth.	native	
315	Magnoliopsida	Lamiaceae Martinov	Pityrodia lepidota (F.Muell.) E.Pritz.	native	
316	Magnoliopsida	Lamiaceae Martinov	Prostanthera althoferi B.J.Conn subsp. althoferi	native	

317	Magnoliopsida	Lamiaceae Martinov	Prostanthera incurvata B.J.Conn	native	
318	Magnoliopsida	Lamiaceae Martinov	Westringia rigida R.Br.	native	
319	Magnoliopsida	Lauraceae Juss.	Cassytha glabella R.Br.	native	
320	Magnoliopsida	Lauraceae Juss.	Cassytha melantha R.Br.	native	
321	Magnoliopsida	Loganiaceae Mart.	Orianthera tortuosa (D.A.Herb.) C.S.P.Foster & B.J.Conn	native	
322	Magnoliopsida	Loranthaceae Juss.	Amyema miquelii (Miq.) Tiegh.	native	
323	Magnoliopsida	Malvaceae Juss.	Sida calyxhymenia DC.	native	
324	Magnoliopsida	Malvaceae Juss.	Sida spodochroma F.Muell.	native	
325	Magnoliopsida	Montiaceae Raf.	Calandrinia baccata Obbens	native	
326	Magnoliopsida	Montiaceae Raf.	Calandrinia calyptrata Hook.f.	native	
327	Magnoliopsida	Montiaceae Raf.	Calandrinia eremaea Ewart	native	
328	Magnoliopsida	Montiaceae Raf.	Calandrinia granulifera Benth.	native	
329	Magnoliopsida	Myrtaceae Juss.	Apectospermum spinescens (Endl.) Peter G.Wilson	native	
330	Magnoliopsida	Myrtaceae Juss.	Balaustion pulcherrimum Hook.	native	
331	Magnoliopsida	Myrtaceae Juss.	Beaufortia R.Br.		
332	Magnoliopsida	Myrtaceae Juss.	Beaufortia micrantha Schauer	native	
333	Magnoliopsida	Myrtaceae Juss.	Calothamnus gilesii F.Muell.	native	
334	Magnoliopsida	Myrtaceae Juss.	Calytrix birdii (F.Muell.) B.D.Jacks.	native	
335	Magnoliopsida	Myrtaceae Juss.	Calytrix duplistipulata Craven	native	
336	Magnoliopsida	Myrtaceae Juss.	Cyathostemon heterantherus (C.A.Gardner) Rye & Trudgen	native	
337	Magnoliopsida	Myrtaceae Juss.	Eremaea pauciflora (Endl.) Druce	native	
338	Magnoliopsida	Myrtaceae Juss.	Eucalyptus campaspe S.Moore	native	
339	Magnoliopsida	Myrtaceae Juss.	Eucalyptus celastroides Turcz.	native	
340	Magnoliopsida	Myrtaceae Juss.	Eucalyptus clelandiorum (Maiden) Maiden	native	
341	Magnoliopsida	Myrtaceae Juss.	Eucalyptus corrugata Luehm.	native	
342	Magnoliopsida	Myrtaceae Juss.	Eucalyptus eremophila (Diels) Maiden subsp. eremophila	native	
343	Magnoliopsida	Myrtaceae Juss.	Eucalyptus flocktoniae (Maiden) Maiden	native	
344	Magnoliopsida	Myrtaceae Juss.	Eucalyptus foecunda Schauer	native	
345	Magnoliopsida	Myrtaceae Juss.	Eucalyptus gracilis F.Muell.	native	
346	Magnoliopsida	Myrtaceae Juss.	Eucalyptus griffithsii Maiden	native	
347	Magnoliopsida	Myrtaceae Juss.	Eucalyptus horistes L.A.S.Johnson & K.D.Hill	native	
348	Magnoliopsida	Myrtaceae Juss.	Eucalyptus leptopoda Benth.	native	
349	Magnoliopsida	Myrtaceae Juss.	Eucalyptus lesouefii Maiden	native	
350	Magnoliopsida	Myrtaceae Juss.	Eucalyptus loxophleba Benth.	native	
351	Magnoliopsida	Myrtaceae Juss.	Eucalyptus occidentalis Endl.	native	
352	Magnoliopsida	Myrtaceae Juss.	Eucalyptus oleosa Miq. subsp. oleosa	native	
353	Magnoliopsida	Myrtaceae Juss.	Eucalyptus pileata Blakely	native	
354	Magnoliopsida	Myrtaceae Juss.	Eucalyptus platycorys Maiden & Blakely	native	
355	Magnoliopsida	Myrtaceae Juss.	Eucalyptus salmonophloia F.Muell.	native	
356	Magnoliopsida	Myrtaceae Juss.	Eucalyptus salubris F.Muell.	native	
357	Magnoliopsida	Myrtaceae Juss.	Eucalyptus torquata Luehm.	native	
358	Magnoliopsida	Myrtaceae Juss.	Euryomyrtus maidenii (Ewart & Jean White) Trudgen	native	
359	Magnoliopsida	Myrtaceae Juss.	Kunzea pulchella (Lindl.) A.S.George	native	
360	Magnoliopsida	Myrtaceae Juss.	Leptospermopsis roei (Benth.) Peter G.Wilson	native	
361	Magnoliopsida	Myrtaceae Juss.	Melaleuca L.		
362	Magnoliopsida	Myrtaceae Juss.	Melaleuca acuminata F.Muell.	native	
363	Magnoliopsida	Myrtaceae Juss.	Melaleuca cordata Turcz.	native	
364	Magnoliopsida	Myrtaceae Juss.	Melaleuca pauperiflora F.Muell.	native	
365	Magnoliopsida	Myrtaceae Juss.	Melaleuca scabra R.Br.	native	
366	Magnoliopsida	Myrtaceae Juss.	Melaleuca uncinata R.Br.	native	
367	Magnoliopsida	Myrtaceae Juss.	Micromyrtus obovata (Turcz.) J.W.Green	native	
368	Magnoliopsida	Myrtaceae Juss.	Rinzia crassifolia Turcz.	native	

369	Magnoliopsida	Myrtaceae Juss.	Tetrapora preissiana Schauer	native	
370	Magnoliopsida	Myrtaceae Juss.	Thryptomene kochii E.Pritz.	native	
371	Magnoliopsida	Myrtaceae Juss.	Verticordia acerosa var. preissii (Schauer) A.S.George	native	
372	Magnoliopsida	Myrtaceae Juss.	Verticordia drummondii Schauer	native	
373	Magnoliopsida	Myrtaceae Juss.	Verticordia insignis Endl.	native	
374	Magnoliopsida	Myrtaceae Juss.	Verticordia plumosa var. incrassata A.S.George	native	
375	Magnoliopsida	Myrtaceae Juss.	Verticordia roei Endl.	native	
376	Magnoliopsida	Pittosporaceae R.Br.	Pittosporum angustifolium Lodd., G.Lodd. & W.Lodd.	mixed	
377	Magnoliopsida	Plantaginaceae Juss.	Plantago drummondii Decne.	native	
378	Magnoliopsida	Polygalaceae Hoffmanns. & Link	Comesperma scoparium J.Drumm.	native	
379	Magnoliopsida	Proteaceae Juss.	Banksia audax C.A.Gardner	native	
380	Magnoliopsida	Proteaceae Juss.	Banksia elderiana F.Muell. & Tate *(Swordfish Banksia)*	native	
381	Magnoliopsida	Proteaceae Juss.	Conospermum brownii Meisn.	native	
382	Magnoliopsida	Proteaceae Juss.	Conospermum stoechadis Endl.	native	
383	Magnoliopsida	Proteaceae Juss.	Grevillea acuaria Benth.	native	
384	Magnoliopsida	Proteaceae Juss.	Grevillea didymobotrya Meisn.	native	
385	Magnoliopsida	Proteaceae Juss.	Grevillea excelsior Diels	native	
386	Magnoliopsida	Proteaceae Juss.	Grevillea hookeriana Meisn.	native	
387	Magnoliopsida	Proteaceae Juss.	Grevillea integrifolia (Endl.) Meisn.	native	
388	Magnoliopsida	Proteaceae Juss.	Grevillea nematophylla F.Muell.	native	
389	Magnoliopsida	Proteaceae Juss.	Grevillea nematophylla F.Muell. subsp. nematophylla	native	
390	Magnoliopsida	Proteaceae Juss.	Grevillea oncogyne Diels	native	
391	Magnoliopsida	Proteaceae Juss.	Hakea erecta Lamont	native	
392	Magnoliopsida	Proteaceae Juss.	Hakea multilineata Meisn.	mixed	
393	Magnoliopsida	Proteaceae Juss.	Hakea rigida Haegi	native	P2
394	Magnoliopsida	Proteaceae Juss.	Isopogon scabriusculus Meisn.	native	
395	Magnoliopsida	Proteaceae Juss.	Persoonia saundersiana Meisn.	native	
396	Magnoliopsida	Proteaceae Juss.	Persoonia sulcata Meisn.	native	P4
397	Magnoliopsida	Proteaceae Juss.	Persoonia trinervis Meisn.	native	
398	Magnoliopsida	Proteaceae Juss.	Petrophile Knight		
399	Magnoliopsida	Proteaceae Juss.	Petrophile ericifolia R.Br.	native	
400	Magnoliopsida	Proteaceae Juss.	Petrophile ericifolia R.Br. subsp. ericifolia	native	
401	Magnoliopsida	Proteaceae Juss.	Synaphea polymorpha R.Br.	native	
402	Magnoliopsida	Rhamnaceae Juss.	Cryptandra Sm.		
403	Magnoliopsida	Rhamnaceae Juss.	Cryptandra glabriflora Benth.	native	P2
404	Magnoliopsida	Rhamnaceae Juss.	Cryptandra minutifolia Rye	native	
405	Magnoliopsida	Rhamnaceae Juss.	Pomaderris forrestiana F.Muell.	native	
406	Magnoliopsida	Rhamnaceae Juss.	Trymalium myrtillus S.Moore subsp. myrtillus	native	
407	Magnoliopsida	Rubiaceae Juss.	Opercularia vaginata Juss.	native	
408	Magnoliopsida	Rutaceae Juss.	Cyanothamnus coerulescens (F.Muell.) Duretto & Heslewood	native	
409	Magnoliopsida	Rutaceae Juss.	Phebalium canaliculatum (F.Muell. & Tate) J.H.Willis	native	
410	Magnoliopsida	Rutaceae Juss.	Phebalium filifolium Turcz.	native	
411	Magnoliopsida	Santalaceae R.Br.	Exocarpos aphyllus R.Br.	native	
412	Magnoliopsida	Santalaceae R.Br.	Leptomeria preissiana (Miq.) A.DC.	native	
413	Magnoliopsida	Santalaceae R.Br.	Santalum acuminatum (R.Br.) A.DC.	native	
414	Magnoliopsida	Santalaceae R.Br.	Santalum spicatum (R.Br.) A.DC.	native	
415	Magnoliopsida	Sapindaceae Juss.	Dodonaea Mill.		
416	Magnoliopsida	Sapindaceae Juss.	Dodonaea amblyophylla Diels	native	
417	Magnoliopsida	Sapindaceae Juss.	Dodonaea caespitosa Diels	native	
418	Magnoliopsida	Sapindaceae Juss.	Dodonaea lobulata F.Muell.	native	
419	Magnoliopsida	Sapindaceae Juss.	Dodonaea microzyga var. acrolobata J.G.West	native	
420	Magnoliopsida	Sapindaceae Juss.	Dodonaea stenozyga F.Muell.	native	
421	Magnoliopsida	Scrophulariaceae Juss.	Eremophila R.Br.		
422	Magnoliopsida	Scrophulariaceae Juss.	Eremophila alternifolia R.Br.	native	

423	Magnoliopsida	Scrophulariaceae Juss.	Eremophila caerulea (S.Moore) Diels subsp. caerulea	native	
424	Magnoliopsida	Scrophulariaceae Juss.	Eremophila clarkei A.F.Oldfield & F.Muell.	native	
425	Magnoliopsida	Scrophulariaceae Juss.	Eremophila clavata Chinnock	native	
426	Magnoliopsida	Scrophulariaceae Juss.	Eremophila decipiens Ostenf.	native	
427	Magnoliopsida	Scrophulariaceae Juss.	Eremophila glabra (R.Br.) Ostenf. subsp. glabra	native	
428	Magnoliopsida	Scrophulariaceae Juss.	Eremophila interstans (S.Moore) Diels subsp. interstans	native	
429	Magnoliopsida	Scrophulariaceae Juss.	Eremophila ionantha Diels	native	
430	Magnoliopsida	Scrophulariaceae Juss.	Eremophila oldfieldii subsp. angustifolia (S.Moore) Chinnock	native	
431	Magnoliopsida	Scrophulariaceae Juss.	Eremophila oppositifolia subsp. angustifolia (S.Moore) Chinnock	native	
432	Magnoliopsida	Scrophulariaceae Juss.	Eremophila parvifolia subsp. auricampi Chinnock	native	
433	Magnoliopsida	Scrophulariaceae Juss.	Eremophila psilocalyx F.Muell.	native	
434	Magnoliopsida	Scrophulariaceae Juss.	Eremophila rugosa Chinnock	native	
435	Magnoliopsida	Scrophulariaceae Juss.	Eremophila scoparia (R.Br.) F.Muell.	native	
436	Magnoliopsida	Solanaceae Juss.	Solanum ellipticum R.Br.	alien	
437	Magnoliopsida	Solanaceae Juss.	Solanum hystrix R.Br.	alien	
438	Magnoliopsida	Solanaceae Juss.	Solanum lasiophyllum Poir.	mixed	
439	Magnoliopsida	Solanaceae Juss.	Solanum nummularium S.Moore	native	
440	Magnoliopsida	Stylidiaceae R.Br.	Levenhookia leptantha Benth.	native	
441	Magnoliopsida	Stylidiaceae R.Br.	Stylidium adpressum Benth.	native	
442	Magnoliopsida	Stylidiaceae R.Br.	Stylidium arenicola Carlquist	native	
443	Magnoliopsida	Stylidiaceae R.Br.	Stylidium choreanthum F.L.Erickson & J.H.Willis	native	P3
444	Magnoliopsida	Stylidiaceae R.Br.	Stylidium piliferum R.Br.	native	
445	Magnoliopsida	Violaceae Batsch	Pigea curvifolia (E.M.Benn.) P.I.Forst.	native	
446	Magnoliopsida	Zygophyllaceae R.Br.	Roepera apiculata (F.Muell.) Beier & Thulin	native	
447	Magnoliopsida	Zygophyllaceae R.Br.	Roepera compressa (J.M.Black) Beier & Thulin	native	
448	Magnoliopsida	Zygophyllaceae R.Br.	Roepera eremaea (Diels) Beier & Thulin	native	
449	Magnoliopsida	Zygophyllaceae R.Br.	Roepera glauca (F.Muell.) Beier & Thulin	native	
450	Magnoliopsida	Zygophyllaceae R.Br.	Roepera ovata (Ewart & Jean White) Beier & Thulin	native	
451	Magnoliopsida	Zygophyllaceae R.Br.	Roepera reticulata (R.M.Barker) Beier & Thulin	native	
452	Pinopsida	Cupressaceae Gray	Callitris verrucosa (Endl.) F.Muell.	mixed	
453	Pteridopsida	Pteridaceae E.D.M.Kirchn.	Cheilanthes sieberi Kunze subsp. sieberi	native	

Conservation status definitions

Threatened species

- CR – Critically Endangered
- EN – Endangered
- VU – Vulnerable
- EX – Extinct
- EW – Extinct in the Wild
- CD – Species of special conservation interest (conservation dependent)
- OS – Species otherwise in need of special protection (other specially protected)
- MI – Migratory
- SP – Specially protected species

Priority species

- P1 – Priority 1: Poorly-known species – known from few locations, none on conservation lands
- P2 – Priority 2: Poorly-known species – known from few locations, some on conservation lands
- P3 – Priority 3: Poorly-known species – known from several locations
- P4 – Priority 4: Rare, Near Threatened and other species in need of monitoring

Dandjoo specific codes

- Parent of conservation listed taxa
- Cons code inherited from parent, X

Read full definitions at https://bio.wa.gov.au/guide/conservation-status-definitions

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Further note, precise locations of conservation listed species are considered sensitive. To protect this information, obfuscation has been applied to conservation-listed species records. For these species, the true location is ±10km from the search area used to generate this species list.

APPENDIX C - EPBC PROTECTED MATTERS SEARCH REPORT

Australian Government

Department of Climate Change, Energy, the Environment and Water

EPBC Act Protected Matters Report

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. Please see the caveat for interpretation of information provided here.

Report created: 18-Jun-2025

Summary

Details

- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat

Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	13
Listed Migratory Species:	7

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	2
Commonwealth Heritage Places:	None
Listed Marine Species:	11
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	10
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	5
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

National Heritage Places			[Resource Information]
Name	State	Legal Status	Buffer Status
Historic			
Goldfields Water Supply Scheme, Western Australia	WA	Listed place	In buffer area only

Listed Threatened Species			[Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Aphelocephala leucopsis			
Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Falco hypoleucos			
Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Leipoa ocellata			
Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area	In feature area
Pezoporus occidentalis			
Night Parrot [59350]	Endangered	Species or species habitat may occur within area	In feature area
Tringa nebularia			
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
INSECT			
Ogyris petrina listed as Ogyris subterrestris petrina			
Arid Bronze Azure [94250]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
MAMMAL			
Dasyurus geoffroii			
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area	In buffer area only
PLANT			
Calectasia pignattiana			
Stilted Tinsel Lily [82018]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Gastrolobium graniticum			
Granite Poison [14872]	Endangered	Species or species habitat known to occur within area	In feature area
Ricinocarpos brevis			
[82879]	Endangered	Species or species habitat may occur within area	In buffer area only
Thelymitra stellata			
Star Sun-orchid [7060]	Endangered	Species or species habitat may occur within area	In buffer area only

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Motacilla cinerea			
Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris acuminata			
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Tringa nebularia			
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area	In buffer area only

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Unknown		
Commonwealth Land - [52241]	WA	In buffer area only
Commonwealth Land - [52183]	WA	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat likely to occur within area	In feature area
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis			
Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area	In feature area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area
Thinornis cucullatus as Thinornis rubricollis Hooded Plover, Hooded Dotterel [87735]		Species or species habitat may occur within area overfly marine area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area overfly marine area	In buffer area only

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Burra	Conservation Park	WA	In buffer area only
Credo	NRS Addition - Gazettal in Progress	WA	In buffer area only

Protected Area Name	Reserve Type	State	Buffer Status
Goldfields Woodlands	Conservation Park	WA	In buffer area only
Goldfields Woodlands	National Park	WA	In buffer area only
Kangaroo Hills Timber Reserve	5(1)(g) Reserve	WA	In buffer area only
Kurrawang	Nature Reserve	WA	In buffer area only
Scahill Timber Reserve	5(1)(g) Reserve	WA	In buffer area only
Victoria Rock	Nature Reserve	WA	In buffer area only
Wallaroo Rock	Conservation Park	WA	In buffer area only
Yallari Timber Reserve	5(1)(h) Reserve	WA	In buffer area only

EPBC Act Referrals

[Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Goldfields Water Supply Scheme Project	2019/8547	Controlled Action	Post-Approval	In buffer area only
Nava-1 Cable System	2001/510	Controlled Action	Completed	In buffer area only
Not controlled action				
Focus, Greenfields and Carins Intersection Upgrade,Great Eastern Highway, WA	2014/7171	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Lynas Kalgoorlie Rare Earths Processing Facility	2020/8719	Not Controlled Action	Completed	In buffer area only

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data is available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on the contents of this report.

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions when time permits.

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded breeding sites; and
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
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-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
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-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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APPENDIX D – LIKELIHOOD OF OCCURENCE OF THREATENED AND PRIORITY FLORA IN THE PROJECT AREA

Single stated likelihood of occurrence conclusions remain unchanged post-field survey, in comparison to pre-survey predictions
Level of certainty applicable to likelihood of occurrence conclusions for the unsurveyed project area stated in **[**square brackets**]**

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Ricinocarpos brevis	Endangered	Endangered	Shrub growing to 1.8 m high. Produces white flowers from June to July.	Rocky hillslopes, rock outcrops.	**Unlikely to occur** - Closest occurrence is >100 km west of the project area. The project area is outside this species' known distribution.	PMST
Thelymitra stellata	Endangered	Endangered	Tuberous perennial herb growing to 0.25 m high with a single lily-like leaf to 0.9 m long. Produces up to 6 golden-brown or yellow with orange striped flowers from September to November.	Sandy loam soils with lateritic gravel. Ridges, slopes and gullies in wandoo and jarrah woodland.	**Unlikely to occur** - Closest occurrence is >100 km west of the project area. The project area is outside this species' known distribution.	Dandjoo, PMST
Gastrolobium graniticum	Endangered	Vulnerable	Erect, open shrub, that grows to a height of 2.5 m and produces yellow and orange flowers from August to September.	Sand, sandy loam, granite. Margins of rock outcrops, along drainage lines.	**May occur [Medium]**- 51 DBCA records occur south and west of the project area, the closest occurrence is 1.55 km west of the project area and the record is more than 50 years old. These records were found on the same land system that occurs within the project area in small patches but on different geology. Suitable habitat was recorded within the project area; however, due to the age of the records it is considered that this species 'May occur' within vegetation units AvMmPd and EsAaSs.	ALA, Dandjoo, DBCA, PMST
Calectasia pignattiana	Vulnerable	Endangered	Rhizomatous, prickly herb, that grows up to 0.5 m in height, and produces blue-purple flowers, from August to October.	Sand to sandy clay over granite or laterite, gravel. Plains and gentle slopes.	**Unlikely to occur** - Closest occurrence is >100 km south-west of the project area. The project area is outside this species' known distribution.	PMST
Eucalyptus crucis subsp. *crucis*	Vulnerable	Endangered	Mallee, 2-8 m high, bark rough, 'minnirichi'. Fl. white, Oct or Dec or Jan to Mar. Sand, loam. Granite outcrops.	Occurs on sand and loam soils on granite outcrops.	**Unlikely to occur** - Closest occurrence is >100 km north of the project area. The project area is outside this species' known distribution.	Dandjoo
Tecticornia flabelliformis	Vulnerable	Priority 2	Erect shrub growing to 0.2 m high.	Clay. Saline flats.	**Unlikely to occur** - Closest occurrence is 48.49 km south-east of the project area. The project area is outside this species' known distribution	DBCA

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Tetratheca spenceri	-	Vulnerable	A clumped subshrub with small, appressed scale-leaves on its mature stems. Produces pink flowers in November and mid December.	Occurs on laterite outcrops along drainage channels seemingly restricted to a dark band of possibly iron-rich soil.	**Unlikely to occur** - Closest occurrence is 30.42 km south-east of the project area. Project area is outside this species' known distribution.	ALA, Dandjoo, DBCA
Acacia coatesii	-	Priority 1	Low domed compact rigid shrub or sub-shrub growing between 0.2 and 0.4 m in height and up to 1.5 m wide. Produces yellow flowers in mid-August to early October.	Open woodland dominated by Eucalyptus clelandii and E. lesouefii over open shrubland. Grows in shallow, red, sandy clay on flat or gently sloping ground towards the base of a low greenstone ridge.	**Pre-Survey Assessment** **Likely to occur** - Five DBCA records occur within the study area, closest occurrence is 0.95 km north of the project area and is between 11-20 years old, this species was recorded on the same geology and land systems that occur within the project area. Suitable habitat likely to occur. **Post-Survey Assessment** **Survey Area: May occur** - *Eucalyptus clelandii* recorded in RPS 2012 report within vegetation unit EsAaSs. The survey area is on the border of this vegetation unit and therefore, suitable habitat may occur. **Unsurveyed Project Area: Likely to occur [Medium]** – Vegetation unit EsAaSs occurs within the unsurveyed project area and therefore, is considered 'Likely to occur'.	ALA, Dandjoo, DBCA
Acacia epedunculata	-	Priority 1	Dense upright blue-green shrub from 0.3-1.5 m tall. Yellow flowers. Flowering August.	Occurs on yellow sand plain.	**Unlikely to occur** - Closest record is 14.44 km west of the project area. The project area is outside this species' known distribution.	ALA, Dandjoo, DBCA
Acacia microneura	-	Priority 1	Slender shrub (with resinous, angled young branches) that grows to a height of 1.5 m, and has flat needle-like phyllodes that are between 4 and 11 cm long. Produces yellow inflorescence that are globular to broadly ellipsoid from August to October.	Sand to loam over granite. Heathlands, disturbed road verges.	**Unlikely to occur** - Closest occurrence is >100 km from the project area. The project area is outside this species' known distribution	ALA

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Acacia sclerophylla var. *teretiuscula*	-	Priority 1	Spreading, much-branched shrub, 0.25-2.5 m high. Fl. yellow, Sep to Oct.	Occurs on clay and loamy soils.	**May occur [High]** - One DBCA record of this species occurs within the study area and is 5.96 km east of the project area and is >50 years old. This species was recorded on the same geology and land system that occurs within the project area. Suitable habitat was recorded throughout the project area, but due to distance and age of record, it is considered this species 'May occur'.	Dandjoo, DBCA
Acacia websteri	-	Priority 1	Shrub growing between 1.5 and 5 m high with fibrous bark. Produces yellow flowers.	Occurs on red sand, clay or loam soils in low lying areas and flats.	**Likely to occur [Medium] -** 26 DBCA records occur within the study area, closest occurrence is 9.64 km north of the project area. This species was recorded on the same land systems and geology as occurs within the project area. Suitable soil and landforms were recorded within the project area. This species is 'Likely to occur' within vegetation units AvMpPd, DfLbRp, EsAaLa, EsAbEs, EsEiEs, EsEiSa and MhScSs.	ALA, Dandjoo, DBCA
Austrostipa burgesiana	-	Priority 1	Perennial tussock grass growing between 0.8 and 1 m in height. Produces flowers in late spring.	Known from a single collection near Mt Burges Station homestead in *Maireana pyramidata* shrubland on a flow line within a calcareous plain.	**Unlikely to occur** - Only one record of this species and occurs 34.99 km north of the project area. The project area is outside this species' known distribution.	ALA, Dandjoo, DBCA
Calandrinia lefroyensis	-	Priority 1	Slender erect perennial herb, 0.2 m high. Growing under shrubs, leaves succulent, flowers pinkish and ascending above shrub canopy, fruiting.	Flat plain, orange clayey sand with fine quartz.	**Unlikely to occur** - Closest occurrence is 31.48 km north of the project area. The project area is outside this species' known distribution.	ALA, Dandjoo, DBCA

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Chamelaucium sp. Coolgardie (P. Pavlovic 289)	-	Priority 1	Perennial shrub growing up to 0.8 m in height and produces white flowers in November and December.	Occurs on yellow sandy soils over laterite on sand plains.	**May occur [Medium]** - Two DBCA records occur within the study area. This species is only known from two records. Closest occurrence is 19.17 km north of the project area. The record is 0-10 years old. This species is restricted to a small distribution, and the project area is located outside of this distribution. This species was recorded on the same land system that occurs in the project area but on different geology. Suitable habitat maybe present within the project area within vegetation unit EgAaaOp.	DBCA
Chamelaucium sp. Koolyanobbing (V. Clarke 644)	-	Priority 1	Shrub, ca 0.3 m high. Fl. white/red-pink, Sep to Dec.	Yellow sand. Sandplains.	**Unlikely to occur** - Closest occurrence is 64 km north-west of the project area. The project area is outside this species' known distribution.	DBCA
Chamelaucium sp. Parker Range (B.H. Smith 1255)	-	Priority 1	Shrub growing up to 1.7 m in height and produces pink flowers in November and December.	Occurs on yellow and red sandy soils over laterite.	**Unlikely to occur** - Closest occurrence is >100 km south-west of the project area. The project area is outside this species' known distribution.	Dandjoo
Cryptandra polyclada subsp. *aequabilis*	-	Priority 1	Low and spreading, dense shrub, 0.1-0.4 m high. Fl. white, Oct.	Occurs on sand.	**Unlikely to occur** - Closest occurrence is 55.14 km west of the project area. The project area is outside this species' known distribution.	DBCA
Cyathostemon divaricatus	-	Priority 1	Low often spreading shrub growing up to 0.5 m in height. Produces white with tinged pink flowers from April to May and August to September.	Occurs on rocky hill slopes.	**Unlikely to occur** - Closest occurrence is 35.06 km south-east of the project area. Suitable habitat is unlikely to occur.	DBCA
Dampiera plumosa	-	Priority 1	Erect perennial herb 0.15-0.2 m high. Produces blue flowers in October.	Red sandy soils.	**May occur [Medium]** - One DBCA record occurs within the study area. This species is only known from two records. Occurrence is 6.88 km north of the project area. The record is >50 years old. This species was recorded on the same land system and soils as occurs within the project area. Suitable habitat maybe present within EgAaaOp.	ALA, DBCA
Dampiera prasiolitica	-	Priority 1	-	-	**Unlikely to occur** - Closest occurrence is 60.44 km north-west of the project area. The project area is outside this species' known distribution.	DBCA

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Eremophila xantholaemus	-	Priority 1	-	-	**Unlikely to occur** - Closest occurrence is 57.49 km north-east of the project area. The project area is outside this species' known distribution.	DBCA
Gunniopsis sp. Coolgardie (A.A. Mitchell et al. AAM 10238)	-	Priority 1	-	-	**Unlikely to occur** - Closest occurrence is 59.15 km south of the project area. The project area is outside this species' known distribution.	DBCA
Lepidosperma lyonsii	-	Priority 1	Tufted rhizomatous, perennial sedge with leaves growing 0.31 to 0.53 m high, culms and leaves distichous.	Pale orange skeletal sandy loam with banded ironstone gravel and rock, well-drained shallow stony loamy with quartz. Gentle hill slopes, upper slopes of large hill.	**Unlikely to occur** - Closest occurrence is 41.54 km west of the project area. Suitable habitat is unlikely to occur.	ALA, Dandjoo, DBCA, PGV Environmental (2018)
Lepidosperma sp. Parker Range (N. Gibson & M. Lyons 2094)	-	Priority 1	Sedge growing up to 0.4 m in height.	Occurs in association with granite, laterite and BIF outcropping in dark brown loamy soil.	**Unlikely to occur** - Closest occurrence is 30.57 km south-east of the project area. Suitable habitat is unlikely to occur	Dandjoo, DBCA
Melichrus sp. Coolgardie (K.R. Newbey 8698)	-	Priority 1	Perennial shrub growing up to 0.8 m in height and produces white to deep pink flowers from April to November.	Occurs on hill slopes and plains in yellow sand.	**Likely to occur [Medium] -** 16 DBCA records occur within the study area, closest occurrence is 2.45 km south of the project area and is >50 years old. This species was recorded on the same land system and soils as occur within the project area. Suitable habitat was recorded within the project area, within vegetation unit EgAaaOp and EsEiSa	Dandjoo, DBCA
Phebalium appressum	-	Priority 1	Rounded shrub, that grows to a height of 1 m, leaves cordate-ovate and 2 mm long. Produces white usually solitary flowers in July that have short and thick pedicels that are 1 mm long.	Yellow sandplain.	**May occur [Medium]** - Two DBCA records occur within the study area. Closest occurrence is 20.67 km north of the project area and the record is between 11 and 20 years old. This species was recorded on the same land system and geology as occurs within the project area. Suitable habitat may occur within the project area in vegetation unit EgAaaOp.	ALA, Dandjoo, DBCA
Philotheca apiculata	-	Priority 1	Erect shrub, 0.5-1.5 m high. Fl. white-pink, Aug to Nov. Stony clay loam. Rocky outcrops, hillsides.	Occurs on stony clay loam soils on rocky outcrops and hillsides.	**Unlikely to occur** - Closest occurrence is 25.15 km south-east of the project area. Survey area is outside this species' known distribution	DBCA

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Philotheca pachyphylla	-	Priority 1	Erect shrub that grows between 0.3-1.5 m high and produces white flowers from May or September.	Sand, red loam, clay loam. Sandplains, hill tops.	**Likely to occur [High]** - Seven DBCA records occur within the study area, closest occurrence is 2.37 km west of the project area and is >50 years old. This species was recorded on the same land system and geology as occurs within the project area. Suitable habitat was observed within the project area and is 'Likely to occur' within vegetation units EcEs, EsAaLa, EsAaSs, EsAbEs, EsEiEs, EsEiSa, EsEsAv and Mosaic.	ALA, Dandjoo, DBCA
Prostanthera splendens	-	Priority 1	Erect, openly branched shrub, 0.2-1 m high. Fl. blue-purple, Aug to Oct. Stony loam, shallow soils with ironstone pebbles. Breakaways.	Occurs on stony loam and shallow soils with ironstone pebbles on breakaways.	**Unlikely to occur** - Closest occurrence is 56.96 km south-east of the project area. Survey area is outside this species' known distribution.	DBCA
Pterostylis xerampelina	-	Priority 1	Tuberous perennial herb growing to 0.15 m. Produces several hooded brown flowers in September.	Red gritty loam over granite.	**May occur [High]**- Two DBCA records occur within the study area. Closest occurrence is 20.5 km east of the project area. This species was recorded on different soils, but the same land system as occurs within the project area. Suitable habitat maybe present within vegetation unit MhScSs.	ALA, Dandjoo, DBCA
Ptilotus procumbens	-	Priority 1	Spreading procumbent annual herb growing to 0.1 m high. Producing ink-white flowers in November.	Red clay, sandy loam with lateritic gravel. Washaways, gravelly plains and flats.	**Unlikely to occur** - Closest occurrence is 40.03 km north-east of the project area. Project area is outside this species' known distribution	DBCA
Ptilotus rigidus	-	Priority 1	Rigid, glabrous shrub growing to 0.25 m high. Produces pink flowers in hemispherical spikes from September to November.	Associated with salt lakes, in rocky clay loam and quartz.	**Unlikely to occur** - Closest occurrence is 50.89 km north of the project area. Project area is outside this species' known distribution.	DBCA
Ptilotus sp. Kalgoorlie (J. Jackson & B. Moyle 260)	-	Priority 1	Erect herb growing from 0.2 m high and 0.1 m wide. Succulent basal leaves.	Quartz outcrop.	**Unlikely to occur** - Closest occurrence is 56.2 km north of the project area. Project area is outside this species' known distribution.	DBCA
Rhodanthe uniflora	-	Priority 1	Erect woolly annual herb growing from 0.02 to 0.1 m high. Produces yellow flowers from August to October.	Occurs on brown earth in open eucalyptus woodland.	**Unlikely to occur** - Closest occurrence is 60.12 km north-east of the project area. Project area is outside this species' known distribution	DBCA

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Ricinocarpos digynus	-	Priority 1	Bushy, resinous shrubs growing to 2 m high and 2 m wide. Produces female and male flowers from November to March, followed by thickly resinous fruit.	Occurs on sandy loam on rocky hillsides.	**Unlikely to occur** - Closest occurrence is 46.07 km east of the project area. Project area is outside this species' known distribution.	DBCA
Tecticornia mellarium	-	Priority 1	Small subshrub growing up to 0.5 m high. Articles pea shaped and glaucous blue in colour.	Occurs on red brow clayey sand soils, near lake shorelines and in samphire scrub.	**Unlikely to occur** - Closest occurrence is 51.17 km south-east of the project area. Project area is outside this species' known distribution.	DBCA
Thryptomene interzonensis	-	Priority 1	-	-	**Unlikely to occur** - Closest occurrence is 67.01 km west of the project area. Project area is outside this species' known distribution.	DBCA
Thryptomene planiflora	-	Priority 1	Shrub growing between 0. m and 2 m in height and up to 1 m wide. Produces deep pink flowers from June to October.	Occurs on plains, with yellow or brown to red sandy soils, in shrublands that are often dominated by Acacia.	**Pre-Survey Assessment:** **Likely to occur** - 20 DBCA records occur within the study area, closest occurrence is 9.26 km south-east of the project area and is >50 years old. Suitable habitat is likely to occur. **Post-Survey Assessment:** **Survey Area: Unlikely to occur** - Suitable habitat was not recorded within the survey area. **Unsurveyed Project Area: May occur [Medium]** – No Acacia dominated shrublands occur within the unsurveyed project area, however vegetation unit EgAaaOp did record sandy soils.	Dandjoo, DBCA
Thryptomene sp. Coolgardie (E. Kelso s.n. 1902)	-	Priority 1	No information available.	Known from two collections in the locality of the Coolgardie district.	**Unlikely to occur** - This species is known from two occurrence the closest is 11.63 km north of the project area and >50 years old.	DBCA
Thysanotus argillaceus	-	Priority 1	Herb with a small subterranean perennating rootstock, storage roots, and annual leaves and inflorescences. Inflorescence purple, flowering in Spring (October).	Red or orange clay soil that feels crunchy underfoot (sometimes referred to as self-mulching clay) on flats or lower slopes of slight rises, in open eucalypt woodland with sparse to absent shrub understorey.	**Unlikely to occur** - Closest occurrence is 66.90 km west of the project area. Project area is outside this species' known distribution.	DBCA

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Acacia kerryana	-	Priority 2	Low, spreading, domed shrub that grows between 0.3-1 m high. Produces yellow flowers from October to December or January to February.	Granitic loamy sand, stony clayey loam or clayey sand. Low stony ridges, undulating plains.	**Unlikely to occur** - Closest record is 31.95 km west of the project area. Project area is outside this species' known distribution.	ALA, Dandjoo, DBCA
Austrostipa frankliniae	-	Priority 2	Perennial tussock grass growing between 0.8 and 1 m in height. Produces flowers in late spring.	Occurs on red brown sandy loam soils of plains.	**Likely to occur [High]** - Two DBCA records occur within the study area, closest occurrence is 1 km north of the project area. This species was recorded on the same land system and geology as occurs within the project area. _Suitable habitat was recorded within the project area in vegetation units MhMp, AaMhPg, EsEiEs and Mosaic.	ALA, Dandjoo, DBCA
Bossiaea laxa	-	Priority 2	Lax, open, spreading shrub, that grows to 2 m high. Produces yellow-green flowers in May.	Brown loam over deep granite. Sheltered positions around outcrops.	**Unlikely to occur** - Closest occurrence is 30.67 km south of the project area. Survey area is outside this species' known distribution.	ALA, Dandjoo, DBCA
Brachysola halganiacea	-	Priority 2	Shrub that grows to 0.5 m high and 0.75 wide. Produces purple flowers in October.	Deep yellow sand. Flats.	**Unlikely to occur** - Closest occurrence is 19.76 km north of the project area. The project area is outside this species' known distribution.	ALA, Dandjoo, DBCA
Cryptandra glabriflora	-	Priority 2	Low shrub, (0.05-)0.1-0.5 m high. Produces white or pink flowers from May to August.	Yellow or grey sand, gravelly soils. Plains.	**Unlikely to occur** - Closest occurrence is >100 km north-west of the project area. The project area is outside this species' known distribution.	Dandjoo
Daviesia sarissa subsp. *redacta*	-	Priority 2	Spreading or sprawling, glaucous shrub, to 0.6 m high. Fl. yellow and red/brown, Sep. Yellow sand. Plains.	Occurs on yellow sand on plains.	**Unlikely to occur** - Closest occurrence is 57.65 km west of the project area. The project area is outside this species' known distribution.	Dandjoo, DBCA
Elachanthus pusillus	-	Priority 2	Ascending or decumbent annual herb growing up to 0.15 m high. Producing yellow to green flowers from August to October.	Plains with iron, quartz or granite stones on red loam and clay soils.	**Unlikely to occur** - Closest occurrence is 43.41 km north-east of the project area. Project area is outside this species' known distribution.	ALA, Dandjoo, DBCA

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Eremophila praecox	-	Priority 2	Broom-like shrub growing 1.5 to 3 m high. Produces purple flowers in October or December.	Occurs on red or brown sandy loam. Undulating plains.	**May occur [High]** - 51 DBCA records occur within the study area. The closest occurrence is 28.98 km north-east of the project area and is >30 years old. This species was recorded on the same soils and land system as occurs within the project area. Suitable habitat was recorded within vegetation unit EsAhTs and MhMp, however, due to distance and age of record it is considered this species 'May occur'.	ALA, Botanica (2021a), Botanica (2021b), Dandjoo, DBCA, Phoenix Environmental (2022), NVS (2020a)
Eucalyptus educta	-	Priority 2	Straggling and spreading mallee 3 to 5 m high with minnirichi bark. Produces cream to yellow flowers in April.	Shallow soils, granite rocks.	**Unlikely to occur** - Closest occurrence is 29.30 km north-east of the project area. Survey area is outside this species' known distribution.	ALA, Dandjoo, DBCA
Eutaxia actinophylla	-	Priority 2	Low shrub, (0.05-)0.1-0.5 m high. Produces white or pink flowers from May to August.	Yellow or grey sand, gravelly soils. Plains.	**Unlikely to occur** - Closest occurrence is 43.65 km north-west of the project area. Suitable habitat is unlikely to occur within the project area	ALA, Dandjoo, DBCA
Frankenia brachyphylla	-	Priority 2	Small, decumbent shrub. Produces white/pink flowers in November.	Salt lake margins.	**Unlikely to occur** - Closest occurrence is >100 km east of the project area. Survey area is outside this species' known distribution.	ALA
Goodenia corralina	-	Priority 2	Low spreading perennial, herb, 0.1-0.7 m high. Brown loam, granite. Near large outcrop.	Occurs on brown loam soils on or near large granite outcrops.	**Unlikely to occur** - Closest occurrence is 60.97 km south of the project area. Survey area is outside this species' known distribution.	DBCA
Goodenia jaurdiensis	-	Priority 2	Open, acaulescent perennial, herb, 0.07-0.15 m high. Red clayey loam with laterite or banded ironstone gravel or quartz pebbles. Low-lying plains and lower slopes.	Occurs on red clayey loam soils with laterite or banded ironstone gravel or quartz pebbles of low-lying plains and lower slopes.	**Unlikely to occur** - Closest occurrence is 71.9 km west of the project area. Survey area is outside this species' known distribution.	DBCA
Goodenia salina	-	Priority 2	Annual herb growing up to 0.2 m high.	Well-drained saline grey or brown loamy clay soils of low gypseous dunes near salt pans.	**Unlikely to occur** - Closest occurrence is 30.69 km north-east of the project area. Survey area occurs outside this species' known distribution.	ALA, Dandjoo, DBCA

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Grammosolen odgersii subsp. *odgersii*	-	Priority 2	Bushy rounded shrub growing up to 0.5 m in height. Produces white flowers with a purple striped throat from August to October.	Occurs on red and yellow sand soils often in association with granite.	**Unlikely to occur** - Closest occurrence is 47.87 km west of the project area. Survey area occurs outside this species' known distribution.	Dandjoo, DBCA
Hakea rigida	-	Priority 2	Shrub grows between 0.6 and 2.7 m high. Produces flowers from September to October.	Sandy soils, yellow sand.	**May occur [Medium]** - Four DBCA records occur within the study area. The closest occurrence is 22.69 km north-east of the project area and the record is >50 years old. This species was recorded on the same land system and soil as occurs within the project area. Suitable habitat occurs within vegetation unit EgAaaOp, however due to distance, it is considered this species 'May occur'	ALA, Dandjoo, DBCA
Lepidium merrallii	-	Priority 2	Erect to spreading annual (possibly ephemeral) herb 0.03-0.15 high.	Clay or loam	**Likely to occur [High]** - Closest occurrence is 11.66 km north of the project area. Project area is outside this species' known distribution. This species has previously been recorded by RPS and Phoenix in the project area. Suitable habitat was recorded throughout the project area in all vegetation units except EgAaaOp, EsAhTs and MhMp.	ALA, DBCA, RPS 2012, Botanica 2021
Lepidosperma sp. Kambalda (A.A. Mitchell 5156)	-	Priority 2	Tussock sedge with serrated leaf margins.	Occurs on brown clay loam over granite of ridges and slopes.	**May occur [Medium]** - Two record occurs within the study area and is 7.14 km east of the project area. This species was recorded on the same soils and land system as occurs within the project area. Suitable habitat was recorded throughout the project area	Dandjoo, DBCA
Leucopogon sp. Yellowdine (M. Hislop & F. Hort MH 3194)	-	Priority 2	Shrub up to 1 m. Flowers white. Recorded flowering in January to May.	Yellow sandy soil.	**Unlikely to occur** - Closest occurrence is 55.03 km west of the project area. Project area is outside this species' known distribution.	DBCA

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Phebalium clavatum	-	Priority 2	Upright shrub that grows between 0.5 and 1.5 m high. Produces white flowers from August to September.	Sandy soils. Sandplains.	**Pre-Survey Assessment:** **Likely to occur** - 12 DBCA records occur within the study area, closest occurrence is 2.44 km north of the project area. This species occurs on the same land system and soils as occurs within the project area. Suitable habitat is likely to occur. **Post-Survey Assessment:** **Survey Area: Unlikely to occur** - Suitable habitat was not recorded within the survey area. **Unsurveyed Project Area: Likely to occur (Medium)** - Suitable habitat likely to occur in the unsurveyed project area within vegetation unit EgAaaOp.	ALA, Dandjoo, DBCA
Phebalium sp. Yerilgee Sandplain (J. Jackson 223)	-	Priority 2	Shrub up to 1.8 m high. Flowers white or cream. Flowers in August.	-	**May occur [Low]** - Four records occur within the study area. Closest occurrence is 22.3 km west of the project area. Not much is known about this species preferred habitat, therefore, suitable habitat maybe present.	Dandjoo, DBCA
Rumex crystallinus	-	Priority 2	Annual, herb growing 0.06 to 0.4 m high.	Arid and semi-arid areas.	**Unlikely to occur** - Closest occurrence is 59.14 km north of the project area. Project area is outside this species' known distribution.	DBCA
Thysanotus sp. Yellowdine (A.S. George 6040)	-	Priority 2	Rhizomatous tufted herb. Purple flowers, flowering recorded in April, November and December.	Sand.	**Unlikely to occur** - Closest occurrence is 54.86 km west of the project area. Survey area is outside this species' known distribution.	DBCA
Acacia crenulata	-	Priority 3	Bushy shrub or tree growing between 0.7-3 m in height. Produces yellow flowers.	Occurs on clay, sandy clay and yellow sand soils of rocky rises, granite outcrops and breakaways.	**Likely to occur [High]**- 10 DBCA records occur within the study area, closest occurrence occurs within 4.94 km north-west of the project area and the record is 11-20 years old. Two DBCA records and one Botanica record occur within the northern portion of the project area. This species has been previously recorded in vegetation units EsEiEs and EsAaSs, and other suitable habitat is present in the project areas, and is likely to occur in the unsurveyed project area.	ALA, Dandjoo, DBCA, RPS 2012, Botanica 2021

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Acacia cylindrica	-	Priority 3	Spreading shrub growing between 1.5-3 m in height. Produces yellow flowers from August to October.	Occurs on yellow or brown sand and gravelly soils on undulating plains and flats.	**Unlikely to occur** - Closest record is 55.03 km west of the project area. Project area is outside this species' known distribution.	DBCA
Acacia desertorum var. *nudipes*	-	Priority 3	Dense or open shrub or tree (rarely) growing between 0.6-2 m in height, phyllodes 16-nerved. Produces yellow flowers from August to October.	Occurs on yellow sand and lateritic gravel soils on sandplains and flats.	**Unlikely to occur** - Closest record is 53.99 km west of the project area. Project area is outside this species' known distribution.	DBCA
Acacia dissona var. *indoloria*	-	Priority 3	Domed or rounded, dense, pungent shrub growing from 0.5 to 2 m high. Produces yellow flowers from August to September.	Sand and sandy loam. Undulating plains.	**Unlikely to occur** - Closest record is 73.60 km west of the project area. Project area is outside this species' known distribution.	DBCA
Acacia filifolia	-	Priority 3	Wispy, spindly, single-stemmed shrub or tree growing between 1.2-3 m in height. Produces yellow flowers from May to September.	Occurs on yellow sand and gravelly lateritic sand soils on sandplains.	**Unlikely to occur** - Closest occurrence is >100 km from the project area. Outside of this species' known distribution.	ALA
Acacia formidabilis	-	Priority 3	Diffuse, pungent shrub, growing from 0.2 to 0.6 metres high. Flowers yellow, August to September.	Yellow or red/brown sand. Undulating plains, hillsides.	**Unlikely to occur** - Closest record is 60.73 km west of the project area. Project area is outside this species' known distribution.	DBCA
Adenanthos gracilipes	-	Priority 3	Erect lignotuberous shrub that grows between 0.4 and 1.5 m in height. Produces cream and red and pink flowers from March or August to December.	White sand.	**Unlikely to occur** - Closest occurrence is >100 km from the project area. Project area is outside of this species' known distribution.	ALA
Allocasuarina eriochlamys subsp. *grossa*	-	Priority 3	Dioecious or monoecious shrub growing 1 to 3 m high, bracteoles prominently exceeding cone.	Stony loam, laterite clay. Granite outcrops.	**May occur [Medium]** - Four DBCA records occur within the study area. Closest occurrence is 8.99 km north-west of the project area. The record is >50 years old. This species was recorded on the same Land system and soils that occur within the project area. Suitable habitat was recorded in the project area within vegetation units EsAcEa, EsAaSs and ElAaDa.	Dandjoo, DBCA

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Alyxia tetanifolia	-	Priority 3	Erect, rigid, pungent shrub growing from 1 to 2 m high, to 2.5 m wide. Produces flowers of white-cream from May to June or November.	Occurs on sandy clay, loam, concretionary gravel.	**Unlikely to occur** - Closest occurrence is 31.7 km north-east of the project area. Survey area is outside this species' known distribution.	Dandjoo, DBCA
Angianthus prostratus	-	Priority 3	Prostrate annual herb. Produces white-yellows flowers in July to September.	Occurs on red clay or loamy soils in saline depressions.	**Unlikely to occur** - Closest occurrence is 60.12 km north-east of the project area. Survey area is outside this species' known distribution.	DBCA
Apectospermum exsertum	-	Priority 3	Shrub growing from 0.3 to 0.6 m high. Produces white flowers from August to September.	Occurs on sandy soils of flat sandplains.	**Unlikely to occur** - Closest occurrence is >100 km from the project area. Outside of this species' known distribution.	Dandjoo
Atriplex lindleyi subsp. *conduplicata*	-	Priority 3	Monoecious short-lived annual or perennial, herb growing 0.2 m high. Produces green flowers in September.	Sandy loam. Edges of salt lakes, swamps.	**Unlikely to occur** - Closest occurrence is 58.59 km north of the project area. Suitable habitat is unlikely to occur.	DBCA
Austrostipa turbinata	-	Priority 3	Perennial tussocking grass growing to 0.4 m tall.	Red loam, brown clay or sandy clay over rocky greenstone, quartz, granite outcrops.	**May occur [High]** - Three DBCA records occur within the study area. Closest occurrence is 7.57 km north-east of the project area. The record is 11-20 years old. This species was recorded on the same land system and soils as occurs within the project area. Suitable habitat was recorded throughout the project area within vegetation units EsAcEa, EsAaSs, ElAaDa, EsEiSa, EsEiEs, AvSc, MhMp, AvMmPd, AvAc, EsAbEs and EsEsAv.	Dandjoo, DBCA
Banksia lullfitzii	-	Priority 3	Lignotuberous shrub, 0.8-2 m high. Fl. yellow-orange/orange-brown, Mar to May. Yellow sand. Sandplains.	Occurs on yellow sand on sandplains.	**Unlikely to occur** - Closest occurrence is 57.13 km west of the project area. Project area is outside this species' known distribution.	DBCA
Bossiaea celata	-	Priority 3	Compact, intricately-branched shrub that grows to 0.8 m high. Produces yellow-red-orange flowers from September to October.	Deep sand. Open mallee.	**Unlikely to occur** - Closest occurrence is 10.63 km south of the project area. Project area is outside this species' known distribution.	ALA, Dandjoo, DBCA
Bossiaea concinna	-	Priority 3	Erect, prickly shrub that grows between 0.4-1.5 m high. Produces yellow and red/brown flowers from June to September.	White or red sand, gravel.	**Unlikely to occur** - Closest occurrence is 36.32 km south-west of the project area. Project area is outside this species' known distribution.	ALA, Dandjoo, DBCA

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Calytrix creswellii	-	Priority 3	Spreading shrub that grows between 0.25 and 1 m in height. Produces white flowers from September to December.	Yellow sand, sometimes with lateritic gravel. Sandplains.	**Unlikely to occur** - Closest occurrence is 41.38 km north-west of the project area. Project area is outside this species' known distribution.	ALA, Dandjoo, DBCA
Chrysocephalum apiculatum subsp. *norsemanense*	-	Priority 3	Erect multi-stemmed perennial woolly herb growing from 0.3 to 0.6 m high. Produces yellow to colourless flowers from September to October.	Sandplain, orange, red well-drained sandy loam. In open places on aeolian or calcareous soils.	**May occur [Medium]** - Two DBCA records occur within the study area. Closest occurrence is 11.79 km north of the project area. The record is 41-50 years old. This species was recorded on the same land system and geology as occurs within the project area. Suitable habitat was recorded within the project area within vegetation unit EgAaaOp. However, due to distance and age of record it is considered this species 'May occur'.	Dandjoo, DBCA
Cratystylis centralis	-	Priority 3	Shrub growing up to 1 m in height and described as being much branched, brittle and greyish in colour.	Occurs on red sandy loam soils with ironstone gravel on flat plains in breakaway country.	**Unlikely to occur** - Closest occurrence is 30.49 km south-east of the project area. Survey area is outside this species' known distribution.	ALA, Dandjoo, DBCA
Cryptandra crispula	-	Priority 3	Non to spinescent shrub growing 0.25 to 0.9 m high. Flowers white recorded in Spring.	Brown sandy clay, yellow loamy sand, red soil, pebbles. Dune ridges, hills, near salt lakes.	**Pre-Survey Assessment:** **May occur -** Two DBCA records occur within the study area. Closest occurrence is 16.44 km west of the project area and record is >50 years old. **Post-Survey Assessment:** **Survey Area: Occurs -** This species was recorded within the survey area during the 2025 survey. This species was recorded within cracking clay cleared areas in vegetation unit EsAhTs **Unsurveyed Project Area: Unlikely to occur [High] –** Although recorded in parts of the 2025 survey areas, suitable habitat unlikely to be present within the unsurveyed project area.	ALA, Dandjoo, DBCA

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Cyathostemon verrucosus	-	Priority 3	Low spreading shrub growing up to 0.4 m in height. Leaves blades are 2-4.5 mm long and 0.5-0.7 mm wide with large glands producing a warty or prominently tuberculate surface. Producing white flowers from September to December.	Yellow sand plains of the South-western Interzone of the Coolgardie region.	**May occur [Medium]-** Five DBCA records occur within the study area. Closest occurrence is 17.60 km south of the project area. The record is >50 years old. This species was recorded on the same land system but different soils that occur within the project area. Suitable soil was recorded within the project area within vegetation unit EgAaaOp. However, due to age of record and distance, it is considered this species 'May occur'.	ALA, Dandjoo, DBCA
Cymbonotus preissianus	-	Priority 3	Stemless perennial herb. Produces yellow flowers.	Occurs on flat sandy clay.	**Unlikely to occur** - Closest occurrence is >100 km south-west of the project area. The project area is outside this species' known distribution.	ALA
Daviesia newbeyi	-	Priority 3	Bushy, multi-stemmed, broom-like shrub, 0.25-1.5 m high. Fl. orange/yellow and red, Aug to Oct. Sand or sandy clay over granite. Rocky slopes.	Occurs on sand or sandy clay soils over granite on rocky slopes.	**Unlikely to occur** - Closest occurrence is >100 km south-west of the project area. The project area is outside this species' known distribution.	Dandjoo
Eremaea acutifolia	-	Priority 3	Spreading dense shrubs 0.4-0.7 m high. Produces flowers orange/pink to August to November.	Grey or yellow sand on sandplains	**Unlikely to occur** - Closest occurrence is 100 km north-west of the project area. Project area is outside this species' known distribution.	ALA
Eremophila annosicaulis	-	Priority 3	Aromatic shrub growing up to 0.8 m tall. Produces leaves in a densely spiral formation and lilac flowers with purple-brown spots.	Occurs abundantly on the summit and slopes of small hills in tall acacia shrubland.	**Unlikely to occur** - Closest occurrence is 60.19 km south-east of the project area. Project area is outside this species' known distribution.	DBCA

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Eremophila microphylla	-	Priority 3	Erect compact perennial shrub growing 1m high and 1 m wide. Produce red or white flowers from November to December and March to May.	Occurs on red brown sandy loam and loamy clay soils of plains and slopes.	**Pre-Survey Assessment:** **Likely to occur** - 12 DBCA records occur within the project area. The closest occurrence is 0.52 km from the project area. This species occurs on the same land system and geology as occurs within the project area. **Post-Survey Assessment:** **Survey Area: Occurs -** This species was recorded in one location by FVC during the 2025 survey within vegetation unit EsEiEs. **Unsurveyed Project Area: Likely to occur [High]**- Vegetation unit EsEiEs occur within the unsurveyed project area. Suitable habitat is likely to occur.	Dandjoo, DBCA
Eremophila succinea	-	Priority 3	Erect shrub that grows between 1.2 and 3 m in height. Produces blue-purple flowers in September.	Clay, sand over clay.	**Unlikely to occur** - Closest occurrence is 22.74 km south-east of the project area. Survey area is outside this species' known distribution.	ALA, Dandjoo, DBCA
Eremophila veronica	-	Priority 3	Spreading, erect shrub growing between 0.5 to 1 m in height. Produces purple flowers from April to May.	Occurs on stony clay and clay loam soils on lateritic breakaways.	**Pre-Survey Assessment:** **Survey Area: Likely to occur** - 11 DBCA records occur within the study area, closest occurrence is 1.33 km north of the project area. **Post-Survey Assessment:** **Survey Area: Occurs -** This species was recorded in six locations within the project area during the 2025 survey within vegetation units EsAbEs and EsEiEs. **Unsurveyed Project Area: Likely to occur [High]-** Vegetation units EsEiEs and EsAbEs occur within the unsurveyed project area. Suitable habitat is likely to occur.	ALA, Dandjoo, DBCA
Eucalyptus exigua	-	Priority 3	Mallee that grows between 2 and 5 m in height with smooth bark. Produces white-cream flowers in March.	Sandy loam, white sand. Sandplains.	**May occur [Medium]** - Two DBCA records occur within the study area. The closest occurrence is 18.47 km west of the project area. This species was recorded on the same Land systems and soils as occurs within the project area. Suitable habitat occurs within the project area within vegetation units EsAhTs, MhMp and EgAaaOp.	ALA, Dandjoo, DBCA

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Eucalyptus frenchiana	-	Priority 3	Mallee growing between 6 m and 14 m in height with smooth grey over light grey, tan or cream bark, decorticating in ribbons. Produces white flowers.	Occurs on red brown sandy loam soils of plains.	**May occur [High]** - Four DBCA records occur within the study area. The closest occurrence is 16.66 km south of the project area. This species was recorded on the same land system and soils that occur within the study area. The project area is on the northern extremity of this species' distribution. Suitable habitat occurs within the project area within vegetation units EsAhTs and MhMp	ALA, Dandjoo, DBCA
Eucalyptus histophylla	-	Priority 3	(Mallee), 2-6 m high, bark smooth. Fl. yellow, Dec. Sandy loam on granite or laterite. Granite outcrops.	Occurs on sandy loam soils over granite and laterite on granite outcrops.	**Unlikely to occur** - Closest occurrence is 54.68 km south-west of the project area. Survey area is outside this species' known distribution.	DBCA
Eucalyptus urna subsp. *xesta*	-	Priority 3	Malle growing 8 to 12 m in heigh with smooth grey to cream and tan bark peeling in ribbons. Produces white flowers in February, August and October.	Occurs on sandy loam soils of plains with *Eucalyptus yilgarnensis.*	**Pre-Survey Assessment** **Survey Area: May occur** - Five DBCA records occur within the study area. The closest occurrence is 4.0 km west of the project area and the records is between 21 and 30 years old. This species was recorded on the same land system and soils as occurs within the project area. Suitable habitat may be present within the project area. **Post Survey Assessment:** **Survey Area: Unlikely to occur [High]–** No *Eucalyptus yilgarnensis* was recorded during any of the three surveys conducted within the project area.	Dandjoo, DBCA
Eucalyptus websteriana subsp. *norsemanica*	-	Priority 3	Low spreading or upright shrub, growing from 0.2 to 1.2 m high and 1 m wide. Produces yellow-orange-red flowers between September and October.	Sandy gravelly soils. Plains.	**May occur [Medium]** - Two DBCA records occur within the study area. The closest occurrence is 7.64 km north-east of the project area. This species was recorded on the same land systems and soils as occurs within the project area. Suitable habitat was recorded within vegetation unit EgAaaOp. However, due to distance, it is considered this species 'May occur'.	Dandjoo, DBCA

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Gastrolobium semiteres	-	Priority 3	Open, multi-stemmed shrub that grows to 1.5 m in height. Produces orange/yellow and purple/red flowers from August to October.	Deep yellow sand, yellow to brown sandy clay, gravel, granite. Broad sand dunes, around rocks, undulating plains.	**Unlikely to occur** - Closest occurrence is 52.94 km west of the project area. Survey area is outside this species' known distribution.	ALA, Dandjoo, DBCA
Gompholobium cinereum	-	Priority 3	Shrub to 0.3 m high.	Yellow sand, clayey sand, brown loam, sandy gravel or laterite on well-drained open sites, slopes, plains and roadsides.	**May occur [Medium]** - Three DBCA records occur within the study area. The closest occurrence is 25.61 km north-west of the project area. This species was recorded on the same land system and soils as occurs within the project area. The project area occurs on the southern extremity of this species' distribution. Suitable habitat was recorded within vegetation unit EgAaaOp. However, due to distance, it is considered this species 'May occur'.	ALA, Dandjoo, DBCA
Grevillea georgeana	-	Priority 3	Erect to widely spreading shrub, 1-3 m high, up to 4 m wide. Flowers red/red-pink and cream. Flowering January to March or September to November.	Stony loamy or clayey. Ironstone hilltops.	**May occur [High]** - Two DBCA records occur within the study area. The closest occurrence is 8.59 km north-west of the project area. This species was recorded on the same land system and soils as occurs within the project area. Suitable habitat was recorded within vegetation units EsAcEa, EsAaSs, ElAaDa, EsEiEs, AvMmPd, EsAbEs.	ALA, Dandjoo, DBCA
Grevillea petrophiloides subsp. *remota*	-	Priority 3	Spreading shrub (with emergent flowering branches), 2.5-3 m high. Fl. pink, Jun to Oct. Loamy sand, granite. Base of outcrops, crevices.	Occurs on loamy sand with granities at the base of outcrops and crevices.	**Unlikely to occur** - Closest occurrence is 49.57 km south of the project area. Survey area is outside this species' known distribution.	DBCA
Hibbertia pachyphylla	-	Priority 3	Shrub that grows to 0.5 m high. Produces yellow flowers from September to November.	White to yellow sand, brown sandy gravel, gravelly loam, laterite, granite, quartz. Undulating plains, low rises, valley floors.	**Unlikely to occur** - Closest occurrence is 15.20 km south of the project area. Survey area is outside this species' known distribution.	ALA, Dandjoo, DBCA

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Homalocalyx grandiflorus	-	Priority 3	Spreading shrub growing from 0.2 to 0.5 m high. Produces purple-red-pink flowers from October to December.	Yellow sand. Sandplains.	**Unlikely to occur** - Closest occurrence is 60.68 km north of the project area. Survey area is outside this species' known distribution.	DBCA
Isoetes brevicula	-	Priority 3	Cormous, perennial, herb or (fern ally) growing to 0.01 m high, stock 3-lobed; leaves 4 to 8 mm long; mature megaspores greyish white when dry.	Submerged in rock pools on granitic outcrops.	**May occur [Medium]** - One DBCA record occurs within the study area. The closest occurrence is 14.22 km south of the project area. This species was recorded on the same land system and soils as occurs within the project area. Suitable habitat was not recorded during Botanicas 2021 survey, however RPS did record a granite outcrop vegetation unit in 2012 which is within Botanicas Mosaic vegetation unit.	ALA, Dandjoo, DBCA
Isolepis australiensis	-	Priority 3	Annua; grass like herb or sedge growing 0.055 m high. Glumes are 08.8-1.2 mm long with 1 or sometimes 2 stamens and three styles. Nuts with abaxial angle acute. Flowers occur in June or September.	Lake margins and pools on silty sand and sandy clay.	**Unlikely to occur** - Closest occurrence is 30.69 km north-east of the project area. Survey area is outside this species' known distribution.	ALA, Dandjoo, DBCA
Lepidium fasciculatum	-	Priority 3	Erect annual, herb growing from 0.3 to 0.6 m high. Produces small green flowers from May to December.	Brown cracking clay or red loam.	**Unlikely to occur** - Closest occurrence is 42.88 km north-east of the project area. Survey area is outside this species' known distribution.	ALA, DBCA
Lepidosperma sp. Pigeon Rocks (H. Pringle 30237)	-	Priority 3	0	0	**Unlikely to occur** - Closest occurrence is 54.81 km west of the project area. Survey area is outside this species' known distribution.	Dandjoo, DBCA
Melaleuca coccinea	-	Priority 3	Much branched shrub growing 1.5 to 2.6 m high, leaf blade elliptic to ovate, 1.5 to 2.2 times as long as wide. Produces red flowers from September to November or January.	Sandy loam over granite. Granite outcrops, sandplain, river valleys.	**Unlikely to occur** - Closest occurrence is 40.03 km north-east of the project area. Survey area is outside this species' known distribution.	DBCA

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Melaleuca macronychia subsp. *trygonoides*	-	Priority 3	Multi-stemmed spreading shrub growing 1 to 4 m high, leaves broadly elliptic. Produces red flowers, from February or July to August or October.	Sandy soils and granite outcrops	**May occur [Medium]**- Six DBCA records occur within the project area. Closest occurrence is 13.97 km south of the project area. This species was recorded on the same land system and soils that occurs within the project area. Suitable habitat was recorded during Botanicas 2021 survey, and RPS 2012 survey in vegetation units Mosaic and EgAaaOp.	Dandjoo, DBCA
Mirbelia densiflora	-	Priority 3	Erect or straggling shrub, 0.2-1 m high. Fl. yellow-orange, Oct or Jan. Stony loam, loamy sand. Small ridges, breakaways, undulating plains.	Occurs on stony loam, loamy sandy soils on small ridges, breakaways and undulating plains.	**Unlikely to occur** - Closest occurrence is 61.18 km south of the project area. Survey area is outside this species' known distribution.	DBCA
Mirbelia ferricola	-	Priority 3	Erect pungent shrub 1.5 m high and 2 m wide. Grey fibrous bark on stems and older branchlets. Flowers yellow/brown. Leaves dark green with yellow at petiole.	Red-orange clay-loam, banded ironstone formation.	**Unlikely to occur** - Closest occurrence is 60.34 km north-west of the project area. Survey area is outside this species' known distribution.	DBCA
Notisia intonsa	-	Priority 3	Prostrate to ascending annual herb growing from 0.01 to 0.04 m high. Produces yellow-brown flowers from September to October.	Red brown clays and stony saline loams	**Pre-Survey Assessment:** **Likely to occur** - Seven DBCA records occur within the study area. Botanica recorded this species in eight locations within vegetation units ElAaSaf, EsAaLa, EsAcEa and EsEiEs. **Post-Survey Assessment:** **Survey Area: Occurs -** A further seven locations for this species were recorded during the 2025 survey in vegetation units AvMmPd, EsAbEs, EsEiEs and EsEiSa. **Unsurveyed Project Area: Likely to occur [High] -** This species is likely to occur within the unsurveyed project area within vegetation units AvMmPd, ElAaSaf, EsAaLa, EsAbEs, EsAcEa, EsEiEs and EsEiSa.	ALA, Dandjoo, DBCA
Phebalium drummondii	-	Priority 3	Upright shrub growing from 0.6 to 1.5 m high. Produces yellow flowers between July to September.	Gravelly sandy or clayey soils. Flats, roadsides.	**Unlikely to occur** - Closest occurrence is 60.34 km north-west of the project area. Survey area is outside this species' known distribution.	ALA, Dandjoo, DBCA

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Phlegmatospermum eremaeum	-	Priority 3	Prostrate to spreading annual herb that grows between 0.02 and 0.1(-0.2) m in height. Produces white-cream flowers from June or August to October.	Stony loam.	**May occur [High]** - Two DBCA record occurs within the study area. Closest occurrence is 12.36 km north-west of the project area. This species was recorded on the same land system and soils as occurs within the project area. Suitable habitat was recorded within vegetation units EsAcEa, EsAaSs, ElAaDa, EsEiSa, EsEiEs, AvSc, MhMp, AvMmPd, AvAc, EsAbEs and EsEsAv. However, due to distance, it is considered this species 'May occur'.	ALA, DBCA
Mirbelia ferricola	-	Priority 3	Erect pungent shrub 1.5 m high and 2 m wide. Grey fibrous bark on stems and older branchlets.. Flowers yellow/brown. Leaves dark green with yellow at petiole.	Red-orange clay-loam, banded ironstone formation.	**Unlikely to occur** - Closest occurrence is 60.34 km north-west of the project area. Survey area is outside this species' known distribution.	DBCA
Pityrodia scabra subsp. *Dendrotricha*	-	Priority 3	-	-	**Unlikely to occur** - Closest occurrence is 62.2 km south-east of the project area. Survey area is outside this species' known distribution.	DBCA
Psammomoya ephedroides	-	Priority 3	Much-branched tangled spreading shrub to 1.5 m high. Produces white flowers July to September.	Deep yellow or red sandy loams.	**Unlikely to occur** - Closest occurrence is >100 km west of the project area. The project area is outside this species' known distribution.	Dandjoo
Rinzia triplex	-	Priority 3	Shrub growing up to 1.5 m in height and 1.2 m wide. Produces bright to pale pink flowers from late June to September.	Recorded on sandy plains in yellow to red, often gravelly or lateritic soils. One record mentioning fragments of banded ironstone, dominated by Acacia, Eucalyptus or Allocasuarina, often with *Baeckea elderiana* present.	**May occur [Medium]**- Three DBCA records occur within the study area. Closest occurrence is 6.26 km north-west of the project area. This species was recorded on the same land system and soils as occurs within the project area. Suitable habitat was recorded in vegetation unit EgAaaOp. However, due to distance, it is considered this species 'May occur'.	ALA, DBCA

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Stackhousia muricata subsp. Perennial (W.R. Barker 3641)	-	Priority 3	Annual or perennial herb growing to 0.03 to 0.55 m high. Produces yellow-green flowers in September.	Granite outcrops.	**Pre-Survey Assessment:** **Likely to occur** - Seven DBCA records occur within the study area, closest occurrence is 3.8 km north-east of the project area and the records is >50 years old. This species occurs on the same land system and soils as occurs within the project area. Suitable habitat is likely to occur. **Post-Survey Assessment:** **Survey Area: Unlikely to occur** - No granite outcrops were observed during the survey and therefore suitable habitat is unlikely to occur. **Unsurveyed Project Area: May occur [Medium]-** Suitable habitat was not recorded during Botanicas 2021 survey, however RPS did record a granite outcrop vegetation unit in 2012 which is within Botanicas Mosaic vegetation unit.	DBCA
Stylidium choreanthum	-	Priority 3	Creeping perennial herb that grows between 0.01-0.03 m in height and to 0.3 m wide. Produces pink/white flowers from September to November.	White/yellow or red sand. Plains.	**May occur [Medium]** - Two DBCA record occurs within the study area. Closest occurrence is 20.49 km south of the project area and is between 41 and 50 years old. This species was recorded on the same land system and soils as occurs within the project area. Suitable habitat was recorded within vegetation unit EgAaaOp. However, due to distance and age of record, it is considered this species 'May occur'.	ALA, Dandjoo, DBCA
Styphelia rectiloba	-	Priority 3	Spreading to compact shrub growing up to 1.5 m in height. Produces cream flowers in December and June.	Occurs on rocky skeletal soils, on or in proximity to granite breakaways.	**May occur [Medium]** - Eight DBCA records occur within the study area. Closest occurrence is 29.13 km south-east of the project area. The record for this species is restricted to west of the Kambalda region. This species was recorded on the same land system and soils as occurs within the project area. Suitable habitat recorded during the RPS survey. However, due to distance, it is considered this species 'May occur'.	Dandjoo, DBCA

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Styphelia saxicola	-	Priority 3	Erect shrub growing up to 1m in height and width. Produces white/pale cream and with pale pink tinge flowers from April to September.	Occurs on shallow soils of rocky sites with laterite, granite or ironstone geology. Associated vegetation is typically open shrubland.	**Pre-Survey Assessment:** **Likely to occur** - There are two DBCA records within the study area, closest occurrence is 2.40 km west of the project area. This species was recorded on the same land system but different soils than occurs within the project area. Suitable habitat is likely to occur. **Post-Survey Assessment:** **Survey Area: May occur** - No open shrublands were recorded within the survey area, however ironstone geology was recorded. **Unsurveyed Project Area**: **Likely to occur [Low] –** There is a DBCA record just outside vegetation unit ElAaDa and looks to be part of the same vegetation type.	Dandjoo, DBCA, RPS 2012
Urodon capitatus	-	Priority 3	Low spreading or upright shrub, growing from 0.2 to 1.2 m high and 1 m wide. Produces yellow-orange-red flowers between September and October.	Sandy gravelly soils. Plains.	**Unlikely to occur** - Closest occurrence is >100 km west of the project area. The project area is outside this species' known distribution.	Dandjoo
Verticordia stenopetala	-	Priority 3	Shrub, 0.2-0.6(-1.3) m high. Fl. pink/pink-purple-red, Oct to Dec or Jan. Yellow sand, sometimes with gravel. Undulating plains.	Occurs on yellow sand sometimes with gravel on undulating plains.	**Unlikely to occur** - Closest occurrence is 50.95 km south of the project area. Survey area is outside this species' known distribution.	DBCA
Banksia arborea	-	Priority 4	Tree or large shrub, 2-8 m high. Flowers yellow, blue-green foliage paler beneath, rough brownish-grey bark. Flowering March to May or September to October.	Stony loam. Ironstone hills.	**Unlikely to occur** - Closest occurrence is 74.01 km north-west of the project area. Survey area is outside this species' known distribution.	DBCA

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Eremophila caerulea subsp. *merrallii*	-	Priority 4	Spreading or sprawling shrub growing up to 0.35 m in height and 0.8 m wide. Producing blue to purple flowers from October to December.	Undulating plains on sand, clay or loam soils.	**May occur [High]** - Four DBCA records occur within the study area. Closest occurrence is 6.88 km north of the project area. The record is >50 years old. This species was recorded on the same land system and geology as occurs within the project area. Suitable habitat was recorded throughout the project area; however, due to distance and age of record, it is considered this species 'May occur'.	Dandjoo, DBCA
Eucalyptus jutsonii subsp. *jutsonii*	-	Priority 4	Mallee growing from 4 to 7 m high. Produces cream flowers from November to March.	Occurs on red to pale orange deep sands. Undulating areas and on dunes.	**Unlikely to occur** - Closest occurrence is 24.85 km north-east of the project area. Survey area is outside this species' known distribution.	Dandjoo
Eucalyptus jutsonii subsp. *Jutsonii*	-	Priority 4	Mallee growing from 4 to 7 m high. Produces cream flowers from November to March.	Occurs on red to pale orange deep sands. Undulating areas and on dunes.	**May occur [Medium]** - One DBCA record occurs within the study area. The closest occurrence is 24.85 km north-east of the project area. This species was recorded on the same land system and soils as occurs within the project area. The project area is on the southern extremity of this species' known distribution. Suitable habitat was recorded within vegetation unit EgAaaOp.	DBCA
Eucalyptus x brachyphylla	-	Priority 4	Erect or decumbent, spreading shrub growing between 0.2 and 1 m high. Produces yellow flowers from September to November.	Grey sand, loam soils, with laterite or granitic soils. Ridgetop, slopes, flats, and gullies.	**Unlikely to occur** - Closest occurrence is 41.87 km north-east of the project area. Survey area is outside this species' known distribution.	DBCA
Frankenia glomerata	-	Priority 4	Low, erect, compact shrub growing to 0.3 m high. Produces pink flowers from October to December.	Clay loam, sand, loam soils. Margins of salt lakes, wetlands, rocky slopes of breakaways.	**Unlikely to occur** - Closest occurrence is 37.39 km east of the project area. Suitable habitat is unlikely to occur within the project area	ALA, DBCA
Grevillea aneura	-	Priority 4	Dense, prickly shrub, 0.5-2.8 m high. Produces red flowers from June or August to December or January.	Sand, sandy clay, gravel.	**Unlikely to occur** - Closest occurrence is >100 km south of the project area. Survey area is outside this species' known distribution	ALA
Grevillea asteriscosa	-	Priority 4	Divaricately branched shrub that grows between 0.3 to 2.6 m in height. Produces red flowers from May or July to November.	Gravelly or granitic soils. Gravel rises, granite outcrops.	**Unlikely to occur** - Closest occurrence is >100 km west of the project area. Survey area is outside this species' known distribution	ALA, Dandjoo

Species	EPBC Cons. Status	WA Cons. Status	Description*	Preferred Habitat	Likelihood of Occurrence	Source
Myriophyllum petraeum	-	Priority 4	Aquatic annual herb with stems 0.15-0.3 m long. Produces white flowers from August to December.	Strictly confined to ephemeral rock pools on granite outcrops.	**May occur [Medium]** - Five DBCA records occur within the study area. Only small portions of the same land systems and soils occur within the project area. Closest occurrence is 17.44 km north-west of the project area. Suitable habitat recorded during the RPS survey. However, due to distance this, it is considered this species 'May occur'.	ALA, Dandjoo, DBCA
Persoonia sulcata	-	Priority 4	Erect or decumbent, spreading shrub growing between 0.2 and 1 m high. Produces yellow flowers from September to November.	Grey sand, loam soils, with laterite or granitic soils. Ridgetop, slopes, flats, and gullies.	**Unlikely to occur** - Closest occurrence is >100 km west of the project area. The project area is outside this species' known distribution	Dandjoo
Sowerbaea multicaulis	-	Priority 4	Tufted perennial, herb growing from 0.075 to 0.25 m high. Produces purple-violet flowers from October to December or January.	Yellow-brown sand.	**Unlikely to occur** - Closest occurrence is 35.88 km west of the project area. Suitable habitat is unlikely to occur	ALA, Dandjoo, DBCA
Wurmbea murchisoniana	-	Priority 4	Perennial, hermaphrodite, bulbous herb growing 0.1-0.26 m high. Produces white flowers occurring from July to September.	Clay sandy loam, seasonally inundated clay hollows, rock pools.	**Unlikely to occur** - Closest occurrence is 74.0 km north-west of the project area. Survey area is outside this species' known distribution.	ALA, DBCA

APPENDIX E – FLORA INVENTORY

FAMILY	TAXON	STATUS
Aizoaceae	**Mesembryanthemum crystallinum*	Weed
Aizoaceae	**Mesembryanthemum*	Weed
Aizoaceae	*Disphyma crassifolium* subsp. *clavellatum*	
Aizoaceae	*Sarcozona ?praecox*	
Amaranthaceae	*Ptilotus carlsonii*	
Amaranthaceae	*Ptilotus exaltatus*	
Amaranthaceae	*Ptilotus holosericeus*	
Amaranthaceae	*Ptilotus obovatus*	
Apocynaceae	*Alyxia buxifolia*	
Apocynaceae	*Vincetoxicum lineare*	
Asparagaceae	*Lomandra effusa*	
Asparagaceae	*Thysanotus* sp.	
Asteraceae	**Sonchus oleraceus*	Weed
Asteraceae	*Asteraceae* sp.	
Asteraceae	*Asteridea athrixioides*	
Asteraceae	*Brachyscome ciliaris*	
Asteraceae	*Calotis hispidula*	
Asteraceae	*Calotis multicaulis*	
Asteraceae	*Cephalipterum drummondii*	
Asteraceae	*Cratystylis ?microphylla*	
Asteraceae	*Cratystylis conocephala*	
Asteraceae	*Cratystylis microphylla*	
Asteraceae	*Hyalochlamys globifera*	
Asteraceae	*Lemooria burkittii*	
Asteraceae	*Minuria gardneri*	
Asteraceae	*Notisia intonsa*	Priority 3
Asteraceae	*Olearia muelleri*	
Asteraceae	*Olearia pimeleoides*	
Asteraceae	*Rhodanthe chlorocephala* subsp. *rosea*	
Asteraceae	*Rhodanthe pygmaea*	
Asteraceae	*Rhodanthe rubella*	
Asteraceae	*Rhodanthe stricta*	
Asteraceae	*Schoenia cassiniana*	
Asteraceae	*Schoenia filifolia* subsp. *filifolia*	
Asteraceae	*Senecio glossanthus*	
Asteraceae	*Senecio lacustrinus*	
Asteraceae	*Siemssenia capillaris*	
Asteraceae	*Streptoglossa* sp.	
Asteraceae	*Waitzia fitzgibbonii*	
Boraginaceae	*Halgania andromedifolia*	
Brassicaceae	*Arabidella chrysodema*	
Casuarinaceae	*Allocasuarina ?acutivalvis*	
Casuarinaceae	*Allocasuarina* sp.	
Chenopodiaceae	*Atriplex codonocarpa*	
Chenopodiaceae	*Atriplex nummularia* subsp. *spathulata*	
Chenopodiaceae	*Atriplex vesicaria*	
Chenopodiaceae	*Chenopodium curvispicatum*	
Chenopodiaceae	*Enchylaena lanata*	

FAMILY	TAXON	STATUS
Chenopodiaceae	*Eriochiton sclerolaenoides*	
Chenopodiaceae	*Maireana ?carnosa*	
Chenopodiaceae	*Maireana ?erioclada*	
Chenopodiaceae	*Maireana brevifolia*	
Chenopodiaceae	*Maireana georgei*	
Chenopodiaceae	*Maireana marginata*	
Chenopodiaceae	*Maireana tomentosa* subsp. *tomentosa*	
Chenopodiaceae	*Maireana triptera*	
Chenopodiaceae	*Rhagodia drummondii*	
Chenopodiaceae	*Sclerolaena cuneata*	
Chenopodiaceae	*Sclerolaena diacantha*	
Chenopodiaceae	*Tecticornia* sp. 2	
Chenopodiaceae	*Tecticornia* sp.1	
Convolvulaceae	*Convolvulus clementii*	
Convolvulaceae	*Wilsonia ?humilis*	
Convolvulaceae	*Wilsonia humilis*	
Cyperaceae	*Lepidosperma* sp.	
Euphorbiaceae	*Bertya dimerostigma*	
Fabaceae	**Medicago minima*	Weed
Fabaceae	*Acacia burkittii*	
Fabaceae	*Acacia colletioides*	
Fabaceae	*Acacia eremophila* var. *eremophila*	
Fabaceae	*Acacia erinacea*	
Fabaceae	*Acacia hemiteles*	
Fabaceae	*Acacia merrallii*	
Fabaceae	*Acacia pachypoda*	
Fabaceae	*Acacia* sp. 1	
Fabaceae	*Acacia* sp. 2	
Fabaceae	*Acacia tetragonophylla*	
Fabaceae	*Bossiaea leptacantha*	
Fabaceae	*Glycyrrhiza acanthocarpa*	
Fabaceae	*Senna ?cardiosperma*	
Fabaceae	*Senna artemisioides* subsp. *filifolia*	
Fabaceae	*Senna stowardii*	
Fabaceae	*Trigonella suavissima*	
Frankeniaceae	*Frankenia* sp. 1	
Frankeniaceae	*Frankenia* sp. 2	
Geraniaceae	*Erodium cygnorum*	
Goodeniaceae	*Goodenia pusilliflora*	
Goodeniaceae	*Scaevola spinescens*	
Haloragaceae	*Haloragis gossei*	
Lamiaceae	*Prostanthera grylloana*	
Lamiaceae	*Westringia rigida*	
Loranthaceae	*Lysiana casuarinae*	
Malvaceae	*Lawrencia repens*	
Marsileaceae	*Marsilea ?drummondii*	
Marsileaceae	*Marsilea drummondii*	
Montiaceae	*Calandrinia* sp.	
Myrtaceae	*Eucalyptus aequioperta*	
Myrtaceae	*Eucalyptus celastroides*	
Myrtaceae	*Eucalyptus clelandiorum*	

FAMILY	TAXON	STATUS
Myrtaceae	*Eucalyptus griffithsii*	
Myrtaceae	*Eucalyptus horistes*	
Myrtaceae	*Eucalyptus longissima*	
Myrtaceae	*Eucalyptus loxophleba* subsp. *lissophloia*	
Myrtaceae	*Eucalyptus salmonophloia*	
Myrtaceae	*Eucalyptus salubris*	
Myrtaceae	*Eucalyptus transcontinentalis*	
Myrtaceae	*Melaleuca acuminata* subsp. *acuminata*	
Myrtaceae	*Melaleuca halmaturorum*	
Myrtaceae	*Melaleuca pauperiflora* subsp. *fastigiata*	
Myrtaceae	*Rinzia carnosa*	
Pittosporaceae	*Pittosporum angustifolium*	
Plantaginaceae	*Plantago debilis*	
Poaceae	**Rostraria pumila*	Weed
Poaceae	**Schismus arabicus*	Weed
Poaceae	*?Neurachne* sp.	
Poaceae	*Aristida contorta*	
Poaceae	*Austrostipa ?elegantissima*	
Poaceae	*Austrostipa scabra* subsp. *scabra*	
Poaceae	*Austrostipa* sp.	
Poaceae	*Poaceae* sp.	
Poaceae	*Sporobolus ramigerus*	
Poaceae	*Triodia ?scariosa*	
Polygonaceae	*Duma florulenta*	
Primulaceae	**Lysimachia arvensis*	Weed
Proteaceae	*Grevillea acuaria*	
Proteaceae	*Grevillea huegelii*	
Proteaceae	*Grevillea nematophylla* subsp. *nematophylla*	
Proteaceae	*Grevillea sarissa* subsp. *anfractifolia*	
Ranunculaceae	*Ranunculus pentandrus* var. *platycarpus*	
Rhamnaceae	*Cryptandra aridicola*	
Rhamnaceae	*Cryptandra crispula*	Priority 3
Rhamnaceae	*Cryptandra* sp.	
Rhamnaceae	*Trymalium myrtillus* subsp. *myrtillus*	
Rutaceae	*Phebalium tuberculosum*	
Santalaceae	*Exocarpos aphyllus*	
Santalaceae	*Santalum acuminatum*	
Santalaceae	*Santalum spicatum*	
Sapindaceae	*Dodonaea adenophora*	
Sapindaceae	*Dodonaea lobulata*	
Sapindaceae	*Dodonaea stenozyga*	
Sapindaceae	*Dodonaea viscosa* subsp. *angustissima*	
Scrophulariaceae	*Eremophila alternifolia*	
Scrophulariaceae	*Eremophila caerulea* subsp. *caerulea*	
Scrophulariaceae	*Eremophila caperata*	
Scrophulariaceae	*Eremophila decipiens* subsp. *decipiens*	
Scrophulariaceae	*Eremophila glabra* subsp. *glabra*	
Scrophulariaceae	*Eremophila interstans* subsp. *interstans*	
Scrophulariaceae	*Eremophila ionantha*	
Scrophulariaceae	*Eremophila maculata* subsp. *brevifolia*	
Scrophulariaceae	*Eremophila microphylla*	Priority 3

FAMILY	TAXON	STATUS
Scrophulariaceae	*Eremophila oppositifolia* subsp. *angustifolia*	
Scrophulariaceae	*Eremophila rugosa*	
Scrophulariaceae	*Eremophila scoparia*	
Scrophulariaceae	*Eremophila* sp.	
Scrophulariaceae	*Eremophila veronica*	Priority 3
Solanaceae	*Lycium australe*	
Solanaceae	*Solanum nummularium*	
Thymelaeaceae	*Pimelea microcephala* subsp. *microcephala*	
Thymelaeaceae	*Pimelea spiculigera* var. *thesioides*	
Violaceae	*Pigea curvifolia*	
Zygophyllaceae	*Roepera eremaea*	
Zygophyllaceae	*Roepera fruticulosa*	
Zygophyllaceae	*Roepera ovata*	
Zygophyllaceae	*Roepera reticulata*	
Zygophyllaceae	*Roepera tetraptera*	

APPENDIX F – RELEVE DATA

BG01r

Date	11/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	301798mE 6562219mN
Vegetation Unit	EsAbEs - Mixed Eucalyptus Open Woodland over *Acacia burkittii* and *Acacia hemiteles* Tall Sparse Shrubland over Mixed Open Shrubland
Slope	Flat
Landform	Plain
Soil Colour	Red
Soil Type	Clayey Loam
Litter	2%
Bare Ground	90%
Fire Age	>10 Years
Vegetation Condition	Very Good
Disturbances/Impacts	Cattle



Species	Height (m)	Cover (%)
Eucalyptus salubris	9	12
Santalum acuminatum	3	1.5
Exocarpos aphyllus	2	4
Acacia hemiteles	1.8	5
Senna artemisioides subsp. *filifolia*	1.2	5
Grevillea acuaria	1	7
Maireana marginata	0.2	0.5
Eriochiton sclerolaenoides	0.15	0.5
Erodium cygnorum	0.05	1
Alyxia buxifolia		+
Asteridea athrixioides		+
Atriplex nummularia subsp. *spathulata*		+
Austrostipa ?elegantissima		+
Austrostipa scabra subsp. *scabra*		+
Eremophila alternifolia		+
Eremophila glabra subsp. *glabra*		+
Lawrencia repens		+
Olearia muelleri		+
Olearia pimeleoides		+
Ptilotus exaltatus		+
Rhagodia drummondii		+
Roepera ovata		+
Scaevola spinescens		+
Sclerolaena diacantha		+
Thysanotus sp.		+
Vincetoxicum lineare		+

BG02r

Date	11/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	301930mE 6563378mN
Vegetation Unit	EsAaLa - *Eucalyptus salubris and E. salmonophloia* Open Woodland over *Acacia acuminata, Eremophila alternifolia* and *Santalum spicatum* Tall Shrubland over *Acacia hemiteles*, *Eremophila decipiens* subsp. *decipiens* and *Lycium australe* Shrubland over Low Open Shrubs
Slope	Flat
Landform	Plain
Soil Colour	Red
Soil Type	Clayey Loam
Litter	10%
Bare Ground	80%
Fire Age	>10 Years
Vegetation Condition	Very Good
Disturbances/Impacts	Cattle



Species	Height (m)	Cover (%)
Eucalyptus salmonophloia	16	5
Acacia burkittii	3	3
Eremophila ionantha	1.5	18
Acacia hemiteles	1.4	5
Atriplex nummularia subsp. *spathulata*	1	3
Ptilotus obovatus	0.5	8
Atriplex vesicaria	0.5	5
Maireana triptera	0.5	3
Aristida contorta		+
Cephalipterum drummondii		+
Convolvulus clementii		+
Enchylaena lanata		+
Eremophila decipiens subsp. *decipiens*		+
Erodium cygnorum		+
Lycium australe		+
Pittosporum angustifolium		+
Ptilotus exaltatus		+
Rhagodia drummondii		+
Roepera ovata		+
Schoenia cassiniana		+
Sclerolaena diacantha		+
Senna artemisioides subsp. *filifolia*		+
Solanum nummularium		+

BG03r

Date	11/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	302795mE 6563607mN
Vegetation Unit	EsAbEs - Mixed Eucalyptus Open Woodland over *Acacia burkittii* and *Acacia hemiteles* Tall Sparse Shrubland over Mixed Open Shrubland
Slope	Flat
Landform	Plain
Soil Colour	Red
Soil Type	Loamy Clay
Litter	40%
Bare Ground	50%
Fire Age	>10 Years
Vegetation Condition	Very Good
Disturbances/Impacts	None



Species	Height (m)	Cover (%)
Eucalyptus loxophleba subsp. *lissophloia*	11	8
Eremophila interstans subsp. *interstans*	4	4
Acacia burkittii	3	2
Exocarpos aphyllus	2.2	1
Senna artemisioides subsp. *filifolia*	1.5	5
Acacia hemiteles	1.3	2
Olearia muelleri	0.4	3
Alyxia buxifolia		+
Eremophila glabra subsp. *glabra*		+
Eremophila scoparia		+
Eriochiton sclerolaenoides		+
Erodium cygnorum		+
Grevillea acuaria		+
Maireana marginata		+
Olearia pimeleoides		+
Prostanthera grylloana		+
Roepera ovata		+
Santalum acuminatum		+
Scaevola spinescens		+
Solanum nummularium		+

BG04r

Date	14/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	303026mE 6564294 mN
Vegetation Unit	EsEiEs- *Eucalyptus salmonophloia, E. transcontinentalis* and *E. salubris* Open Woodland over *Eremophila interstans* subsp. *interstans* and *Santalum spicatum* Tall Open Shrubland over *Eremophila* spp. Shrubland over Open Tussock Grassland/ Low Open Shrubland
Slope	Gentle
Landform	Plain
Soil Colour	Orange
Soil Type	Clayey Loam
Litter	1%
Bare Ground	90%
Fire Age	>10 Years
Vegetation Condition	Very Good
Disturbances/Impacts	Drought - struggling alot dying off



Species	Height (m)	Cover (%)
Eucalyptus salmonophloia	10	4
Eucalyptus celastroides	8	2
Exocarpos aphyllus	2.1	2
Eremophila interstans subsp. *interstans*	1.8	10
Acacia hemiteles	1.4	2
Eremophila ionantha	1.3	13
Atriplex nummularia subsp. *spathulata*	0.4	0.5
Atriplex vesicaria	0.4	0.5
Olearia muelleri	0.3	1
Arabidella chrysodema		+
Austrostipa ?elegantissima		+
Austrostipa scabra subsp. *scabra*		+
Eremophila decipiens subsp. *decipiens*		+
Haloragis gossei		+
Lawrencia repens		+
Lycium australe		+
Notisia intonsa		+
Ptilotus carlsonii		+
Ptilotus exaltatus		+
Ptilotus holosericeus		+
Rhagodia drummondii		+
Scaevola spinescens		+
Sclerolaena cuneata		+

BG07r

Date	14/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	303350mE 6562727mN
Vegetation Unit	EcEs - *Eucalyptus celastroides* and *Eucalyptus salubris* Open Forest
Slope	Gentle
Landform	Plain
Soil Colour	Orange
Soil Type	Clayey Loam
Litter	95%
Bare Ground	4%
Fire Age	>10 Years
Vegetation Condition	Poor-Good
Disturbances/Impacts	None



Species	Height (m)	Cover (%)
Eucalyptus salubris	9	35
Eucalyptus celastroides	7	15
Alyxia buxifolia		+
Atriplex vesicaria		+
Eremophila glabra subsp. *glabra*		+
Eremophila interstans subsp. *interstans*		+
Eremophila oppositifolia subsp. *angustifolia*		+
**Lysimachia arvensis*		+
Olearia muelleri		+
Santalum acuminatum		+

BG08r

Date	14/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	304040mE 6563310mN
Vegetation Unit	EsEsAv - *Eucalyptus salmonophloia* and *Eucalyptus salubris* Open Woodland over *Eremophila scoparia* Sparse Shrubland over *Atriplex vesicaria* Low Open Shrubland
Slope	Gentle
Landform	Plain
Soil Colour	Brown
Soil Type	Clayey Loam
Litter	30%
Bare Ground	50%
Fire Age	>10 Years
Vegetation Condition	Very Good
Disturbances/Impacts	None



Species	Height (m)	Cover (%)
Eucalyptus salmonophloia	12	2
Eucalyptus salubris	7	2
Eucalyptus celastroides	6	4
Eremophila interstans subsp. *interstans*	2	1
Eremophila scoparia	2	1
Atriplex vesicaria	0.5	20
Olearia muelleri	0.5	1
Maireana tomentosa subsp. *tomentosa*	0.15	1
Sarcozona ?praecox	0.1	1
Senecio glossanthus	0.1	0.5
Alyxia buxifolia		+
Atriplex nummularia subsp. *spathulata*		+
Austrostipa scabra subsp. *scabra*		+
Eremophila glabra subsp. *glabra*		+
Frankenia sp.		+
Lawrencia repens		+
Maireana georgei		+
Rhodanthe stricta		+
Roepera tetraptera		+
**Rostraria pumila*		+
Scaevola spinescens		+
Sclerolaena cuneata		+

BG09r

Date	14/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	304241mE 6563831mN
Vegetation Unit	EsAbEs - Mixed Eucalyptus Open Woodland over *Acacia burkittii* and *Acacia hemiteles* Tall Sparse Shrubland over Mixed Open Shrubland
Slope	Flat
Landform	Plain
Soil Colour	Brown
Soil Type	Clayey Loam
Litter	1%
Bare Ground	90%
Fire Age	>10 Years
Vegetation Condition	Very Good
Disturbances/Impacts	None



Species	Height (m)	Cover (%)
Eucalyptus griffithsii	8	6
Eremophila interstans subsp. *interstans*	3	1
Eremophila scoparia	2	3
Alyxia buxifolia	2	2
Senna artemisioides subsp. *filifolia*	1.8	2
Scaevola spinescens	0.5	5
Grevillea acuaria	0.5	3
Olearia muelleri	0.4	1
Maireana georgei	0.15	0.5
Sclerolaena cuneata	0.1	0.5
Acacia burkittii		+
Acacia erinacea		+
Acacia hemiteles		+
Austrostipa ?elegantissima		+
Eremophila glabra subsp. *glabra*		+
Exocarpos aphyllus		+
Frankenia sp.		+
Lawrencia repens		+
Maireana marginata		+
Ptilotus exaltatus		+
Ptilotus obovatus		+
Rhagodia drummondii		+
Roepera tetraptera		+
Santalum acuminatum		+
Santalum spicatum		+
Sclerolaena diacantha		+
Siemssenia capillaris		+
Vincetoxicum lineare		+

BG10r

Date	15/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	305382mE 6564236mN
Vegetation Unit	EsAbEs - Mixed Eucalyptus Open Woodland over *Acacia burkittii* and *Acacia hemiteles* Tall Sparse Shrubland over Mixed Open Shrubland
Slope	Gentle
Landform	Plain
Soil Colour	Light Brown
Soil Type	Clayey Loam
Litter	10%
Bare Ground	80%
Fire Age	>10 Years
Vegetation Condition	Very Good
Disturbances/Impacts	None



Species	Height (m)	Cover (%)
Eucalyptus griffithsii	9	9
Eucalyptus longissima	9	1
Acacia burkittii	2.2	16
Alyxia buxifolia	1.7	17
Eremophila alternifolia	1.3	10
Scaevola spinescens	0.8	1
Dodonaea adenophora	0.6	1
Acacia hemiteles		+
Asteridea athrixioides		+
Austrostipa scabra subsp. scabra		+
Cephalipterum drummondii		+
Eremophila decipiens subsp. decipiens		+
Eriochiton sclerolaenoides		+
Erodium cygnorum		+
Exocarpos aphyllus		+
Grevillea acuaria		+
Haloragis gossei		+
**Lysimachia arvensis*		+
Maireana marginata		+
Notisia intonsa		+
Pigea curvifolia		+
Ptilotus carlsonii		+
Ptilotus obovatus		+
Santalum spicatum		+
Sclerolaena cuneata		+
Sclerolaena diacantha		+
Senna artemisioides subsp. filifolia		+
Solanum nummularium		+
Vincetoxicum lineare		+

BG11r

Date	15/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	305238mE 6562285mN
Vegetation Unit	EsAbEs - Mixed Eucalyptus Open Woodland over *Acacia burkittii* and *Acacia hemiteles* Tall Sparse Shrubland over Mixed Open Shrubland
Slope	Flat
Landform	Plain
Soil Colour	Light Brown
Soil Type	Cracking Clay
Litter	10%
Bare Ground	80%
Fire Age	>10 Years
Vegetation Condition	Very Good
Disturbances/Impacts	None



Species	Height (m)	Cover (%)
Eucalyptus clelandiorum	8	6
Eucalyptus griffithsii	6	4
Eucalyptus loxophleba subsp. *lissophloia*	5	8
Acacia burkittii	2.2	3
Alyxia buxifolia	1.8	8
Trymalium myrtillus subsp. *myrtillus*	0.6	6
Acacia erinacea	0.5	3
Grevillea acuaria	0.5	2
Scaevola spinescens	0.4	6
Acacia hemiteles		+
Allocasuarina ?acutivalvis		+
Austrostipa ?elegantissima		+
Austrostipa scabra subsp. *scabra*		+
Dodonaea adenophora		+
Eremophila interstans subsp. *interstans*		+
Eremophila oppositifolia subsp. *angustifolia*		+
Eremophila scoparia		+
Exocarpos aphyllus		+
Grevillea nematophylla subsp. *nematophylla*		+
Olearia muelleri		+
Pigea curvifolia		+
Santalum acuminatum		+
Santalum spicatum		+

BG12r

Date	15/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	305937mE 6562813mN
Vegetation Unit	EsEiEs - *Eucalyptus salmonophloia, E. transcontinentalis* and *E. salubris* Open Woodland over *Eremophila interstans* subsp. *interstans* and *Santalum spicatum* Tall Open Shrubland over *Eremophila* spp. Shrubland over Open Tussock Grassland/ Low Open Shrubland
Slope	Flat
Landform	Plain
Soil Colour	Light Brown
Soil Type	Cracking Clay
Litter	10%
Bare Ground	80%
Fire Age	>10 Years
Vegetation Condition	Very Good
Disturbances/Impacts	None



Species	Height (m)	Cover (%)
Eucalyptus salmonophloia	12	7
Exocarpos aphyllus	2.2	2
Eremophila scoparia	1.9	1
Eremophila ionantha	1.6	1
Senna artemisioides subsp. *filifolia*	1.5	1
Atriplex nummularia subsp. *spathulata*	0.5	8
Atriplex vesicaria	0.3	5
Sclerolaena diacantha	0.15	0.5
Sclerolaena cuneata	0.1	0.5
**Schismus arabicus*	0.05	3
Plantago debilis	0.05	1
Acacia hemiteles		+
Arabidella chrysodema		+
Calandrinia sp.		+
Calotis multicaulis		+
Erodium cygnorum		+
Lawrencia repens		+
Lysiana casuarinae		+
Maireana georgei		+
**Maireana tomentosa* subsp. *tomentosa*		+
**Mesembryanthemum crystallinum*		+
**Mesembryanthemum nodiflorum*		+
Notisia intonsa		+
Pittosporum angustifolium		+
Ptilotus exaltatus		+
Rhagodia drummondii		+
Roepera eremaea		+
Roepera tetraptera		+
Eucalyptus celastroides		ASS
Eucalyptus griffithsii		ASS

BG13r

Date	15/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	304878mE 6562621mN
Vegetation Unit	EsEiEs- *Eucalyptus salmonophloia, E. transcontinentalis* and *E. salubris* Open Woodland over *Eremophila interstans* subsp. *interstans* and *Santalum spicatum* Tall Open Shrubland over *Eremophila* spp. Shrubland over Open Tussock Grassland/ Low Open Shrubland
Slope	Gentle
Landform	Mid Slope
Soil Colour	Light Brown
Soil Type	Clayey Loam
Litter	1%
Bare Ground	10%
Fire Age	>10 Years
Vegetation Condition	Very Good
Disturbances/Impacts	None



Species	Height (m)	Cover (%)
Eucalyptus salmonophloia	12	2
Eremophila interstans subsp. *interstans*	2.3	3
Eremophila scoparia	1.7	1
Eremophila glabra subsp. *glabra*	1.6	2
Eremophila ionantha	1.6	0.5
Atriplex nummularia subsp. *spathulata*	0.5	11
Atriplex vesicaria	0.4	18
Ptilotus obovatus	0.3	1
Rhagodia drummondii	0.3	1
Sclerolaena diacantha	0.2	0.5
Acacia hemiteles		+
Acacia tetragonophylla		+
Chenopodium curvispicatum		+
Dodonaea lobulata		+
Enchylaena lanata		+
Eremophila alternifolia		+
Exocarpos aphyllus		+
Maireana georgei		+
Sarcozona ?praecox		+
Sclerolaena cuneata		+
Senna artemisioides subsp. *filifolia*		+
Solanum nummularium		+
Eucalyptus salubris		ASS

BG14r

Date	15/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	305766mE 6562151mN
Vegetation Unit	EsAbEs - Mixed Eucalyptus Open Woodland over *Acacia burkittii* and *Acacia hemiteles* Tall Sparse Shrubland over Mixed Open Shrubland
Slope	Gentle
Landform	Plain
Soil Colour	Light Brown
Soil Type	Clayey Loam
Litter	2%
Bare Ground	95%
Fire Age	>10 Years
Vegetation Condition	Very Good
Disturbances/Impacts	None



Species	Height (m)	Cover (%)
Eucalyptus griffithsii	10	4
Grevillea nematophylla subsp. *nematophylla*	3	2
Acacia burkittii	2.5	7
Eremophila oppositifolia subsp. *angustifolia*	2.1	7
Acacia hemiteles	1.9	2
Scaevola spinescens	0.9	4
Prostanthera grylloana	0.7	1
Acacia tetragonophylla		+
Alyxia buxifolia		+
Eremophila glabra subsp. *glabra*		+
Eremophila sp.		+
Exocarpos aphyllus		+
Grevillea acuaria		+
Olearia muelleri		+
Olearia pimeleoides		+
Trymalium myrtillus subsp. *myrtillus*		+
Allocasuarina sp.		ASS

BG15r

Date	13/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	298478mE 6555725mN
Vegetation Unit	AvAc - *Atriplex vesicaria* and *Atriplex codonocarpa* Low sparse chenopodland
Slope	Gentle
Landform	Swale - Clay Pan
Soil Colour	Orange
Soil Type	Cracking Clay
Litter	0.5%
Bare Ground	98%
Fire Age	>10 Years
Vegetation Condition	Good-Very Good
Disturbances/Impacts	None



Species	Height (m)	Cover (%)
Atriplex codonocarpa	0.3	6
Atriplex vesicaria	0.3	2
Asteraceae sp.		+
Eremophila decipiens subsp. *decipiens*		+
Maireana brevifolia		+
Sclerolaena cuneata		+
Senna ?cardiosperma		+
Sporobolus ramigerus		+
Trigonella suavissima		+

BG16r

Date	13/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	299913mE 6556308mN
Vegetation Unit	AvMmPd - *Atriplex vesicaria, Maireana maginata* and *Plantago debilis* Low Shrubland
Slope	Flat
Landform	Flood Plain
Soil Colour	Orange
Soil Type	Cracking Clay
Litter	0.5%
Bare Ground	95%
Fire Age	>10 Years
Vegetation Condition	Good-Very Good
Disturbances/Impacts	None



Species	Height (m)	Cover (%)
Eremophila decipiens subsp. *decipiens*	0.5	0.5
Atriplex vesicaria	0.4	0.5
Maireana marginata	0.1	0.5
Rhodanthe chlorocephala subsp. *rosea*	0.05	2
Aristida contorta		+
Erodium cygnorum		+
Frankenia sp.		+
Lawrencia repens		+
Maireana tomentosa subsp. *tomentosa*		+
Maireana triptera		+
**Mesembryanthemum crystallinum*		+
?Neurachne sp.		+
Plantago debilis		+
Ptilotus holosericeus		+
Rhodanthe pygmaea		+
Sclerolaena cuneata		+
Sclerolaena diacantha		+
Senna stowardii		+

BG17r

Date	13/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	301635mE 6556924mN
Vegetation Unit	EsEiSa - *Eucalyptus salubris* Open Woodland over *Eremophila ionantha* and *Eremophila scoparia* and *Senna artemisioides* subsp. *filifolia* Open Shrubland
Slope	Flat
Landform	Plain
Soil Colour	Orange
Soil Type	Clayey Loam
Litter	20%
Bare Ground	70%
Fire Age	>10 Years
Vegetation Condition	Good-Very Good
Disturbances/Impacts	Drought - struggling alot dying off



Species	Height (m)	Cover (%)
Eucalyptus salmonophloia	13	12
Eucalyptus salubris	10	9
Acacia hemiteles	1.5	12
Eremophila ionantha	1.4	14
Eremophila scoparia	1.4	3
Senna artemisioides subsp. *filifolia*	1.2	6
Scaevola spinescens	0.5	18
Acacia colletioides		+
Austrostipa ?elegantissima		+
Exocarpos aphyllus		+
Grevillea acuaria		+
Olearia muelleri		+
Santalum acuminatum		+

BG18r

Date	13/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	304787mE 6557859mN
Vegetation Unit	EsEsAv - *Eucalyptus salmonophloia* and *Eucalyptus salubris* Open Woodland over *Eremophila scoparia* Sparse Shrubland over *Atriplex vesicaria* Low Open Shrubland
Slope	Flat
Landform	Plain
Soil Colour	Orange
Soil Type	Clay
Litter	20%
Bare Ground	70%
Fire Age	>10 Years
Vegetation Condition	Good-Very Good
Disturbances/Impacts	Cattle



Species	Height (m)	Cover (%)
Eucalyptus salmonophloia	12	4
Eucalyptus salubris	7	5
Eremophila scoparia	1.6	3
Cratystylis microphylla	1.4	7
Mixed Chenopods	0.5	1
Atriplex vesicaria	0.4	3
Acacia colletioides		+
Austrostipa scabra subsp. *scabra*		+
Cratystylis conocephala		+
Eremophila decipiens subsp. *decipiens*		+
Eremophila glabra subsp. *glabra*		+
Frankenia sp.		+
Lawrencia repens		+
Maireana marginata		+
Maireana tomentosa subsp. *tomentosa*		+
?Neurachne sp.		+
Olearia muelleri		+
Ptilotus exaltatus		+
Santalum acuminatum		+
Sclerolaena cuneata		+
Sclerolaena diacantha		+

BG19r

Date	13/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	306656mE 6558095mN
Vegetation Unit	EsEiSa - *Eucalyptus salubris* Open Woodland over *Eremophila ionantha* and *Eremophila scoparia* and *Senna artemisioides* subsp. *filifolia* Open Shrubland
Slope	Flat
Landform	Plain
Soil Colour	Orange
Soil Type	Clayey Loam
Litter	30%
Bare Ground	60%
Fire Age	>10 Years
Vegetation Condition	Good-Very Good
Disturbances/Impacts	Drought - struggling alot dying off



Species	Height (m)	Cover (%)
Eucalyptus salmonophloia	10	7
Eucalyptus salubris	8	5
Acacia sp.	4	5
Eremophila ionantha	1.6	8
Eremophila scoparia	1.5	8
Senna artemisioides subsp. *filifolia*	1.4	4
Roepera tetraptera	0.1	1
Acacia colletioides		+
Acacia eremophila var. *eremophila*		+
Acacia hemiteles		+
Atriplex nummularia subsp. *spathulata*		+
Austrostipa ?elegantissima		+
Austrostipa scabra subsp. *scabra*		+
Eriochiton sclerolaenoides		+
Exocarpos aphyllus		+
Olearia muelleri		+
Santalum acuminatum		+

BG20r

Date	13/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	308354mE 6558959mN
Vegetation Unit	AvMmPd - *Atriplex vesicaria, Maireana maginata* and *Plantago debilis* Low Shrubland
Slope	Flat
Landform	Drainage
Soil Colour	Brown
Soil Type	Cracking Clay
Litter	1%
Bare Ground	70%
Fire Age	>10 Years
Vegetation Condition	Good
Disturbances/Impacts	Drought - struggling alot dying off



Species	Height (m)	Cover (%)
Atriplex vesicaria	0.4	1
Rhagodia drummondii	0.3	0.5
Cephalipterum drummondii	0.1	4
Plantago debilis	0.05	6
Ptilotus carlsonii	0.05	0.5
Arabidella chrysodema		+
Maireana marginata		+
**Medicago minima*		+
Notisia intonsa		+
Ptilotus holosericeus		+
Rhodanthe pygmaea		+
Roepera reticulata		+
Sclerolaena cuneata		+
Sclerolaena diacantha		+
Acacia hemiteles		ASS

BG21r

Date	12/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	312370mE 6556635mN
Vegetation Unit	EsEiSa - *Eucalyptus salubris* Open Woodland over *Eremophila ionantha* and *Eremophila scoparia* and *Senna artemisioides* subsp. *filifolia* Open Shrubland
Slope	Gentle
Landform	Plain
Soil Colour	Red
Soil Type	Clayey Loam
Litter	20%
Bare Ground	80%
Fire Age	>10 Years
Vegetation Condition	Very Good
Disturbances/Impacts	None



Species	Height (m)	Cover (%)
Eucalyptus salubris	12	2
Eucalyptus celastroides	6	6
Eucalyptus horistes	6	8
Exocarpos aphyllus	4	2
Acacia sp.	3.5	4
Santalum acuminatum	2	2
Senna artemisioides subsp. *filifolia*	2	10
Eremophila ionantha	0.6	3
Grevillea acuaria	0.5	13
Halgania andromedifolia	0.5	8
Mixed Chenopods	0.15	1
Acacia colletioides		+
Acacia hemiteles		+
Austrostipa ?elegantissima		+
Eremophila rugosa		+
Erodium cygnorum		+
Maireana georgei		+
Maireana tomentosa subsp. *tomentosa*		+
Olearia pimeleoides		+
Ptilotus exaltatus		+
Rhagodia drummondii		+
Sclerolaena diacantha		+
Thysanotus sp.		+

BG22r

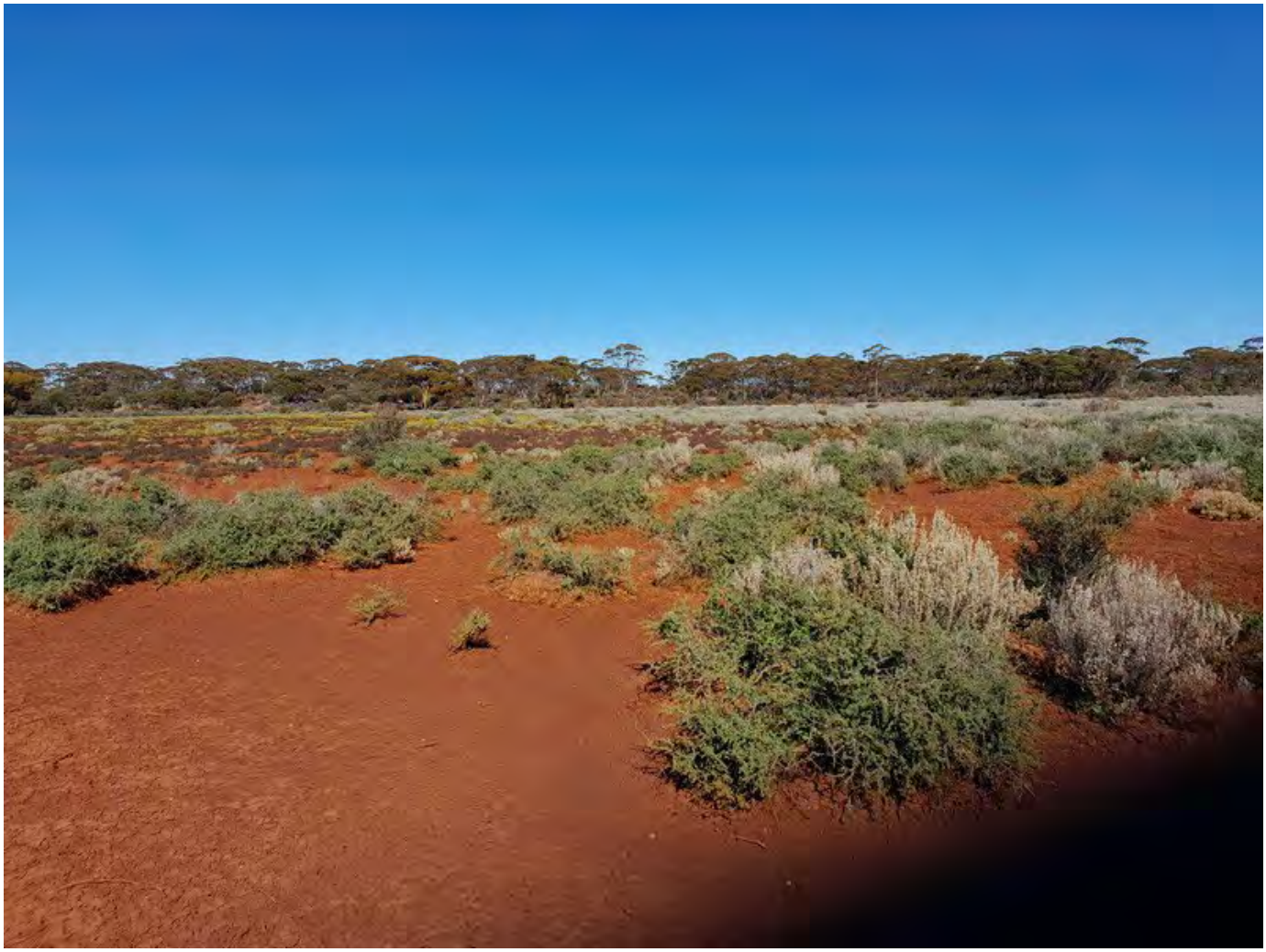
Date	12/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	313467mN 6554366mE
Vegetation Unit	MhMp - *Melaleuca halmaturorum* and *Melaleuca pauperiflora* subsp. *fastigiata* Tall Shrubland
Slope	Flat
Landform	Plain
Soil Colour	Orange
Soil Type	Sandy Loam
Litter	2%
Bare Ground	90%
Fire Age	>10 Years
Vegetation Condition	Poor
Disturbances/Impacts	None



Species	Height (m)	Cover (%)
Melaleuca pauperiflora subsp. *fastigiata*	4	7
Melaleuca halmaturorum	1.8	5
Eremophila decipiens subsp. *decipiens*		+
Exocarpos aphyllus		+
Olearia muelleri		+

BG23r

Date	12/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	315009mE 6555439mN
Vegetation Unit	MhScSs - *Melaleuca halmaturorum* and *Melaleuca pauperiflora* subsp. *fastigiata* Tall Shrubland over *Sclerolaena cuneata, Atriplex vesicaria* Low Open Shrubland and *Lycium australe* over *Streptoglossa* sp. Open Herbland
Slope	Flat
Landform	Flood Plain
Soil Colour	Brown
Soil Type	Cracking Clay
Litter	1%
Bare Ground	90%
Fire Age	>10 Years
Vegetation Condition	Very Good
Disturbances/Impacts	Cattle



Species	Height (cm)	Cover (%)
Melaleuca pauperiflora subsp. *fastigiata*	4	7
Melaleuca halmaturorum	1.8	5
Lycium australe	0.5	18
Atriplex vesicaria	0.4	7
Disphyma crassifolium subsp. *clavellatum*	0.1	2
Sclerolaena cuneata	0.1	4
Streptoglossa sp.	0.05	4
Lycium australe		+
Atriplex codonocarpa		+
Austrostipa ?elegantissima		+
Duma florulenta		+
Eremophila decipiens subsp. *decipiens*		+
Eremophila maculata subsp. *brevifolia*		+
Exocarpos aphyllus		+
**Lysimachia arvensis*		+
Marsilea ?drummondii		+
Olearia muelleri		+
Senecio lacustrinus		+
**Sonchus oleraceus*		+

BG24r

Date	12/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	316729mE 6555525mN
Vegetation Unit	AvSc - *Atriplex vesicaria,Disphyma crassifolium* subsp. *clavellatum* and *Sclerolaena cuneata* Low Open Shrubland
Slope	Flat
Landform	Salt Plain
Soil Colour	Brown
Soil Type	Cracking Clay
Litter	1%
Bare Ground	90%
Fire Age	>10 Years
Vegetation Condition	Good-Very Good
Disturbances/Impacts	None



Species	Height (m)	Cover (%)
Atriplex vesicaria	0.6	18
Maireana tomentosa subsp. *tomentosa*	0.2	2
Sclerolaena cuneata	0.15	3
Disphyma crassifolium subsp. *clavellatum*	0.05	5
Austrostipa sp.		+
Brachyscome ciliaris		+
Calotis hispidula		+
Eremophila decipiens subsp. *decipiens*		+
Frankenia sp.		+
Goodenia pusilliflora		+
Hyalochlamys globifera		+
Lemooria burkittii		+
Lycium australe		+
**Lysimachia arvensis*		+
Maireana georgei		+
Marsilea drummondii		+
Minuria gardneri		+
Poaceae sp.		+
Ptilotus exaltatus		+
Rhodanthe stricta		+
Schoenia filifolia subsp. *filifolia*		+
Sclerolaena diacantha		+
**Sonchus oleraceus*		+
Tecticornia sp.1		+
Tecticornia sp.2		+

BG25r

Date	12/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	318250mE 6555029mN
Vegetation Unit	EsAhTs - *Eucalyptus salubris, Eucalyptus aequioperta* and *Melaleuca pauperiflora* subsp. *Fastigiata* Open Woodland over *Acacia hemiteles* Tall Open Shrubland over *Dodonaea viscosa* subsp. *angustissima* and *Senna artemisioides* subsp. *filifolia* over Halgania andromedifolia, *Triodia* ?*scariosa* and *Westringia rigida* Sparse Hummock Grassland/Shrubland
Slope	Flat
Landform	Plain
Soil Colour	Orange
Soil Type	Loamy Sand
Litter	2%
Bare Ground	90%
Fire Age	>10 Years
Vegetation Condition	Very Good
Disturbances/Impacts	None



Species	Height (m)	Cover (%)
Eucalyptus salubris	12	4
Eucalyptus aequioperta	8	1
Melaleuca pauperiflora subsp. *fastigiata*	6	3
Acacia hemiteles	2	14
Dodonaea viscosa subsp. *angustissima*	1.8	12
Senna artemisioides subsp. *filifolia*	1.6	6
Halgania andromedifolia	0.8	3
Westringia rigida	0.5	2
Triodia ?scariosa	0.3	2
Acacia colletioides		+
Acacia merrallii		+
Austrostipa ?elegantissima		+
Eremophila scoparia		+
Exocarpos aphyllus		+
Grevillea acuaria		+
Lomandra effusa		+
Maireana ?carnosa		+
Maireana triptera		+
Olearia muelleri		+
Santalum acuminatum		+

BG28r

Date	14/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	327876mE 6561871mN
Vegetation Unit	DfLbRp - *Ranunculus pentandrus* var. *platycarpus, Lemooria burkittii* and *Duma florulenta* Open Herbland
Slope	Flat
Landform	Drainage
Soil Colour	Brown
Soil Type	Cracking Clay
Litter	0.5%
Bare Ground	80%
Fire Age	>10 Years
Vegetation Condition	Poor
Disturbances/Impacts	Cattle



Species	Height (m)	Cover (%)
Duma florulenta	1.8	4
Lemooria burkittii	0.01	5
Ranunculus pentandrus var. *platycarpus*	0.01	20
Glycyrrhiza acanthocarpa		+

BG30r

Date	14/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	304605mE 6564361mN
Vegetation Unit	EsAbEs - Mixed Eucalyptus Open Woodland over *Acacia burkittii* and *Acacia hemiteles* Tall Sparse Shrubland over Mixed Open Shrubland
Slope	Gentle
Landform	Upper Slope
Soil Colour	Brown
Soil Type	Clayey Loam
Litter	2%
Bare Ground	1%
Fire Age	>10 Years
Vegetation Condition	Very Good
Disturbances/Impacts	None



Species	Height (cm)	Cover (%)
Eucalyptus clelandiorum	6	3
Exocarpos aphyllus	2.1	1
Eremophila oppositifolia subsp. *angustifolia*	1.9	1
Eremophila scoparia	1.9	0.5
Dodonaea stenozyga	1.8	3
Scaevola spinescens	0.5	2.5
Acacia erinacea	0.4	2
Grevillea acuaria	0.4	1
Sclerolaena cuneata	0.1	0.5
Acacia colletioides		+
Alyxia buxifolia		+
Asteridea athrixioides		+
Cratystylis conocephala		+
Eremophila glabra subsp. *glabra*		+
Olearia muelleri		+
Roepera fruticulosa		+
Waitzia fitzgibbonii		+

BG31r

Date	15/08/2025
Botanist	Sarah Beckwith & Taryn Brebner
Quadrat Size	Relevé
NW Corner Coordinates	306296mE 6562567mN
Vegetation Unit	EsAbEs - Mixed Eucalyptus Open Woodland over *Acacia burkittii* and *Acacia hemiteles* Tall Sparse Shrubland over Mixed Open Shrubland
Slope	Gentle
Landform	Mid Slope
Soil Colour	Light Brown
Soil Type	Clayey Loam
Litter	10%
Bare Ground	80%
Fire Age	>10 Years
Vegetation Condition	Very Good
Disturbances/Impacts	None



Species	Height (m)	Cover (%)
Eucalyptus clelandiorum	7	5
Eucalyptus longissima	7	3
Acacia burkittii	3	18
Eremophila oppositifolia subsp. *angustifolia*	2.3	10
Acacia tetragonophylla	2.2	2
Dodonaea lobulata	1.3	5
Cryptandra aridicola	0.9	21
Acacia hemiteles		+
Acacia tetragonophylla		+
Alyxia buxifolia		+
Eremophila ionantha		+
Exocarpos aphyllus		+
Grevillea nematophylla subsp. *nematophylla*		+
Olearia muelleri		+
Phebalium tuberculosum		+
Scaevola spinescens		+
Trymalium myrtillus subsp. myrtillus		+
Westringia rigida		+

APPENDIX G – LOCATIONS OF SIGNIFICANT FLORA

Species	WA Cons. Status	Recorded Relevé (or from Targeted Searches)	Abundance	Coordinates (GDA2020, MGA Zone 50)	
				Easting (mE)	Northing (mN)
**Acacia crenulata*	P3	Opportunistic	6	300278	6565676
Cryptandra crispula	P3	Opportunistic	1	318276	6555212
Cryptandra crispula	P3	Opportunistic	1	318265	6555162
Cryptandra crispula	P3	Opportunistic	2	313556	6554287
Cryptandra crispula	P3	Opportunistic	1	313562	6554303
Cryptandra crispula	P3	Opportunistic	3	313637	6554491
Cryptandra crispula	P3	Opportunistic	10	318349	6555225
Cryptandra crispula	P3	Opportunistic	2	318329	6555219
Cryptandra crispula	P3	Opportunistic	10	313536	6554496
Cryptandra crispula	P3	Opportunistic	1	313526	6554295
Eremophila microphylla	P3	Opportunistic	2	302138	6563370
Eremophila veronica	P3	Opportunistic	15	301884	6556864
Eremophila veronica	P3	Opportunistic	4	301693	6562451
Eremophila veronica	P3	Opportunistic	1	301679	6562455
Eremophila veronica	P3	Opportunistic	15	301631	6562509
Eremophila veronica	P3	Opportunistic	21	301855	6562540
Eremophila veronica	P3	Opportunistic	19	301935	6562543
Notisia intonsa	P3	BG04R	1	303026	6564294
Notisia intonsa	P3	BG20R	1	308354	6558959
Notisia intonsa	P3	BG10R	1	305382	6564236
Notisia intonsa	P3	BG12R	1	305937	6562813
Notisia intonsa	P3	Opportunistic	25	301700	6562444
Notisia intonsa	P3	Opportunistic	22	302702	6563732
Notisia intonsa	P3	Opportunistic	20	311216	6559579
**Notisia intonsa*	P3	Opportunistic	1000	300698	6567224
**Notisia intonsa*	P3	Opportunistic	20	300136	6567082
**Notisia intonsa*	P3	Opportunistic	2	300819	6570507
**Notisia intonsa*	P3	Opportunistic	50	299637	6571610
**Notisia intonsa*	P3	Opportunistic	100	300215	6572350
**Notisia intonsa*	P3	Opportunistic	20	300894	6564875
**Notisia intonsa*	P3	Opportunistic	3	299719	6569459
**Notisia intonsa*	P3	Opportunistic	300	300112	6565121
**Notisia intonsa*	P3	Opportunistic	50	299951	6565854
**Notisia intonsa*	P3	Opportunistic	6	300698	6567224

*Recorded by Botanica 2021

APPENDIX H – FLORA SPECIES BY VEGETATION UNIT

* = introduced (weed) species

Family	Taxon	AvAc	AvMmPd	AvSc	DfLbRp	EcEs	EsAaLa	EsAbEs	EsAhTs	EsEiEs	EsEiSa	EsEsAv	MhMp	MhScSs
Aizoaceae	**Mesembryanthemum crystallinum*		+							+				
Aizoaceae	**Mesembryanthemum nodiflorum*									+				
Aizoaceae	*Disphyma crassifolium* subsp. *clavellatum*			+										+
Aizoaceae	*Sarcozona ?praecox*									+		+		
Amaranthaceae	*Ptilotus carlsonii*		+					+		+				
Amaranthaceae	*Ptilotus exaltatus*			+			+	+		+	+	+		
Amaranthaceae	*Ptilotus holosericeus*		+							+				
Amaranthaceae	*Ptilotus obovatus*						+	+		+				
Apocynaceae	*Alyxia buxifolia*					+		+				+		
Apocynaceae	*Vincetoxicum lineare*							+						
Asparagaceae	*Lomandra effusa*								+		+			
Asparagaceae	*Thysanotus* sp.							+			+			
Asteraceae	**Sonchus oleraceus*			+										+
Asteraceae	Asteraceae sp.	+												
Asteraceae	*Asteridea athrixioides*							+						
Asteraceae	*Brachyscome ciliaris*			+										
Asteraceae	*Calotis hispidula*			+										
Asteraceae	*Calotis multicaulis*									+				
Asteraceae	*Cephalipterum drummondii*		+				+	+						
Asteraceae	*Cratystylis ?microphylla*									+				
Asteraceae	*Cratystylis conocephala*							+				+		
Asteraceae	*Cratystylis microphylla*											+	+	

Family	Taxon	AvAc	AvMmPd	AvSc	DfLbRp	EcEs	EsAaLa	EsAbEs	EsAhTs	EsEiEs	EsEiSa	EsEsAv	MhMp	MhScSs
Asteraceae	*Hyalochlamys globifera*			+										
Asteraceae	*Lemooria burkittii*			+	+									
Asteraceae	*Minuria gardneri*			+										
Asteraceae	*Notisia intonsa* (P3)		+					+		+	+			
Asteraceae	*Olearia muelleri*					+		+	+	+	+	+	+	+
Asteraceae	*Olearia pimeleoides*							+			+			
Asteraceae	*Rhodanthe chlorocephala* subsp. *rosea*		+											
Asteraceae	*Rhodanthe pygmaea*		+											
Asteraceae	*Rhodanthe rubella*							+						
Asteraceae	*Rhodanthe stricta*			+								+		
Asteraceae	*Schoenia cassiniana*						+							
Asteraceae	*Schoenia filifolia* subsp. *filifolia*			+										
Asteraceae	*Senecio glossanthus*											+		
Asteraceae	*Senecio lacustrinus*													+
Asteraceae	*Siemssenia capillaris*							+						
Asteraceae	*Streptoglossa* sp.													+
Asteraceae	*Waitzia fitzgibbonii*							+						
Boraginaceae	*Halgania andromedifolia*								+		+			
Brassicaceae	*Arabidella chrysodema*		+					+		+				
Casuarinaceae	*Allocasuarina ?acutivalvis*							+						
Casuarinaceae	*Allocasuarina* sp.							+						
Chenopodiaceae	*Atriplex codonocarpa*	+												+
Chenopodiaceae	*Atriplex nummularia* subsp. *spathulata*						+	+		+	+	+		
Chenopodiaceae	*Atriplex vesicaria*	+	+	+		+	+			+		+		+
Chenopodiaceae	*Chenopodium curvispicatum*									+				

Family	Taxon	AvAc	AvMmPd	AvSc	DfLbRp	EcEs	EsAaLa	EsAbEs	EsAhTs	EsEiEs	EsEiSa	EsEsAv	MhMp	MhScSs
Chenopodiaceae	*Enchylaena lanata*						+			+				
Chenopodiaceae	*Eriochiton sclerolaenoides*							+			+			
Chenopodiaceae	*Maireana ?carnosa*								+					
Chenopodiaceae	*Maireana ?erioclada*										+			
Chenopodiaceae	*Maireana brevifolia*	+												
Chenopodiaceae	*Maireana georgei*			+				+		+	+	+		
Chenopodiaceae	*Maireana marginata*		+					+				+		
Chenopodiaceae	*Maireana tomentosa* subsp. *tomentosa*		+	+						+	+	+		
Chenopodiaceae	*Maireana triptera*		+				+		+					
Chenopodiaceae	*Rhagodia drummondii*		+				+	+		+	+			
Chenopodiaceae	*Sclerolaena cuneata*	+	+	+				+		+		+		+
Chenopodiaceae	*Sclerolaena diacantha*		+	+			+	+		+	+	+		
Chenopodiaceae	*Tecticornia* sp. 2			+										
Chenopodiaceae	*Tecticornia* sp.1			+										
Convolvulaceae	*Convolvulus clementii*						+							
Convolvulaceae	*Wilsonia ?humilis*											+		
Convolvulaceae	*Wilsonia humilis*											+		
Cyperaceae	*Lepidosperma* sp.								+					
Euphorbiaceae	*Bertya dimerostigma*								+					
Fabaceae	**Medicago minima*		+											
Fabaceae	*Acacia burkittii*						+	+						
Fabaceae	*Acacia colletioides*							+	+		+	+		
Fabaceae	*Acacia eremophila* var. *eremophila*								+		+			
Fabaceae	*Acacia erinacea*							+						
Fabaceae	*Acacia hemiteles*		+				+	+	+	+	+			

Family	Taxon	AvAc	AvMmPd	AvSc	DfLbRp	EcEs	EsAaLa	EsAbEs	EsAhTs	EsEiEs	EsEiSa	EsEsAv	MhMp	MhScSs
Fabaceae	*Acacia merrallii*								+					
Fabaceae	*Acacia pachypoda*							+						
Fabaceae	*Acacia* sp. 1										+			
Fabaceae	*Acacia* sp. 2										+			
Fabaceae	*Acacia tetragonophylla*							+		+				
Fabaceae	*Bossiaea leptacantha*								+					
Fabaceae	*Glycyrrhiza acanthocarpa*				+									
Fabaceae	*Senna ?cardiosperma*	+												
Fabaceae	*Senna artemisioides* subsp. *filifolia*						+	+	+	+	+			
Fabaceae	*Senna stowardii*		+											
Fabaceae	*Trigonella suavissima*	+												
Frankeniaceae	*Frankenia* sp. 1			+				+				+		
Frankeniaceae	*Frankenia* sp. 2		+											
Geraniaceae	*Erodium cygnorum*		+				+	+		+	+			
Goodeniaceae	*Goodenia pusilliflora*			+										
Goodeniaceae	*Scaevola spinescens*							+		+	+	+		
Haloragaceae	*Haloragis gossei*							+		+				
Lamiaceae	*Prostanthera grylloana*							+						
Lamiaceae	*Westringia rigida*							+	+					
Loranthaceae	*Lysiana casuarinae*									+				
Malvaceae	*Lawrencia repens*		+					+		+		+		
Marsileaceae	*Marsilea ?drummondii*													+
Marsileaceae	*Marsilea drummondii*			+										
Montiaceae	*Calandrinia* sp.									+				
Myrtaceae	*Eucalyptus aequioperta*								+					

Family	Taxon	AvAc	AvMmPd	AvSc	DfLbRp	EcEs	EsAaLa	EsAbEs	EsAhTs	EsEiEs	EsEiSa	EsEsAv	MhMp	MhScSs
Myrtaceae	*Eucalyptus celastroides*					+				+	+	+		
Myrtaceae	*Eucalyptus clelandiorum*							+						
Myrtaceae	*Eucalyptus griffithsii*						+	+		+				
Myrtaceae	*Eucalyptus horistes*										+			
Myrtaceae	*Eucalyptus longissima*							+						
Myrtaceae	*Eucalyptus loxophleba* subsp. *lissophloia*							+						
Myrtaceae	*Eucalyptus salmonophloia*						+			+	+	+		
Myrtaceae	*Eucalyptus salubris*					+	+	+	+	+	+	+		
Myrtaceae	*Eucalyptus transcontinentalis*							+						
Myrtaceae	*Melaleuca acuminata* subsp. *acuminata*								+					
Myrtaceae	*Melaleuca halmaturorum*												+	+
Myrtaceae	*Melaleuca pauperiflora* subsp. *fastigiata*								+				+	+
Myrtaceae	*Rinzia carnosa*							+						
Pittosporaceae	*Pittosporum angustifolium*						+			+				
Plantaginaceae	*Plantago debilis*		+							+				
Poaceae	**Rostraria pumila*											+		
Poaceae	**Schismus arabicus*									+				
Poaceae	*?Neurachne* sp.		+									+		
Poaceae	*Aristida contorta*		+				+							
Poaceae	*Austrostipa ?elegantissima*							+	+	+	+			+
Poaceae	*Austrostipa scabra* subsp. *scabra*							+		+	+	+		
Poaceae	*Austrostipa* sp.			+										
Poaceae	Poaceae sp.			+										
Poaceae	*Sporobolus ramigerus*	+												
Poaceae	*Triodia ?scariosa*								+					

Family	Taxon	AvAc	AvMmPd	AvSc	DfLbRp	EcEs	EsAaLa	EsAbEs	EsAhTs	EsEiEs	EsEiSa	EsEsAv	MhMp	MhScSs
Polygonaceae	*Duma florulenta*				+									+
Primulaceae	**Lysimachia arvensis*			+		+		+						+
Proteaceae	*Grevillea acuaria*							+	+		+			
Proteaceae	*Grevillea huegelii*								+					
Proteaceae	*Grevillea nematophylla* subsp. *nematophylla*							+						
Proteaceae	*Grevillea sarissa* subsp. *anfractifolia*										+			
Ranunculaceae	*Ranunculus pentandrus* var. *platycarpus*				+									
Rhamnaceae	*Cryptandra aridicola*							+						
Rhamnaceae	*Cryptandra crispula* (P3)								+					
Rhamnaceae	*Cryptandra* sp.							+						
Rhamnaceae	*Trymalium myrtillus* subsp. *myrtillus*							+						
Rutaceae	*Phebalium tuberculosum*							+						
Santalaceae	*Exocarpos aphyllus*							+	+	+	+		+	+
Santalaceae	*Santalum acuminatum*					+		+	+		+	+		
Santalaceae	*Santalum spicatum*							+		+				
Sapindaceae	*Dodonaea adenophora*							+						
Sapindaceae	*Dodonaea lobulata*							+		+				
Sapindaceae	*Dodonaea stenozyga*							+						
Sapindaceae	*Dodonaea viscosa* subsp. *angustissima*								+					
Scrophulariaceae	*Eremophila alternifolia*							+		+				
Scrophulariaceae	*Eremophila caerulea* subsp. *caerulea*							+		+				
Scrophulariaceae	*Eremophila caperata*										+			
Scrophulariaceae	*Eremophila decipiens* subsp. *decipiens*	+	+	+			+	+		+		+	+	+
Scrophulariaceae	*Eremophila glabra* subsp. *glabra*					+		+		+		+		
Scrophulariaceae	*Eremophila interstans* subsp. *interstans*					+		+		+		+		

Family	Taxon	AvAc	AvMmPd	AvSc	DfLbRp	EcEs	EsAaLa	EsAbEs	EsAhTs	EsEiEs	EsEiSa	EsEsAv	MhMp	MhScSs
Scrophulariaceae	*Eremophila ionantha*						+	+		+	+			
Scrophulariaceae	*Eremophila maculata* subsp. *brevifolia*													+
Scrophulariaceae	*Eremophila microphylla* (P3)									+				
Scrophulariaceae	*Eremophila oppositifolia* subsp. *angustifolia*					+		+						
Scrophulariaceae	*Eremophila rugosa*										+			
Scrophulariaceae	*Eremophila scoparia*							+	+	+	+	+		
Scrophulariaceae	*Eremophila* sp.							+						
Scrophulariaceae	*Eremophila veronica* (P3)							+			+			
Solanaceae	*Lycium australe*			+			+	+		+				+
Solanaceae	*Solanum nummularium*						+	+		+				
Thymelaeaceae	*Pimelea microcephala* subsp. *microcephala*										+			
Thymelaeaceae	*Pimelea spiculigera* var. *thesioides*							+						
Violaceae	*Pigea curvifolia*							+						
Zygophyllaceae	*Roepera eremaea*									+				
Zygophyllaceae	*Roepera fruticulosa*							+						
Zygophyllaceae	*Roepera ovata*						+	+						
Zygophyllaceae	*Roepera reticulata*		+											
Zygophyllaceae	*Roepera tetraptera*							+		+	+	+		

APPENDIX 2. BASIC FAUNA ASSESSMENT - BULLABULLING GOLD PROJECT (EMA, 2025)

Basic Fauna assessment for the Bullabulling Gold Project



Ecology Matters Australia Pty Ltd

December 2025

ECOLOGY MATTERS
AUSTRALIA

Prepared for:

Green Values on behalf of Minerals 260

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11th December 2025

Image on front cover: Malleefowl mound, recently-used but inactive, located in study area (photo: P. Smith).

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Executive Summary

Minerals 260 is proposing to restart the Bullabulling Gold Project (the Project). The Project is located 20 km west-south-west of Coolgardie, in the Eastern Goldfields subregion of the Coolgardie bioregion, and within the Southern climactic region.

A 'basic' fauna assessment was undertaken for a portion of the Project area in 2021 by Terrestrial Ecosystems (TE) which contained consolidated historical survey effort by various companies.

In June 2025, Ecology Matters Australia Pty Ltd (EMA) was commissioned by Green Values Australia (GVA) on behalf of Minerals 260 to conduct a 'basic' vertebrate fauna assessment of the remaining Project area to address and identify fauna values within the study area as per guidance published by the Environmental Protection Authority (EPA 2020).

Additional targeted fauna assessments were undertaken for significant species known to occur in the region:

- Malleefowl (*Leipoa ocellata*) (VU – BC and EPBC Act) – mound validation and LiDAR assessment.
- Arid Bronze Azure Butterfly (*Ogyris petrina*) (CR – BC and EPBC Act) – habitat reconnaissance survey.
- Inland Hairstreak Butterfly (*Jalmenus aridus*) (P1 – BC Act) – habitat reconnaissance survey and targeted survey.

This report presents the results of EMA's 2025 field survey and incorporates findings from the 2021 assessment and desktop assessment to provide a consolidated fauna assessment of the Project area.

The study area consists of two areas - the Mine area (surveyed by EMA in 2025, TE in 2021 and RPS in 2012), and the Borefield (surveyed by EMA in 2025), totalling 9,021.5 ha.

Five field assessments were undertaken between 13th June and 12th October 2025, including two 'basic fauna assessments, one targeted butterfly survey, and two Malleefowl mound/habitat assessments.

A total of thirteen broad habitat types occur in the study area. The dominant habitat within the study area is 'Open woodland on clay-loam plain' (61.7%). The remaining 12 habitats occupy less than 10% of the study area each.

The 'Open woodland on clay-loam plain' habitat is widespread and common in the region. It provides habitat for many species of fauna and acts as an important habitat for connectivity for fauna.

Shrubland habitats ('Mallee woodland and shrubland', 'Dense mallee woodland and shrubland', 'Shrubland', 'Tall *Melaleuca* shrubland on calcrete', and 'Sparse low shrubs on rocky rise') occur throughout the study area, particularly the Mine area, and these represent Malleefowl and Southern Whiteface habitat. Where the shrublands are dense, topography is gentle, and there are suitable substrates and other mound building materials (such as 'Dense mallee woodland and shrubland'), this represents high quality Malleefowl breeding habitat. In contrast, the more open areas of the above shrubland habitat types are more suitable for Southern Whiteface (VU), which requires trees or tall shrubs for nesting, and patchy bare earth with a variety of understorey and midstorey species for movement and foraging.

Drainage line habitats mainly occur in the Mine area, and contain dense vegetation, supporting a diversity of species. Open chenopod plain is sparsely vegetated and supports a lower diversity of fauna. Within the Borefield area, the 'Open woodland and spinifex on sandplain' is dominant to the east. The

remaining habitats occupy less than 1% of the study area, and while they provide habitat for many species of fauna, none are likely to represent critical habitat given their small areas.

There is a total of 273 vertebrate fauna species considered likely to occur in the study area, consisting of 66 reptiles, four amphibians, 137 birds and 25 mammals. Of these, 16 are conservation significant. Two are considered resident to the study area - Malleefowl and Southern Whiteface (both VU EPBC Act and BC Act).

Fifteen records of Malleefowl are within study area (14 mounds in the Mine area and one desktop record of an individual in the Borefield). EMA assessments of ten previously known mounds within the Mine area recorded three as being inactive (recently used), three as long unused (old), two as long unused (very old), and two as not Malleefowl mounds (likely excavations related to historical mineral exploration). The remaining four mounds were not assessed due to not being within the tenement boundary or indicative planned infrastructure area.

The three 'inactive – recently used' Malleefowl mounds are located in high-quality Malleefowl breeding habitat (Dense mallee woodland and shrubland). This habitat is highly suitable for breeding and occupies 116 ha of the study area. Its suitability for Malleefowl breeding habitat features highly suitable vegetation structure (species, density and canopy), substrates for mounds building (soils, leaf litter), and negligible to gentle slope.

A further 1,274.2 ha is considered low-quality Malleefowl breeding habitat. It is less suitable for breeding due to the presence of historical disturbance which has created a more open vegetation structure and soil compaction in some areas. Although these areas retain some suitable features, the absence of recently used mounds and the availability of higher-quality habitat nearby suggest Malleefowl are more likely to breed elsewhere until this area regenerates.. The remaining fauna habitats may be used by Malleefowl for foraging and dispersal.

Regionally, Malleefowl are common and widespread. The regional and local population is less under threat than populations in more disturbed areas (such as the Wheatbelt), where clearing is widespread and feral predators are abundant.

A LiDAR assessment to detect Malleefowl mounds in the study area was commissioned by GVA. Of the >1900 detections, 15 were re-classified to 'likely' and 122 'unlikely' via high resolution imagery analysis. Of these, 49 were subsequently ground-truthed by GVA, of which two were confirmed as possible long unused (very old) mounds.

Southern Whiteface was recorded from one location in the mine area. This species may occur throughout the study area, but its preferred habitat is open woodland or shrubland habitats that provide some moderately dense areas and some open areas. Given the widespread abundance of suitable habitat within the study area and region, the Proposal is unlikely to impact upon local or regional populations.

Targeted butterfly surveys did not detect any suitable habitat for either *Ogyris petrina* (CR) and *Jalmenus aridus* (P1).

Overall, the study area is characteristic of the Eastern Goldfields bioregion, predominantly comprising 'Open eucalypt woodland', which is typical of the broader landscape. It is within the Great Western Woodlands, which occur over 16 million ha of south-western Australia with known high biodiversity values.

All identified habitat types were assessed to be in good ecological condition. There has been widespread impacts from historical mining activities, such as cleared areas, mine shafts and other infrastructure which has caused a level of degradation. However, the habitat is generally in good condition which is likely attributable to the site's remoteness from major population centres and associated impacts, such as ongoing habitat disturbance and loss, and feral predator abundance.

The ecological processes that are likely to have had, or continue to have, major effects upon the fauna assemblage include habitat degradation, connectivity, and large areas of intact vegetation communities, the presence and abundance of introduced species, mining, and local hydrology.

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1 Introduction

1.1 Background

Minerals 260 is proposing to restart the Bullabulling Gold Project (the Project). The Project is located 20 km west-south-west of Coolgardie, in the Eastern Goldfields subregion of the Coolgardie bioregion, and within the Southern climactic region (EPA, 2020).

A 'basic' fauna assessment was undertaken for a portion of the Project area in 2021 by Terrestrial Ecosystems (TE) which contained consolidated historical survey effort by various companies.

In June 2025, Ecology Matters Australia Pty Ltd (EMA) was commissioned by Green Values Australia (GVA) on behalf of Minerals 260 to conduct a 'basic' vertebrate fauna assessment of the remaining Project area to address and identify fauna values within the study area as per guidance published by the Environmental Protection Authority (EPA, 2020).

This report presents the results of EMA's 2025 field survey and incorporates findings from the 2021 assessment to provide a consolidated fauna assessment of the Project area.

1.2 Approach

The purpose of impact assessment is to provide government agencies with the information they need to decide upon the significance of impacts of a proposed development, and to provide information to proponents to help them to develop appropriate strategies for avoiding and minimising impacts of their activities. The impact assessment relies on information from the collection of baseline fauna assemblage and habitats. The (EPA, 2020). allows for three survey types (Basic, Detailed and Targeted). The type of assessment required is based on several factors pertaining to the nature of the Project, and the environmental values upon which it may impact. A 'basic' assessment was undertaken for the Project due to the high level of regional and local fauna knowledge, regionally common habitats within the study area, and small scale of impact (small open pit mines and associated infrastructure). Additional targeted fauna assessments were undertaken for significant species known to occur in the region:

- Malleefowl (*Leipoa ocellata*) (VU – BC and EPBC Act).
- Arid Bronze Azure Butterfly (*Ogyris petrina*) (CR – BC and EPBC Act).
- Inland Hairstreak Butterfly (*Jalmenus aridus*) (P1 – BC Act).

A 'basic' fauna assessment involves a desktop study and a field component involving a site inspection to assess fauna habitats and place the desktop findings into the site's context. In order to achieve this, a fauna impact assessment based on a Basic survey requires the identification of the following fauna values:

- Assemblage characteristics: uniqueness, completeness and richness.
- Species of conservation significance.
- Recognition of ecotypes or vegetation and substrate associations or 'habitat types' that provide habitat for fauna, particularly those that are rare, unusual and/or support significant fauna.
- Patterns of biodiversity across the landscape.
- Ecological processes upon which the fauna depend.

In addition to the above, potential threats to fauna from the Project are identified. These include (but are not limited to):

- Habitat loss leading to population decline.
- Habitat loss leading to population fragmentation.
- Degradation of habitat due to weed invasion leading to population decline.
- Ongoing mortality from operations.
- Species interactions including feral and overabundant native species.
- Hydrological change.
- Altered fire regimes.
- Disturbance (dust, light, noise).

This report presents the findings of the desktop and field assessments.

1.3 Scope of works

The objectives of the assessment are as follows:

- Conduct a 'basic' fauna assessment (including desktop and field assessments) to:
    - Identify expected significant fauna within the study area.
    - Identify expected fauna assemblage within the study area.
    - Identify fauna habitats within the study area, particularly those which may support significant fauna.
- Conduct a targeted Malleefowl assessment involving:
    - Breeding, foraging and dispersal habitat assessment.
    - Consideration of LiDAR data.
    - Re-assessment of mounds previously recorded by RPS (2012) and Terrestrial Ecosystems (2022).
- Conduct a targeted significant butterfly habitat assessment for *Ogyris petrina* (CR) and *Jalmenus aridus* (P1).
- Prepare a technical report in accordance with (EPA, 2020) survey guidelines that:
    - Outlines the methods and results of the desktop and field assessments.
    - Reviews the list of fauna expected to occur in the study areas in the light of fauna habitats present, with a focus on investigating the likelihood of significant species being present.
    - Identifies any ecological processes in the study area upon which fauna may depend.
    - Identifies general patterns of biodiversity within or adjacent to the study area.
    - Reviews impacting processes.

1.4 Project area

The Project is located is located 20 km west southwest of Coolgardie (Figure 1-1). This report presents the data and results from two areas (the '**Mine area**' and '**Borefield**'), which were assessed by Terrestrial Ecosystems in 2021 and EMA in 2025.

The area terms used throughout this report are:

- Study area (9,021.5 ha) – a combination of the 2025 and 2021 study areas.
- 2025 study area (6,493.3 ha) (Figure 1-1). – the area surveyed by EMA in 2025 (6,493.3 ha). This consists of two areas:
    - 'Mine area' (1,989.9 ha) – the southern and eastern part of the 'Mine area'
    - 'Borefield' (4,503.4 ha) – southern part of the study area extending east to west.
- 2021 study area (2,528.2 ha) – the western and northern part of the 'Mine area'. This is the area surveyed by Terrestrial Ecosystems in 2021 (Terrestrial Ecosystems, 2022).
- Survey area – the area which was surveyed. This includes the study area and any areas visited outside the study area i.e. Malleefowl mounds in adjacent areas.
- Local area – the area within 15 km of the study area.
- Regional area – pertaining to the IBRA region.
- Desktop search area – the area from which database records were sourced; this was a 40 km buffer around the study area.

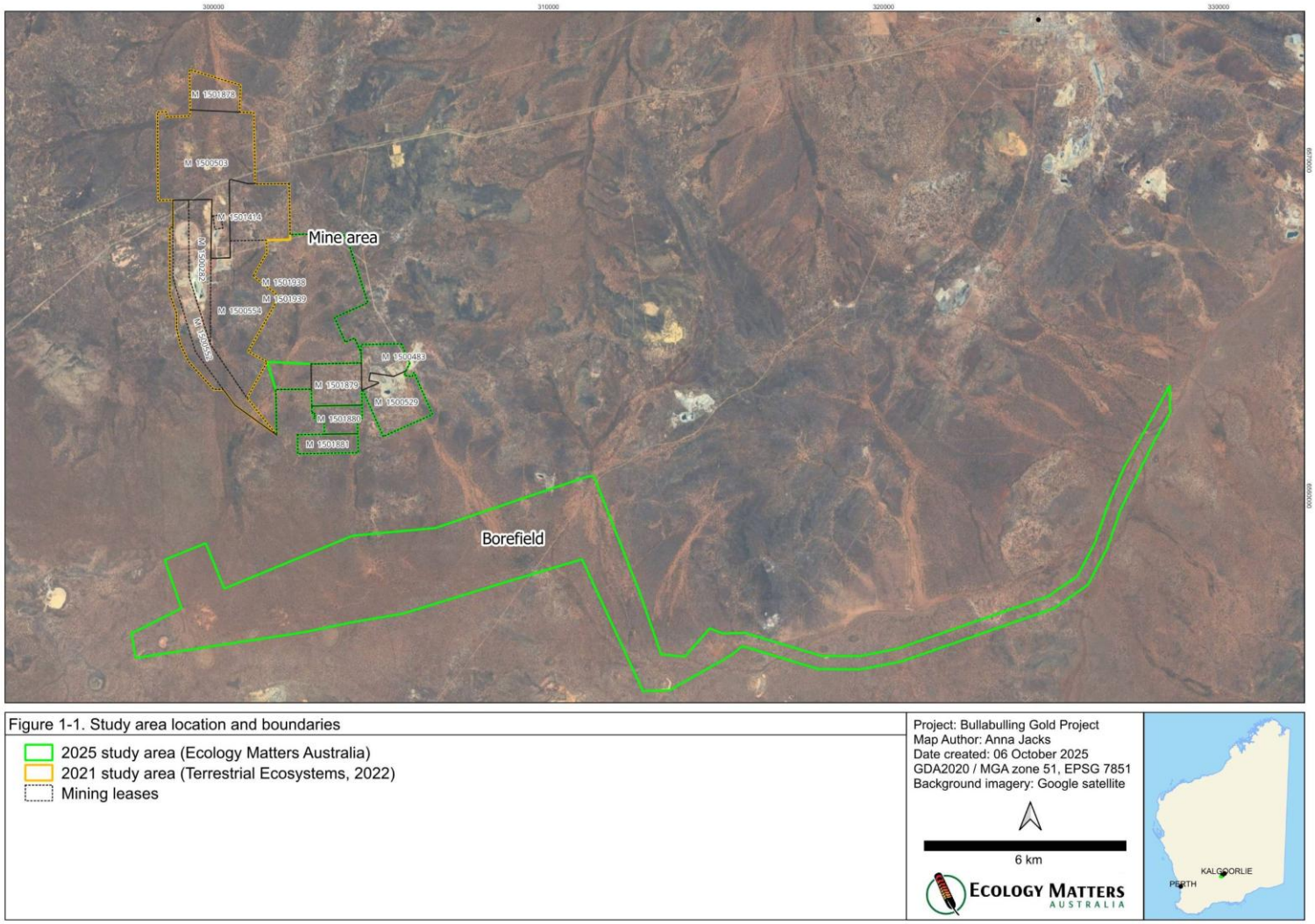


Figure 1-1. Study area location and boundaries

1.5 Regional landscape context

1.5.1 Landscape characteristics

1.5.1.1 Interim Biogeographical Regionalisation for Australia (IBRA)

The Interim Biogeographical Regionalisation for Australia (IBRA) classifies Australia into distinct regions and bioregions based on climate, geology, landform, native vegetation and species information (DCCEEW, 2023a). The characteristics of each bioregion/subregion in Western Australia were summarized in the 2002 Biodiversity Audit for Western Australia (CALM, 2003), and these summaries provide useful context for understanding the physical environment, biodiversity values and conservation issues relating to each bioregion of Western Australia.

The study area is predominantly located within the Eastern Goldfields subregion (COO03) of the Coolgardie bioregion. A small proportion (<5%) in the north-western extent and the south-eastern extent is within the Coolgardie 2 Sub-region (COO02) of the Coolgardie bioregion (Figure 1-2).

As described by Cowan (2003), the Eastern Goldfields subregion is characterised by gently undulating plains interrupted in the west with low hills and ridges of Archaean greenstones, and in the east a horst of Proterozoic basic granulite.

A series of large playa lakes in the western half are the remnants of an ancient major drainage line. The vegetation is of Mallees, *Acacia* thickets, and shrub-heaths on sandplains. Areas of Eucalypt woodland occur around salt lakes, on ranges, and in valleys, while salt lakes support dwarf shrublands of samphire.

1.5.2 Soil-landscape mapping

Within the study area five land systems occur (AC1, BB5, Mx42, Mx43, Mx41). These are dominated by BB5, Mx42, Mx43 (Figure 1-3) (from DPIRD, 2023):

- AC1: Gently sloping to gently undulating plateau areas, or uplands, on granites, gneisses, and allied rocks, with long gentle slopes and, in places, abrupt erosional scarps.
- BB5: Rocky ranges and hills of greenstones-basic igneous rocks.
- Mx41: Flat to undulating pediments marginal to unit AC1; granitic rock outcrop; some low escarpments.
- Mx42: Broad flat to undulating valleys with isolated granitic rock outcrops and some low escarpments; some seasonal lakes and clay pans.
- Mx43: Gently undulating valley plains and pediment with some outcrop of basic rock.

Seven land systems occur relatively evenly throughout the local area (within 15 km of the study area) Figure 1-3. These consist of a variety of topographies, including flats, hills and salt lakes (Land systems BB5, Mx41, Mx42, Mx43, My154, SV15 and AC1).

1.5.3 Pre-European vegetation

The Pre-European vegetation types within the study area consist of two of vegetation types - Woodland (other) and 'Thicket' (Figure 1-4) (from Beard et al., 2013; DPIRD, 2024a):

Locally, five vegetation types occur. These are dominated by the 'Woodland (other)' vegetation types, with some areas of 'Thicket' along with small areas of 'Rock' and 'Salt lake, lagoon, clay pan', and 'saltbush' (Figure 1-4).

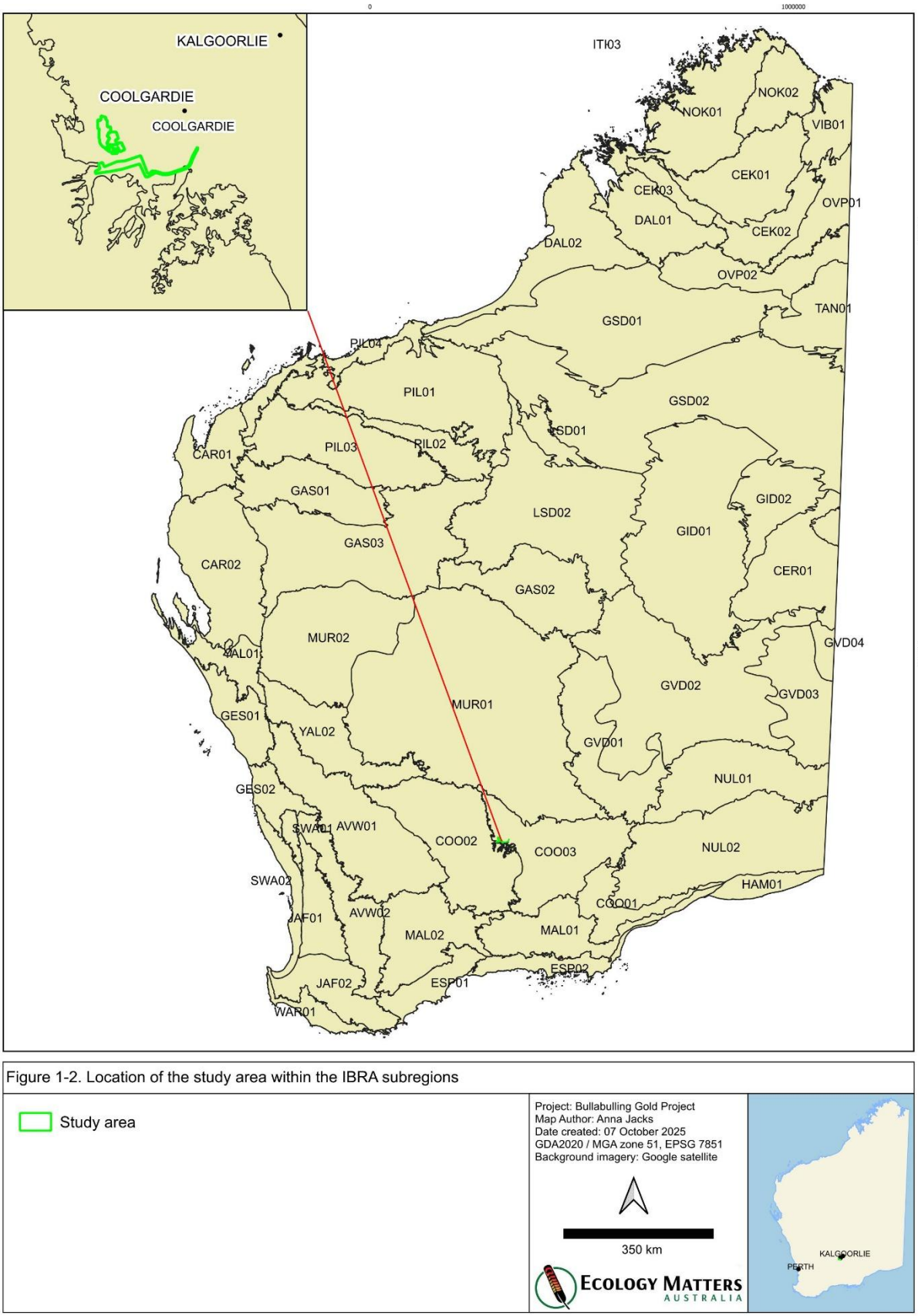


Figure 1-2. Location of the study area within the IBRA subregions

Figure 1-2 Location of the study area within the IBRA subregions

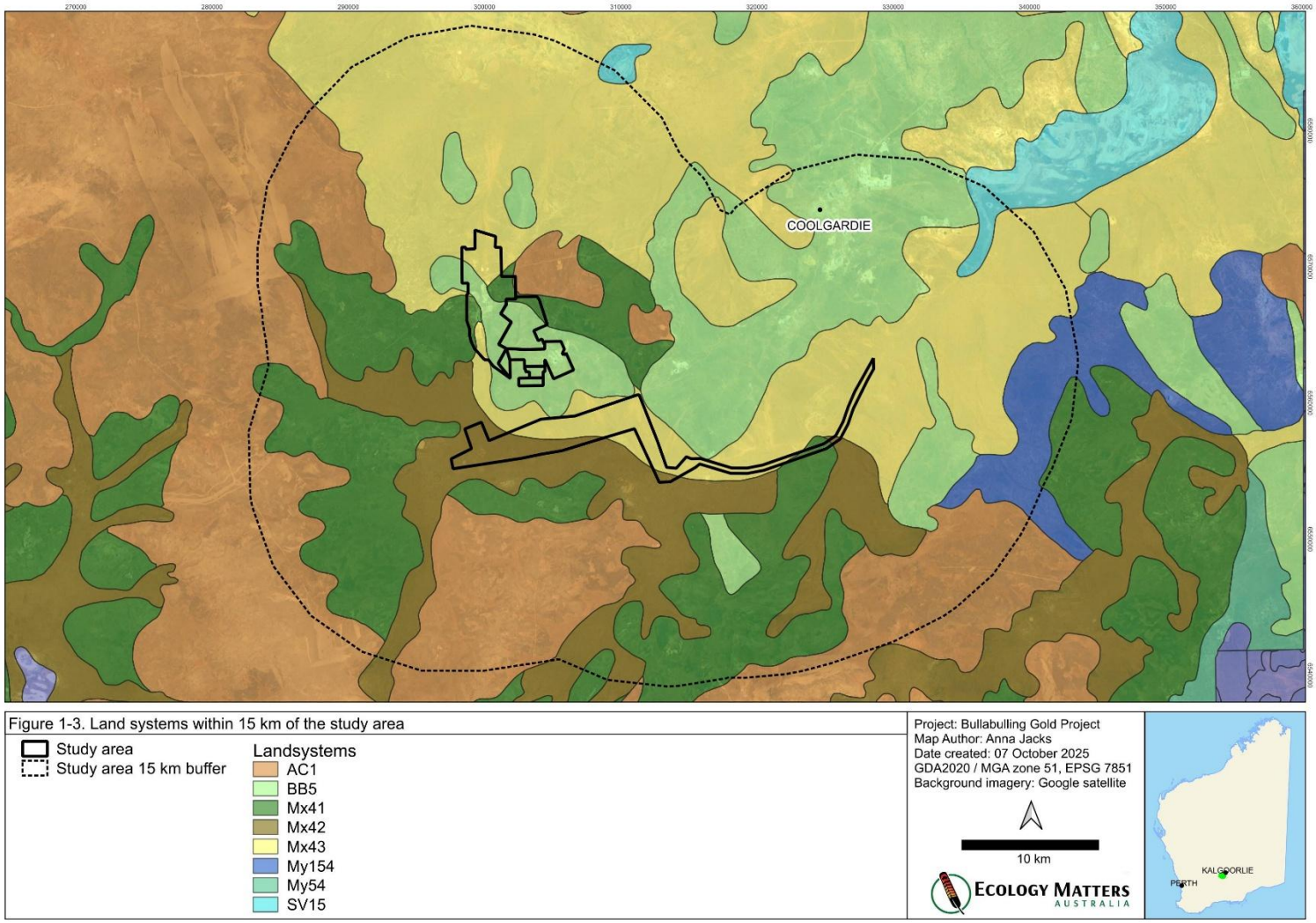


Figure 1-3. Land systems within 15 km of the study area

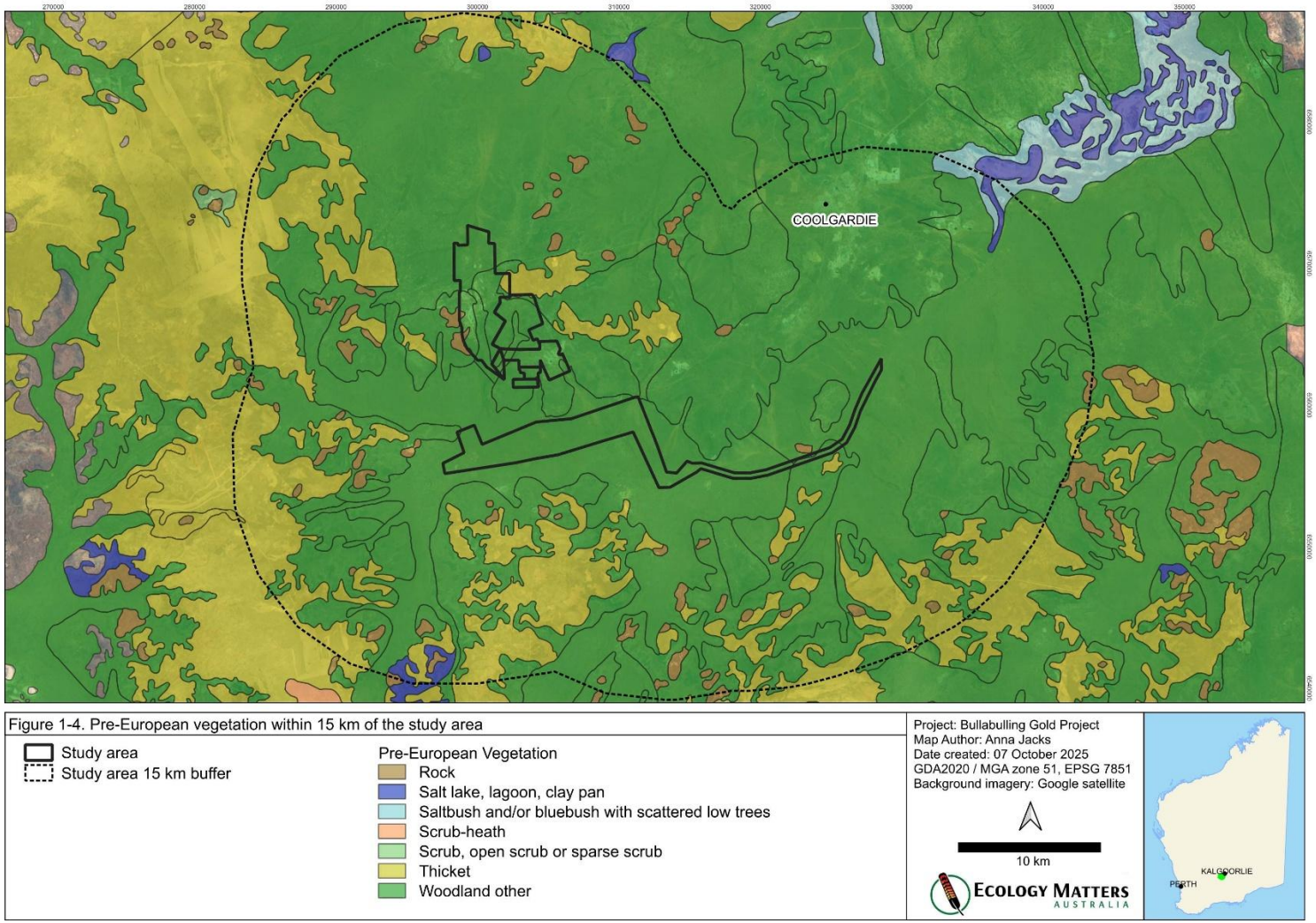


Figure 1-4. Pre-European vegetation types within 15 km of the study area

1.5.4 Land use and regional development

Cowan (2003) describes the main land uses in the Eastern Goldfields subregion to be UCL and Crown, reserves, grazing, conservation, and mining leases, and the Southern Cross subregion to be dry-land agriculture (cropping and grazing), grazing, mining and mineral exploration, and Crown land / reserves. According to (2017), Catchment Scale Land Use mapping, the study area comprises 'Conservation and natural environments' and 'Production from relatively natural environments' (Figure 1-5).

Locally (15 km buffer of the study area), the land-use largely consists of extensive grazing and conservation reserves, with smaller areas of mining.

Native vegetation (DPIRD, 2024b) within the study area and locally is largely intact. Some large areas of the mine area have been historically cleared, however the Borefield and local area are primarily remnant native vegetation (Figure 1-5).

1.5.5 Recognised sensitive sites

Within 15 km of the study area, one National Park, one Conservation reserve, and one Environmentally Sensitive Area (ESA) are present, however none are within the study area (Figure 1-6).

1.5.5.1 Protected terrestrial reserves

Two Protected terrestrial reserves occur within or in close proximity to the study area (DCCEEW, 2025a, 2022):

- Goldfields Woodlands Nature Reserve – 15 km south-east of the study area; and
- Goldfields Woodlands Conservation Park – 10 km south of the study area

In addition, three Timber Reserves are present within 15 km of the study area, of which one intersects a small area of the borefield (Figure 1-6):

- Kangaroo Hills Timber Reserve – intersects the eastern boundary of the Borefield.
- Scahill Timber Reserve – within 1 km of the study area.
- Yallari Timber Reserve – 10 km east of the study area.

1.5.5.2 Environmentally Sensitive Areas

One ESA occurs within 5 km of the study area (Figure 1-6).

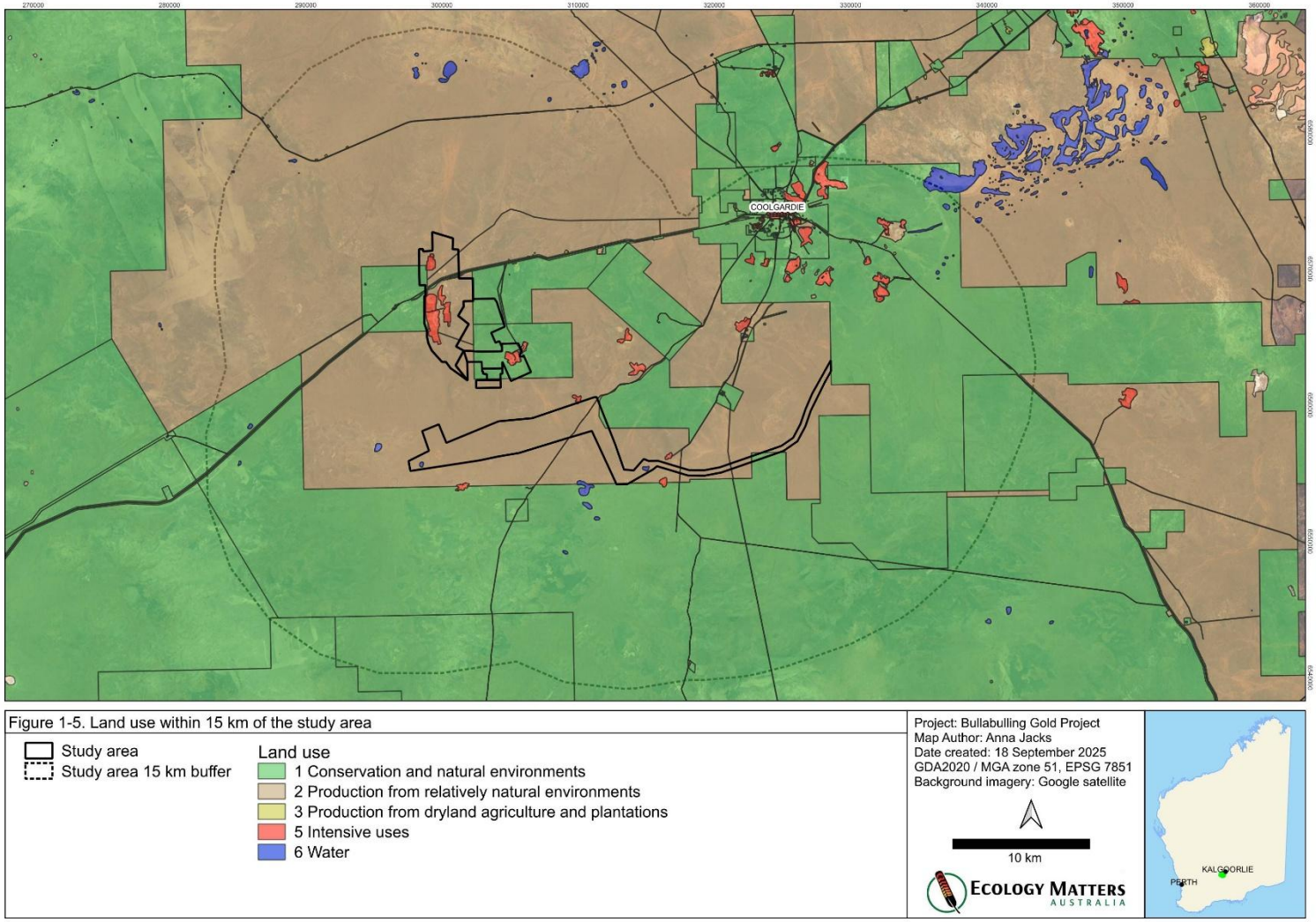


Figure 1-5. Land use within 15 km of the study area

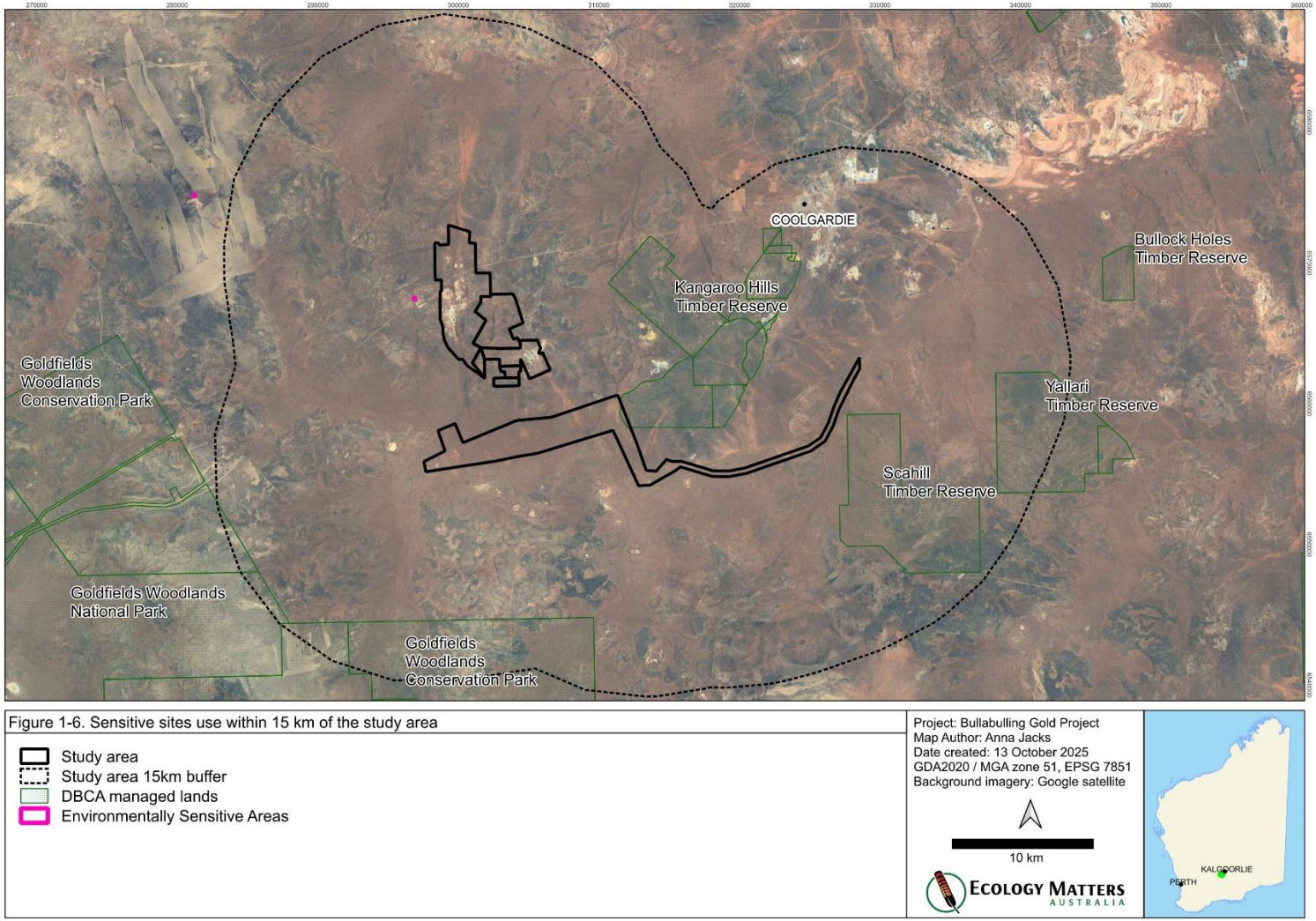


Figure 1-6. Sensitive sites within 40 km of the study area

1.6 Site-specific landscape characteristics

The study area is situated within a relatively flat landscape, with occasional stoney rises and hills. A minor drainage line passes through the study area.

1.7 Climate information

The Eastern Goldfields subregion has an Arid to Semi-arid climate with 200 to 300 mm of rainfall (Cowan, 2003). It is situated in the Southern Climatic region (EPA, 2020). The nearest weather station to the study area with long-term and current climate data is Kalgoorlie (Station number 12117) (BOM, 2025), located 60 km east of the study area. Average annual rainfall at Kalgoorlie is 264.7 mm which falls evenly throughout the year, but with peaks in January, February and June (Figure 1-7). Average maximum temperatures range from 33.7 °C in January to 16.9 °C in July (Figure 1-7).

In the six months preceding the 'basic' field assessments, temperatures were significantly hotter than the long-term average and rainfall was variable, with some months experiencing much higher than average or much lower than average rainfall. The variable rainfall is not unexpected for the region.

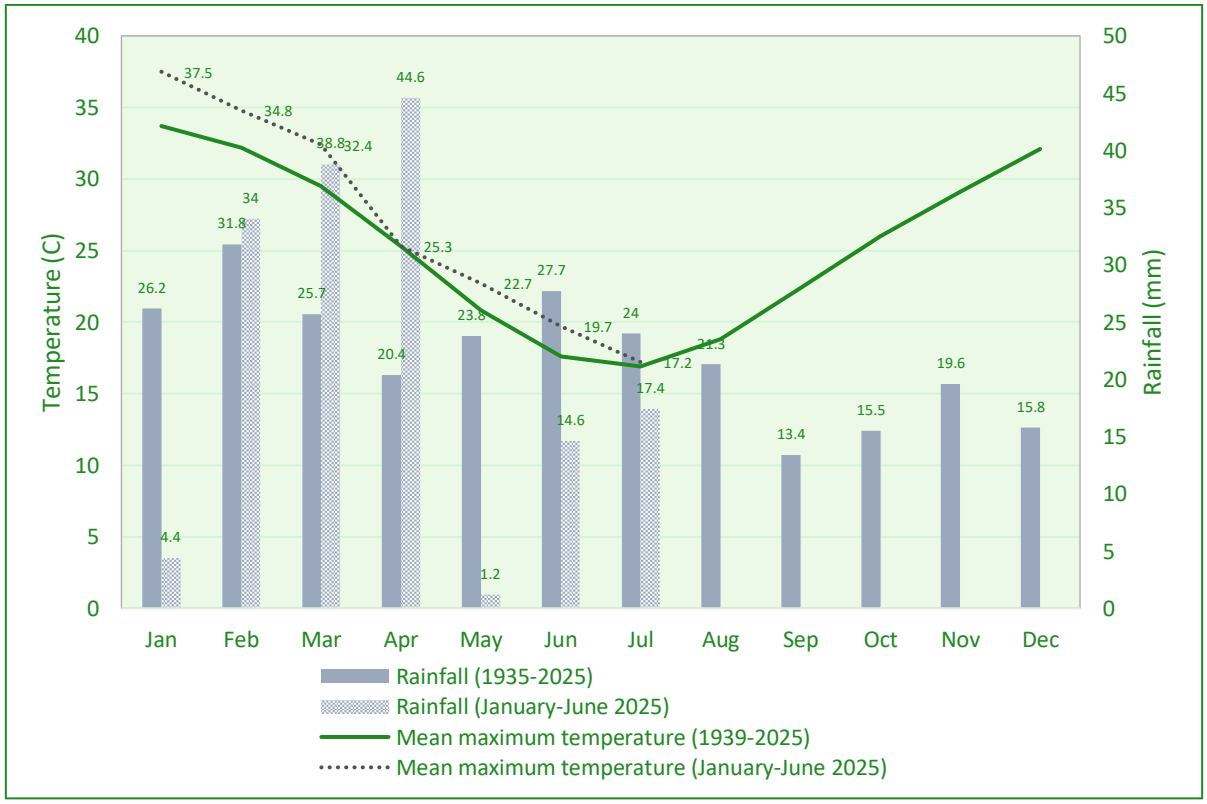


Figure 1-7. Climate and weather graph

2 Legal framework for the protection of significant fauna and habitats

Projects that may have the potential to significantly impact the environment are required by State and Commonwealth legislation to undergo environmental impact assessment (EIA). A formal assessment is triggered when it has been determined that a project is likely to have a significant impact on fauna or their habitats. This may be required under both the *Environmental Protection Act 1986 (WA)* (Part IV) and the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)*. A bilateral agreement between the Western Australian and Australian Governments allows certain projects to be assessed by a single entity, avoiding duplication between the two jurisdictions.

2.1 Western Australian legislation

In WA, the protection of fauna in WA is legislated by the *Biodiversity Conservation Act 2016* (BC Act). The Environmental Protection Authority (EPA) may require projects to be assessed against a range of factors, including terrestrial fauna (EPA, 2016a) and Short-range endemic invertebrate fauna (SRE) (EPA, 2016b). Terrestrial fauna is described by the EPA as "terrestrial vertebrate fauna". Some invertebrates, which do not typically fall under the category of SREs are also listed significant species.

2.2 Commonwealth legislation

In Australia, some fauna and fauna habitats are protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), which is administered by the Department of Climate Change, Energy, the Environment and Water (DCCEEW). Protected matters include "listed threatened species and ecological communities", and "listed migratory species (protected under international agreements)" (DCCEEW, 2025b). Threatened species may be either vertebrates or invertebrates.

2.3 Categories of significant fauna

There are three overarching categories of significant fauna:

- **Threatened fauna** – The EPBC Act and BC Act categorisation of Threatened Fauna is based on categories used by the IUCN (International Union for the Conservation of Nature) (IUCN, 2012). Threatened fauna consist of subcategories depending on their risk threat of extinction (Extinct, Extinct in the Wild, Critically Endangered, Endangered, and Vulnerable). These species are considered most in need of protection due to their risk of extinction.
- **Other specially protected species** – This list includes species that may not be at risk of extinction but require consideration due to other factors such as migration patterns or other conservation measures. Migratory species can be listed as both Migratory and Threatened.
- **Priority species** – The Western Australian Department of Biodiversity, Conservation, and Attractions (DBCA) administers a list of species "that do not qualify for listing under the EP Act because of insufficient survey or are otherwise data deficient" but are considered of concern.

Details of each category and their sub-categories are given in Table 2-1. Lists of significant fauna vary between State and Commonwealth legislation. In some cases, the categorisation of a species is not consistent between the legislation (i.e. a species can be listed as Vulnerable under the EPBC Act and Endangered under the BC Act).

Table 2-1. Significant fauna categories

Category	Description	EPBC Act	BC Act	DBCA
Threatened Fauna (TF)				
Extinct (EX)	No reasonable doubt that the species no longer exists	✓	✓	
Extinct in the Wild (EW)	Only surviving in captivity, cultivation, or as a naturalised population outside its original range		✓	
Critically Endangered (CR)	Taxa facing an extremely high risk of extinction in the wild in the immediate future.	✓	✓	
Endangered (EN)	Taxa facing a very high risk of extinction in the wild in the near future.	✓	✓	
Vulnerable (VU)	Taxa facing a high risk of extinction in the wild in the medium-term future.	✓	✓	
Specially Protected species (SP)				
Migratory (MI)	Due to their reliance on habitats in multiple areas, often international, which increases their potential impact from global threats. Migratory bird species, are also protected under three bilateral migratory bird agreements between Australia and Japan, China, and the Republic of Korea (JAMBA, CAMBA and ROKAMBA), as well as the Bonn Convention, an international treaty for migratory birds.	✓	✓	
Conservation Dependent (CD)	Taxa whose survival depends upon ongoing conservation measures to prevent it becoming a Threatened species.	✓	✓	
Other Specially Protected species (OS)	Species otherwise in need of special protection to ensure their conservation.		✓	
Priority species (P)				
Priority 1 (P1)	Taxa with few, poorly known populations on threatened lands.			✓
Priority 2 (P2)	Taxa with few, poorly known populations on conservation lands; or taxa with several, poorly known populations not on conservation lands.			✓
Priority 3 (P3)	Taxa with several, poorly known populations, some on conservation lands.			✓
Priority 4 (P4)	Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection but could be if present circumstances change.			✓

2.4 Threatened and Priority Ecological systems

Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs) are also recognised by Commonwealth (TECs) and State legislation (TECs and PECs). These communities contain a unique assemblage of flora, fauna, and landforms. Threatened Ecological Communities are communities identified as at risk of extinction due to ongoing threats, while PECs may have insufficient information or may be rare but not currently threatened.

3 Methods

3.1 Desktop study

3.1.1 Sources of information

Databases queried to inform the list of expected species are presented in Table 3-1. Database outputs were supplemented by general patterns of distribution according to field guides as detailed in Table 3-2. Previous fauna assessments in the region were reviewed to provide context and inform the expected species list (Table 3-3).

Table 3-1. Databases and literature queried during the desktop study

Database	Record type	Search parameters
Nature Map (DBCA, 2025a)	Fauna records from DBCA database.	40 km buffer of study area.
DBCA Threatened and Priority Fauna (DBCA, 2025a)	Records of Threatened and Priority Fauna (state) from DBCA database, protected under the WA BC Act.	40 km buffer of study area.
EPBC Protected Matters Search Tool (DCCEEW, 2025a)	Records and predicted ranges of Threatened fauna (federal), protected under the EPBC Act.	40 km buffer of study area.
BirdLife Australia Birdata	Bird records	40 km buffer of study area.
IBSA (DWER, 2025b)	Survey information including fauna records submitted for approval under the WA EIA process	40 km buffer of study area.

Table 3-2. Field guides referred to for general patterns of distribution.

Taxa	Sources
Fish	Morgan *et al.* (1998), Department of Fisheries (2023), Allen *et. al* (2003), Morgan *et. al* (2014)
Frogs	Tyler and Doughty (2009), Anstis (2017)
Reptiles	Storr *et al*. (2002, 1999, 1990, 1983) , Bush *et al.* (2010), Wilson and Swan (2021).
Birds	Johnstone and Storr (2005, 1998), Menkhorst *et al*. (2017).
Mammals	Van Dyck and Strahan (2008a), Churchill (2009), Menkhorst and Knight (2011).

3.1.2 Previous fauna assessments

To date, several fauna assessments have previously been undertaken within the Bullabulling Project area (e.g. Harewood, 2014; Phoenix, 2014; Invertebrate Solutions, 2022; RPS, 2012); these were consolidated by Terrestrial Ecosystems (2022) (Table 3-3). All recent surveys sampled the same study area (the 2021 study area) which is located immediately north and west of the 2025 study area (Figure 1-1). Terrestrial Ecosystems (2022) revisited and reassessed mounds recorded in previous studies. As such, only the results of their 2021 fauna survey are integrated into this report (and indicated so when referred to) to provide a compiled fauna assessment of the study area.

Table 3-3. Previous fauna assessments within the study area.

Report	Location and details
Terrestrial Ecosystems (2022). Basic and targeted vertebrate fauna reconnaissance survey and risk assessment for the Bullabulling Heap Leach Project.	2021 study area. Twelve Malleefowl mounds were re-assessedd (ranging from Profiles 1 to 6), two with evidence of recent use (eggshells).
RPS (2012). Spring level 2 flora and vegetation survey and level 1 fauna assessment for the Bullabulling Gold Project.	2021 study area. One Malleefowl mound (inactive), tracks and feathers recorded. Thirty-two other fauna species recorded.
Invertebrate Solutions (2022). Survey for Short Range Endemic Fauna for the Bullabulling Gold Project.	2021 study area. Six Widespread taxa and four Possible (data deficient) SREs recorded. No Confirmed or Likely SREs recorded.
Harewood (2014). Malleefowl (*Leipoa ocellata*) Assessment Bullabulling Gold Project.	Report not available; mounds were re-assessed by Terrestrial Ecosystems (2022).
GHD (2008). Bullabulling Gold Project Fauna Survey of Eileen and Bacchus Pits.	Report not available; mounds were re-assessed by Terrestrial Ecosystems (2022).
Phoenix (2014). Level 2 Flora and Vegetation Survey and Level 1 Fauna Survey for the Bullabulling Gold Project.	Report not available; mounds were re-assessed by Terrestrial Ecosystems (2022).

An additional six fauna assessments with available reports and data were identified within 40 km of the study area; these are listed in Table 3-4.

Table 3-4. Publicly available fauna assessment reports and data within 40 km of the study area.

Report	Location and details
Phoenix (2019). Fauna survey for Mungari Gold Operations Cutters Ridge Project.	Located 30 km north of the study area. 75 species recorded, including an old Malleefowl mound.
JB Botanical Consulting (2016). McPhersons Reward Level 2 Flora and Vegetation Survey and Level 1 Fauna Survey with Targeted Mallee Fowl Survey (Reference provided by GVA)	Located 26 km east northeast of the study area. 28 species recorded, 3 inactive old Malleefowl mounds
Terrestrial Ecosystems (2020). Vertebrate Fauna Assessment for the Jaurdi Gold Project (M16/529).	Located 26 km north of the study area. No significant species recorded.
NVS (2020). Targeted Threatened Flora and Malleefowl Mound Survey for the Jaurdi Gold Project (M16/560).	Located 15 km north of the study area. No significant species recorded.
Strategen (2019). Coolgardie landfill Flora, vegetation and fauna habitat assessment.	Located 14 km north of the study area. Desktop assessment only.
Botanica Consulting (2021). White Foil Project Detailed Flora/Vegetation and Basic Fauna Survey.	Located 30 km north-east of the study area. No significant species recorded.

3.1.3 Database searches for expected species

A list of fauna species that may potentially be present in the study area was compiled based on data obtained from a variety of sources, including databases and a literature review. A summary of

databases that were queried is shown in Table 3-1. The search area used to query databases was a maximum of a 40 km radius around the study area boundary (Table 3-1).

The database search results were then examined to produce a list of species expected to occur in the study area. This involves removing:

- Errors in databases (e.g. misidentification, data entry errors, old taxonomy).
- Marine species.
- Taxa that are out of range.
- Taxa for which the study area doesn't provide habitat for (i.e. wetland species if no wetlands are present in the study area).

3.1.4 Categorisation of conservation significant species

Significant species returned from the databases and not excluded on the basis of ecology or environment are considered potentially present or expected to be present in the study area at least occasionally, whether or not they were recorded during field assessments, and whether or not the study area is likely to be important for them. This list of expected significant species is therefore subject to interpretation by assigning each a predicted status and expected occurrence in the study area. The categories for predicted status and expected occurrence are:

- **Resident:** species with a population permanently present in the study area.
- **Regular visitor:** species that occur within the study area regularly in at least moderate numbers, such as part of an annual cycle (includes migrants).
- **Irregular Visitor:** species that occur within the study area irregularly such as nomadic and irruptive species. The length of time between visitations could be decades but when the species is present, it uses the study area in at least moderate numbers and for some time.
- **Vagrant:** species that occur within the study area unpredictably, in small numbers and/or for very brief periods. Therefore, the study area is unlikely to be of importance for the species.
- **Locally extinct:** species that would have been present but has not been recently recorded in the local area and therefore is almost certainly no longer present in the study area.

3.1.5 Nomenclature and taxonomy

Nomenclature and organisation of species lists in this report follow the format recommended by the EPA (2020):

- Mammals and herpetofauna: Checklist of the Terrestrial Vertebrate Fauna of Western Australia (WAM, 2025).
- Birds: Australian Faunal Directory (DCCEEW, 2025c); Birdlife Australia (BirdLife Australia, 2025) and International Ornithological Congress' 'World Bird List' (Gill et al., 2025).

Due to the ongoing taxonomic and range revisions, differences in international nomenclature, and common name terminology used by specific agencies (e.g. DBCA or federal guidelines, or conservation advice), deviations from the above may occur. These have been specifically considered in the context of the study area. Subspecies are only used where relevant, such as a significant status listing (i.e. Priority or Threatened), or significant populations (i.e. isolated) occur within or locally near the study

area. English common names of species, where available, are used throughout the text; Latin names are presented in appendices.

3.2 Field assessment (2025 study area)

3.2.1 Field assessment dates

The study area was visited on five occasions by EMA and GVA; see Table 3-5 for details.

Table 3-5. Field assessment dates

Date	Survey type	Personnel
13th to 15th June 2025	Basic fauna survey of the Mine area, re-assessment of previous Malleefowl mounds.	Peter Smith (EMA), Sarah Smith (EMA)
28th July to 2nd August 2025	Basic fauna survey of the Mine and Borefield areas	Peter Smith (EMA) Sarah Smith (EMA)
19th September 2025	LiDAR mound validation	Rhys Houlihan (GVA) & Phoebe Cochran (GVA)
3rd October 2025	Malleefowl habitat validation and re-assessment of previous Malleefowl mounds.	Natalia Huang (EMA) Rhys Houlihan (GVA)
11th to 12th October 2025	Targeted significant butterfly (*Ogyris petrina* and *Jalmenus aridus*) survey	Dr. Rod Eastwood (EMA) Rhys Houlihan (GVA)

3.2.2 Personnel

The EMA personnel involved in the assessment are shown in Table 3-6.

Table 3-6. Survey personnel

Name	Qualification	EIA/Wildlife Survey Experience	Field survey	Reporting
Peter Smith	Assoc. Dip. Ag.	30 years	✓	
Sarah Smith	BSc. (Biology)	30 years	✓	
Dr. Rodney Eastwood	PhD. (Entomology)	50 years	✓	
Natalia Huang	BSc. (Zoology), Hons (Conservation Biology), MBA	20 years	✓	✓
Anna Jacks	BSc. (Env. Sc.), Hons (Biology)	20 years		✓

3.2.3 Basic fauna assessment

The Basic fauna field assessment involved traversing the entire area on foot or vehicle to assess fauna habitat present and record any evidence of fauna, particularly conservation significant species. GPS tracks from the field assessment are shown in Figure 3-1.

3.2.3.1 Habitat assessment

In this report, 'fauna habitat' is defined based on the environment as a whole: a habitat consists of several factors important to the ecology and biology of a species, such as breeding, roosting/sheltering, and foraging requirements. The following three factors play a distinct role in creating a 'habitat':

- Distinct broad vegetation types (e.g. *Acacia* shrubland, Jarrah/Marri eucalypt woodland);
- Substrate (e.g. clay, sandy, calcrete); and
- Topography (e.g. mesa, valley, plain, hillslope, major drainage).

Each broad habitat type in this report consists of a combination of all three factors mentioned above. Specific features that are particularly important for many WA fauna may include rare or isolated habitats, outcrops, significant trees, drainages, pools and basins.

Preliminary habitat mapping was undertaken using aerial imagery and sites were pre-selected to visit.

During the field visit, habitat assessments were conducted at pre-selected sites (where possible), and additional sites throughout the study area where appropriate, such as different or replicate habitat types. A total of 348 habitat assessment sites were visited during the survey (Appendix 1; Figure 3-1).

Additionally, the following habitat observations were taken at each habitat assessment site:

- Presence of specific flora or vegetation of known importance to fauna.
- Evidence of fire history including, where possible, estimates of time since fire.
- Evidence and degree of other disturbance or threats, e.g. feral species.
- Presence of microhabitats and significant habitat features, such as coarse woody debris, rocky outcrops, tree hollows, water sources, and caves.
- Evidence of potential to support significant fauna.
- Function of the habitat as a fauna refuge or part of an ecological linkage.

3.2.3.2 Opportunistic fauna observations

Opportunistic records of fauna were collected at all times while traversing the study area. These include direct sightings of fauna and evidence such as tracks, scats, feathers, diggings and calls.

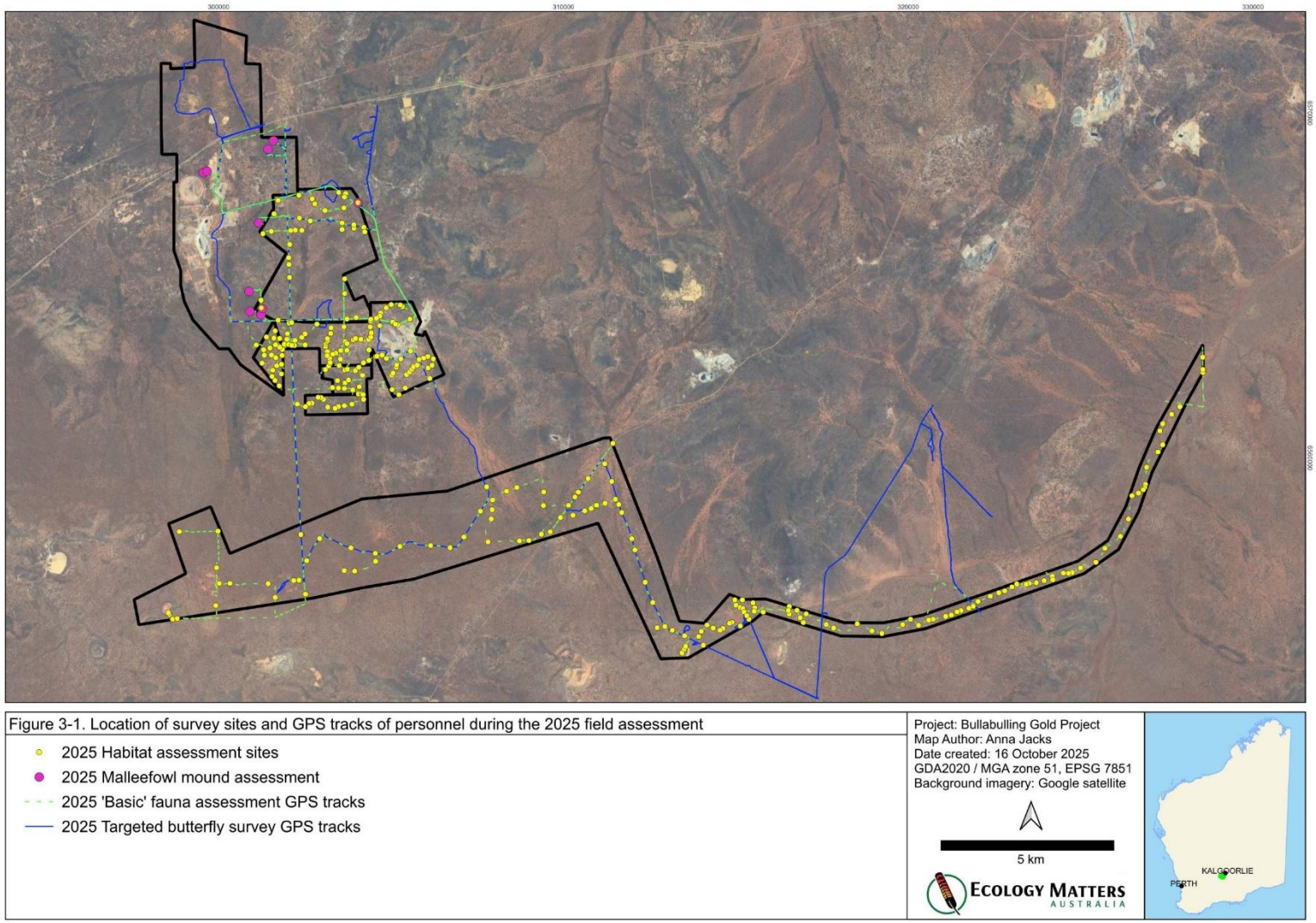


Figure 3-1. Location of survey sites and GPS tracks of personnel during the 2025 field assessment

Figure 3-1. Location of survey sites and GPS tracks of personnel during the 2025 field assessment

3.2.4 Targeted Malleefowl survey

3.2.4.1 Opportunistic records of Malleefowl

Any direct observations (sightings or calls) of Malleefowl within the study area during the survey were recorded. In addition, secondary evidence such as footprints, mounds, scats and feathers was also recorded. Malleefowl mounds were assessed for signs of use, profile and age (Section 3.2.4.3.1).

3.2.4.2 Malleefowl habitat

Malleefowl habitat quality was assessed at each site assessment where the following habitat features were considered:

- Vegetation type and structure –
  - Understory of dense shrubs (e.g. *Allocasuarina*, *Acacia*, *Melaleuca*) for protection from predators, microclimate regulation, and mound building materials.
  - Overstory of mallee eucalypts for mound building materials.
  - Ground cover for foraging.
- Substrate – loose soil and leaf litter for mound construction (mound thermoregulation).
- Slope – flat or gently sloping for drainage.
- Position in landscape – not in areas prone to flooding or excessive water runoff.

Habitat quality was classified into three categories based on the presence and condition of key features important for Malleefowl breeding, and foraging and dispersal:

- **High-quality breeding habitat**: Habitat contains all the key features required for successful breeding (e.g. suitable litter-producing vegetation, adequate canopy and shrub cover, and minimal disturbance).
- **Low-quality breeding habitat**: Habitat contains key breeding features but they are suboptimal (less dense vegetation, reduced canopy cover, compacted ground, or near disturbance).
- **Foraging and dispersal habitat**: Habitat is not suitable for mound construction due to the absence or poor condition of key breeding habitat features but may still provide food resources.

3.2.4.3 Malleefowl mounds

3.2.4.3.1 Previously recorded mounds

GVA requested EMA to re-assess Malleefowl mounds previously recorded by RPS (2012) and Terrestrial Ecosystems (2023). A total of ten mounds were revisited during the 2025 field visits. Attributes of the mounds were documented according to National Malleefowl Monitoring Manual (NHT, 2016) and included recording mound profile (Figure 3-2), age, and evidence of current or recent use.

The profile of a Malleefowl mound changes with breeding activity and age (erosion and vegetation growth) (NHT, 2016):

- Profile 1: Typical crater with raised rims. This is the typical shape of an inactive nest. However, this is also the profile of a mound being worked early in the breeding season.
- Profile 2: Nest fully dug out. The characteristic of this profile is that the crater slopes down steeply and at the base the sides drop vertically to form a box- like structure with side usually 20 to 30 cm deep. Often, litter will have been raked into windrows and may have started to enter the nest.

- Profile 3: Nest with litter. This is the next stage after profile 2. Litter will have been raked into the nest by Malleefowl, and thick layers of litter are evident on the surface. There may or may not be sand mixed with the litter at this stage.
- Profile 4: Nest mounded up (no crater). This is the typical profile of an active but unopened Malleefowl nest. The active mound is closed and dome shaped.
- Profile 5: Nest a crater with peak in centre. This is a typical profile of an active nest which is in the process of being closed by Malleefowl.
- Profile 6: Nest low and flat without peak or crater. This mound has not been used for some time and weathering, and erosion have 'flattened" the original mound.

Mound Age

- Active: Fresh scratching, Malleefowl scats, loose soil, mound may be dug out in preparation for the breeding season or mounded for breeding.
- Inactive (recently used) (1-5 years): Mound contains signs of recent activity (e.g., eggshell fragments) and mound may still contain large amounts of leaf litter if not excavated. Soil surface compacted, mound structure intact with well-defined central depression. No vegetation colonising mound.
- Long unused (moderately old) (5-20 years): No recent activity, mound compacted. Surface of mound showing some weathering and some minor plant colonisation possibly present. Mound profile raised; central depression defined.
- Long unused (old) (20-100 years): Mound moderately to very weathered, often with a veneer of gravel on the slopes because of removal of fine materials from the surface. Extensive plant colonisation. Mound profile raised; no or minimal central depression.
- Long unused (very old) (100+ years): Mound very weathered, with a low profile. Bushes and even small trees growing on mound. No central depression.

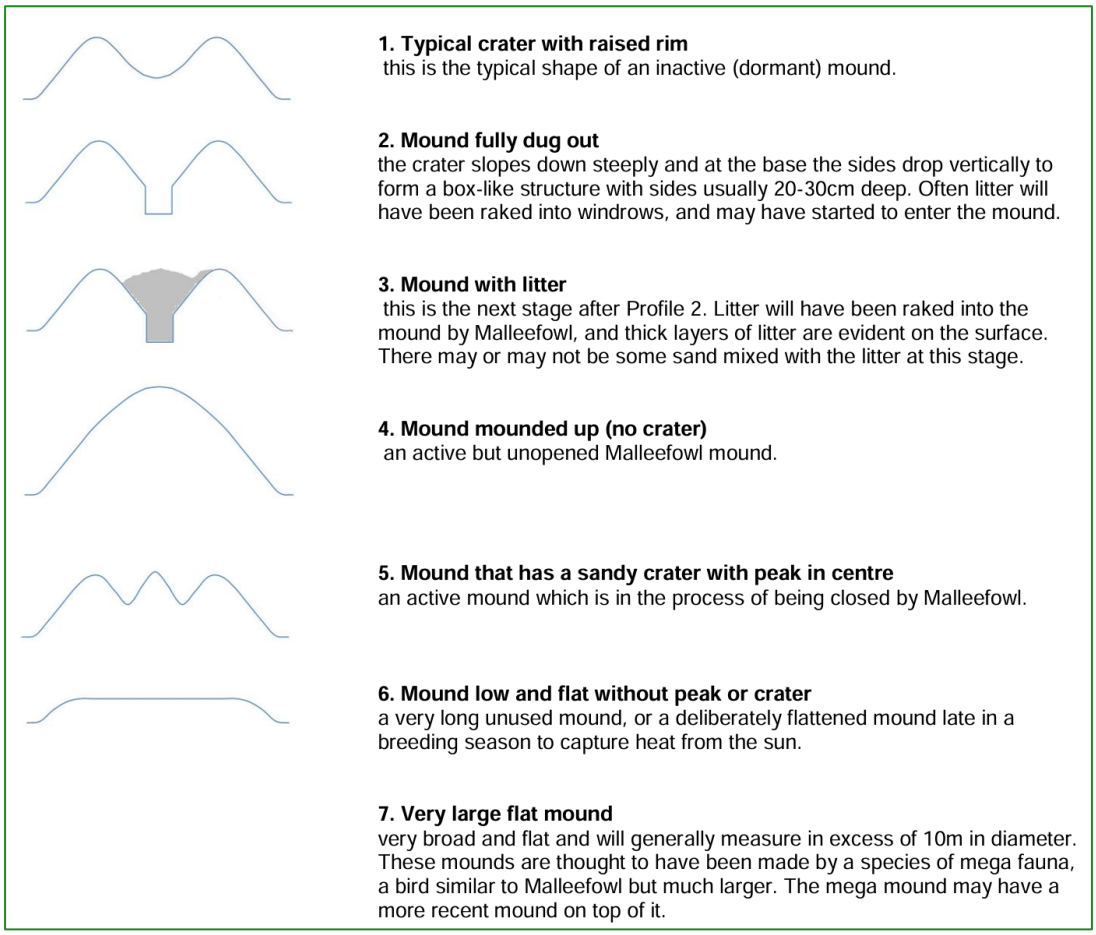


Figure 3-2. Malleefowl mound profiles (National Malleefowl Monitoring Manual, 2016)

3.2.4.3.2 Light Detection and Ranging (LiDAR) assessment for detection of new mounds

A LiDAR assessment was commissioned in August 2025 by Green Values Australia to detect potential Malleefowl mounds across the study area (Appendix 9). Figure 3-3 shows the extent of LiDAR coverage.

LiDAR is a remote sensing technology that uses laser from an aircraft or drone to calculate a precise 3D image of the land surface, including vegetation, soil and structure. LiDAR allows measurement of the topography of the land to 1-3 cm accuracy, allowing changes to the land surface, such as Malleefowl mounds or spoil heaps, to be detected. The shape and size of Malleefowl mounds (circular and symmetrical) and up to 1 metre high mean they are easily-detectable by LiDAR. However, the degree of accuracy declines as the age of the Malleefowl mound increases due to degradation and contraction of the mound. Old Malleefowl mounds can also have similar characteristics to previous soil disturbance by mining or exploration activities or spoil heaping around trees, so ground truthing is necessary.

A model was parameterised with known mound attributes (e.g., shape, height, size) to predict potential mounds, with mounds allocated one of three confidence categories (low, medium or high) as the model output.

The LiDAR analysis model output was 1,976 potential mounds, rated with low, medium and high confidence. Of these, 1,196 were on M260 tenure (37 high confidence, 447 medium confidence). All

potential mounds within the study area were then inspected by GVA personnel using both LiDAR and satellite imagery which resulted in them being classified as either ‘unlikely’ or ‘maybe’.

As a result of the visual validation, the >1900 potential mounds output by the model were reduced to 137, with only 15 of these deemed to be “likely”, some of which were outside of the project tenement package (Figure 3-3). Green Values Australia visited the site on 19th September 2025 to ground-truth 49 of these mounds and assess them as per Malleefowl guidelines. Ground-truthing of potential mounds was focused within the planned infrastructure footprint.

Photographs of ‘ground-truthed ‘potential mounds’ taken by GVA were subsequently checked by EMA staff to validate the GVA assessment.

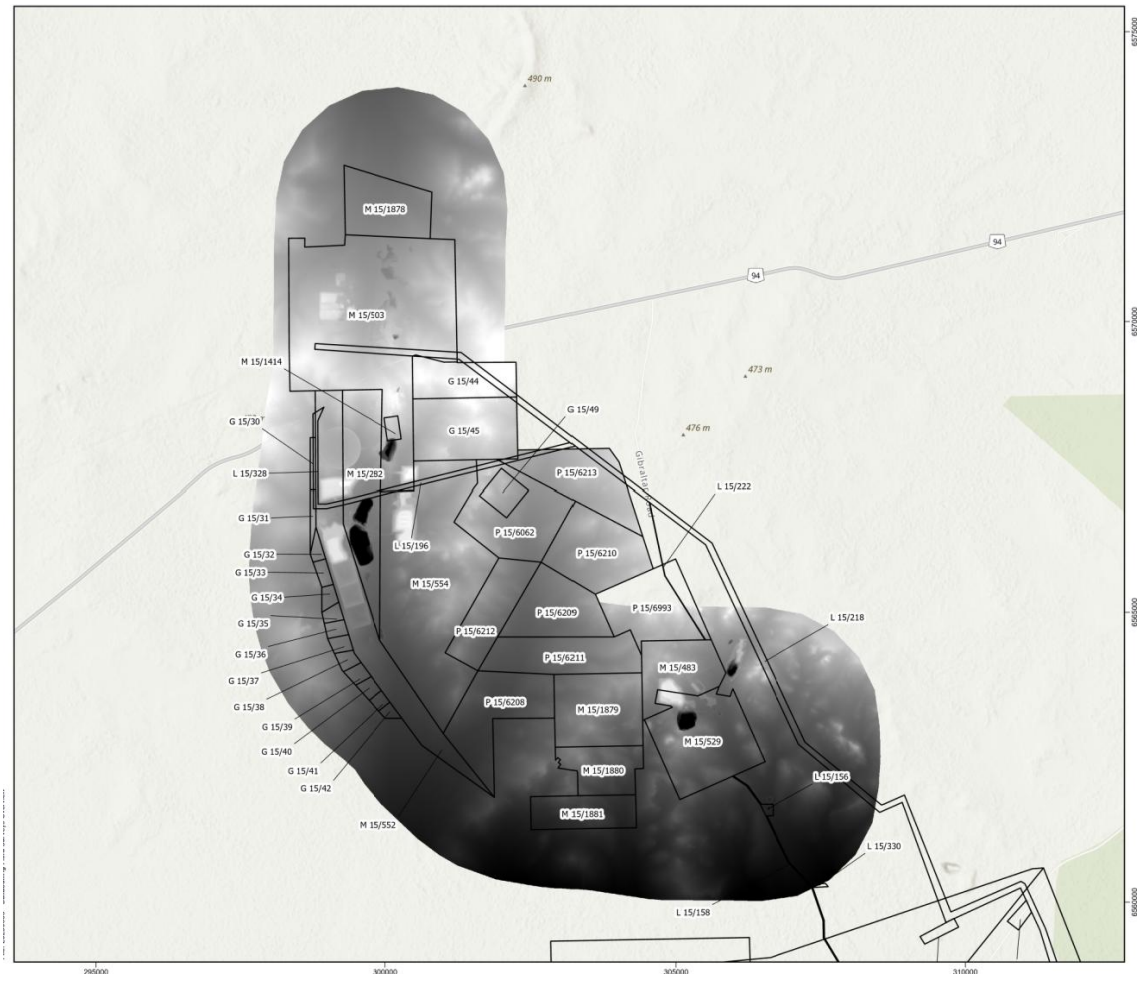


Figure 3-3. LiDAR survey extent. Image supplied by GVA.

3.2.5 Targeted significant butterfly assessment

The Arid Bronze Azure Butterfly (*Ogyris petrina*, CR) is a very rare species due to its specific ecological requirements. The butterfly can only survive in the presence of its host ant *Camponotus* sp. nr. *terebrans*, an undescribed species of ant which builds distinctive nests eucalypt woodland. While eucalypt woodland is common, the ants are not common. Furthermore, the butterfly can only be searched for during its flight period, which lasts only a few weeks each year and emergence is unpredictable. Searches for ant host nests outside of the flight period may narrow down search areas, thus the absence of host ant nests indicates the butterfly is not present. Suitable habitat for this species may occur in the eucalypt woodland habitat within the study area.

The Inland Hairstreak Butterfly (*Jalmenus aridus*; P1) occurs in the Goldfields region, however very little is known about the biology of this species due to its short life cycle, with adult butterflies only emerging for a few weeks during spring. Since 2021, over 25 new populations of this species have been recorded in the region, primarily south and east of the study area. The nearest two subpopulations are located 8 to 10 km north of the eastern end of the Borefield area, and 18 km and east of the Mine area (DBCA, 2025b). Suitable habitat exists in the study area where known host plants *Senna artemisioides* ssp. *filifolia* and *Acacia tetragonophylla* occur. These include shrubland and woodland habitat types.

A reconnaissance field assessment was undertaken to determine the suitability of the Study area for *Ogyris petrina* (CR) and *Jalmenus aridus* (P1) on 11th to 12th October 2025.

The study area was initially inspected using aerial imagery and previous vegetation and habitat mapping to identify potentially suitable areas for each species of significant butterfly. During the field survey, habitat suitability assessments were undertaken, considering the following:

- Habitat type (eucalypt woodland for *O. petrina*, and *Senna* and *Acacia* shrubland for *J. aridus*).
- Vegetation structure (whether there is suitable density of host and forage species).
- Floristic diversity (whether there is suitable diversity of forage species).
- Drainage (e.g. considering that low-lying areas prone to flooding or sheetwash and drainage is not suitable for *O. petrina* host ant).

The field survey was undertaken during the flight period for *J. aridus,* and it is expected that this species would be detected if present. GPS tracks of personnel are shown in Figure 3-1.

3.3 2021 assessment (Terrestrial Ecosystems)

The 2021 'basic' fauna survey undertaken by Terrestrial Ecosystems (2022) was undertaken between 3 and 7 November 2021 by Dr. Scott Thomson and Mr. Ray Turnbull. The 'basic' survey methods consisted of:

- Assessing fauna habitat types and their condition.
- Assessing the possible presence of and recording evidence of conservation significant fauna.

The 2021 study area was traversed on foot and by all-terrain vehicle to assess habitat features (Figure 3-4). Habitats mapping was undertaken based on vegetation units as mapped by Botanica is presented in Appendix 5.

Fauna habitat as mapped by Terrestrial Ecosystems (2022) and were compared and matched to the habitat descriptions from the 2025 basic fauna assessment (Table 4-1).

Targeted Malleefowl searches were also undertaken during the 2021 survey with transects shown in Figure 3-4. This consisted of transect searches using all-terrain vehicles (ATVs) or by walking, with the distances between transects altered based on the density of the vegetation. Malleefowl mounds were assessed according to profiles outlined in the National Malleefowl Monitoring Manual (2016) (section 3.2.4). This involved re-assessing mounds recorded by Harewood (2014).

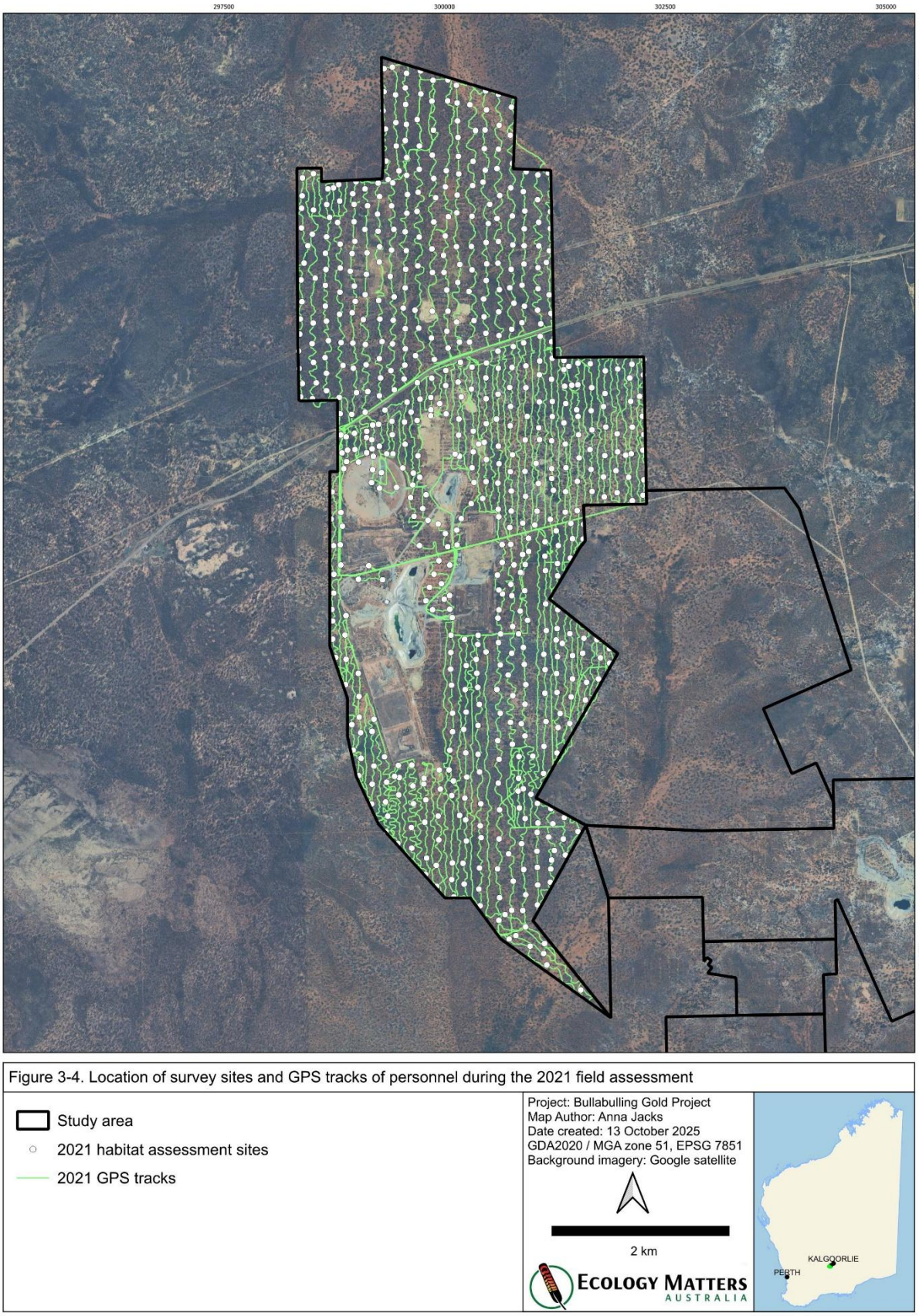


Figure 3-4. Location of survey sites and GPS tracks of personnel during the 2021 field assessment

Figure 3-4. Location of survey sites and GPS tracks of personnel during the 2021 field assessment

3.4 Survey limitations

Survey limitations are factors that may affect the outcomes of field assessments. Limitations are discussed to adequately inform whether the results of the study area is a true representation of the site, and to justify any deviations from EPA (2020). survey guidelines (Table 3-7).

Table 3-7. Survey limitations for the 2025 field assessment

Limitation	Comment
Availability and reliability of data and information.	Not a limitation – there was ample contextual information available locally and the region.
Competency/experience of the survey team, including experience in the bioregion surveyed.	Not a limitation – The survey team have experience in undertaking fauna assessments in the region.
Scope of the survey, e.g. where faunal groups were excluded from the survey.	Not a limitation – The scope of the assessment includes all terrestrial vertebrate groups and significant butterfly species.
Timing, weather, and season.	Not a limitation – During the field assessment, the weather was suitable for undertaking a Basic assessment. The purpose of the Basic assessment was to gather information on habitats and general fauna assemblage; thus timing and weather does not affect the results of the field assessment. Climate leading up to the surveys was suitable, although significantly hotter during the preceding summer, the subsequent temperatures and rainfall closer to the survey was adequate and unlikely to affect habitats or species assemblages. Rainfall was variable, but adequate, leading up to the survey, with some months recording more than average and some months recording less than average; therefore unlikely to affect species assemblage or habtiats.
Disturbance that may have affected results, e.g. fire, flood.	Not a limitation – No disturbances were present that could affect the results of the assessment.
The proportion of fauna identified, recorded, or collected.	Not a limitation – All fauna groups were sampled for, recorded and identified accordingly.
Adequacy of the survey intensity and proportion of survey achieved, e.g. the extent to which the area was surveyed.	Not a limitation – Sampling effort was adequate for the assessment type.
Access problems.	Not a limitation – Access was unrestricted, enabling sufficient coverage of the entire study area.
Problems with data and analysis, including sampling biases.	Not a limitation – There were no problems with data analysis or sampling biases.

Terrestrial Ecosystems (2022) reported one survey limitation to the 2021 'basic' fauna survey: '*Availability of data and information'*, citing '*a small amount of vertebrate fauna survey data available for similar habitats near the project area'*. However, this was considered a negligible constraint given that fauna in the region is well known with many regional records.

4 Results

4.1 Habitat types

A total of thirteen broad habitat types occur in the study area, of which twelve habitat types consist of remnant native vegetation and collectively occupy 8,363.9 ha (92.6%) of the study area. The remaining 657.7 ha (7.4%) is cleared (historic open pit mine, roads/tracks, and dams). Details of each habitat type as identified by EMA and corresponding fauna habitats identified by Terrestrial Ecosystems are given in Figure 4-1, with photographs of each habitat type given below in Plates 1 to 12. Distribution of the habitat types are shown in Figure 4-1 and Figure 4-2.

Terrestrial Ecosystems (2022) mapped three fauna habitats:

- 'Acacia shrubland thickets' – the description is consistent with EMA fauna habitat 'Shrubland'.
- 'Mixed Eucalypt woodland with and without shrubs' – this habitat description was consistent with the EMA habitat 'Open woodland on clay-loam plain.'
- 'Mallee woodland' – the description matched closest with EMA fauna habitat 'Shrubland' which only had occasional mallee eucalypts present; however the Mallee woodland habitat as mapped by Terrestrial Ecosystems has a higher density of mallee eucalypt, therefore was considered a separate and more important habitat type for Malleefowl in the present survey ('Mallee woodland and shrubland'). In patches where this habitat contained recently active Malleefowl mounds supported by a denser vegetation structure, this habitat was called 'Dense mallee woodland and shrubland' and considered 'High-quality breeding habitat'.

'Rehabilitated areas with Chenopod shrubland' and 'Cleared' areas were also mapped by Terrestrial Ecosystems, however these were not considered fauna habitat. Due to historic mining operations being present, the 2021 study area contained a higher proportion of cleared and disturbed areas than the 2025 study area. In contrast, the 2025 study area contained primarily remnant vegetation.

Table 4-1. Habitat types within the study area

Habitat type (EMA)	Habitat type (TE, 2022)	Description (EMA)	Extent, ha (%) in study area
Open woodland on clay-loam plain.	Mixed Eucalypt woodland with and without shrubs.	*Eucalyptus salmonophloia*, E. *salubris*, and sometimes mallees, over sparse shrubland (*Acacia* sp., *Senna* sp., *Exocarpus* sp. *Eremophila* sp., *Atriplex* sp., *Cratystylis* sp.). Soils varied but usually red brown loam or clay-loams, and occasionally on stoney lower slopes.	5,569.3 (61.7%)
Mallee woodland and shrubland.	Mallee woodland.	Open mallee eucalypt woodland over mixed shrubs dominated by *Acacia*, *Allocasuarina*, and *Eremophila*. Good mid-lower story comprising mixed shrubs species. Substrate is a range of gravel, cobbles and outcropping rock with sandy loam soil.	875.7 (9.7%)
Open woodland and spinifex on sandplain.	Not present.	*Eucalyptus* sp. over scattered mixed shrub mid-story of *Acacia* sp., *Exocarpus* sp., *Eremophila scoparia* and other low shrubs. Understory of *Triodia* sp. (spinifex) which is dominant on sandy rises and mixed in with other species on the lower plain.	747.9 (8.3%)
Shrubland.	*Acacia* shrubland thickets.	Mixed shrubs dominated by *Acacia*, *Allocasuarina*, and *Eremophila*. Good mid-lower story comprising mixed shrubs species. Substrate is a range of gravel, cobbles and outcropping rock with sandy loam soil.	396.6 (4.4%)
Open chenopod plain.	Not present.	Mostly open bare ground with scattered low vegetation to 1m (*Atriplex vesicaria*, *Senna* sp., *Cratystylis* sp., and occasional *Acacia* sp., *Eremophila scoparia*, *Sclerolaena* sp.). Isolated Eucalypts. Substrate of sandy loam with some fine quartz and ironstone.	344.6 (3.8%)
Dense tall shrubland on drainage line or depression.	Not present.	Dense shrub vegetation to 4 m dominated by *Acacia burkittii* and other *Acacia* spp. Occasional *Eucalyptus* sp. (mallee). Dense mid-story of mixed shrubs with *Acacia* sp., *Dodonea* sp., *Eremophila* sp. and other shrubs. Occur in clay-loam depressions and drainage.	138.3 (1.5%)
Dense Mallee woodland and shrubland.	Mallee woodland (Dense areas).	Same as 'Mallee woodland and shrubland' habitat, however vegetation is denser.	116.0 (1.3%)
Tall *Melaleuca* shrubland on calcrete.	Not present.	Tall dense stands of *Melaleuca* sp. with either *Eucalyptus* sp. Sparse mid-story or understory. Substrate of sandy loam soils with outcropping calcrete nodules and cobbles.	90.3 (1.0%)

Habitat type (EMA)	Habitat type (TE, 2022)	Description (EMA)	Extent, ha (%) in study area
Claypan.	Not present.	Bare claypan with fringing *Atriplex vesicaria*, *Maireana* sp., *Frankenia* sp., *Sclerolaena* sp. Vegetation only on slightly raised patches of sandy loam or on claypan margins.	39.7 (0.4%)
Sparse low shrubs on rocky rise.	Not present.	Isolated *Cratystylis conocephala* and *Atriplex vesicaria* and isolated stunted mallee on open stony ground. Substrate of gravelly quartz and other rock with cobbles and outcropping rock with little to no soil.	21.3 (0.2%)
Dense woodland next to claypan.	Not present.	Dense stand of *Eucalyptus* sp. (mallee) and tall *Melaleuca* sp. No or sparse understory. It occurs on sandy loam soil adjacent to claypans.	16.1 (0.2%)
Open woodland on conical hill.	Not present.	Scattered *Eucalyptus* sp. with isolated low shrubs on a small conical rocky hill with cobbles, boulders and outcropping rock. Severely degraded by historic mining activity.	8.0 (0.1%)
Cleared.	Disturbed area.	Mine, road/track, dam.	657.7 (7.4%)
			9,021.5 (100%)



Plate 1. Open woodland on clay-loam plain



Plate 2. Mallee woodland and shrubland (Photo: Terrestrial Ecosystems 2022)



Plate 3. Open woodland and spinifex on sandplain



Plate 4. Shrubland



Plate 5. Open chenopod plain



Plate 6. Dense mallee woodland and shrubland (Photo: Terrestrial Ecosystems 2022)



Plate 7. Dense tall shrubland on drainage line or depression



Plate 8. Tall Melaleuca shrubland on calcrete



Plate 9. Claypan



Plate 10. Sparse low shrubs on rocky rise



Plate 11. Dense woodland adjacent to claypan



Plate 12. Open woodland on conical hill

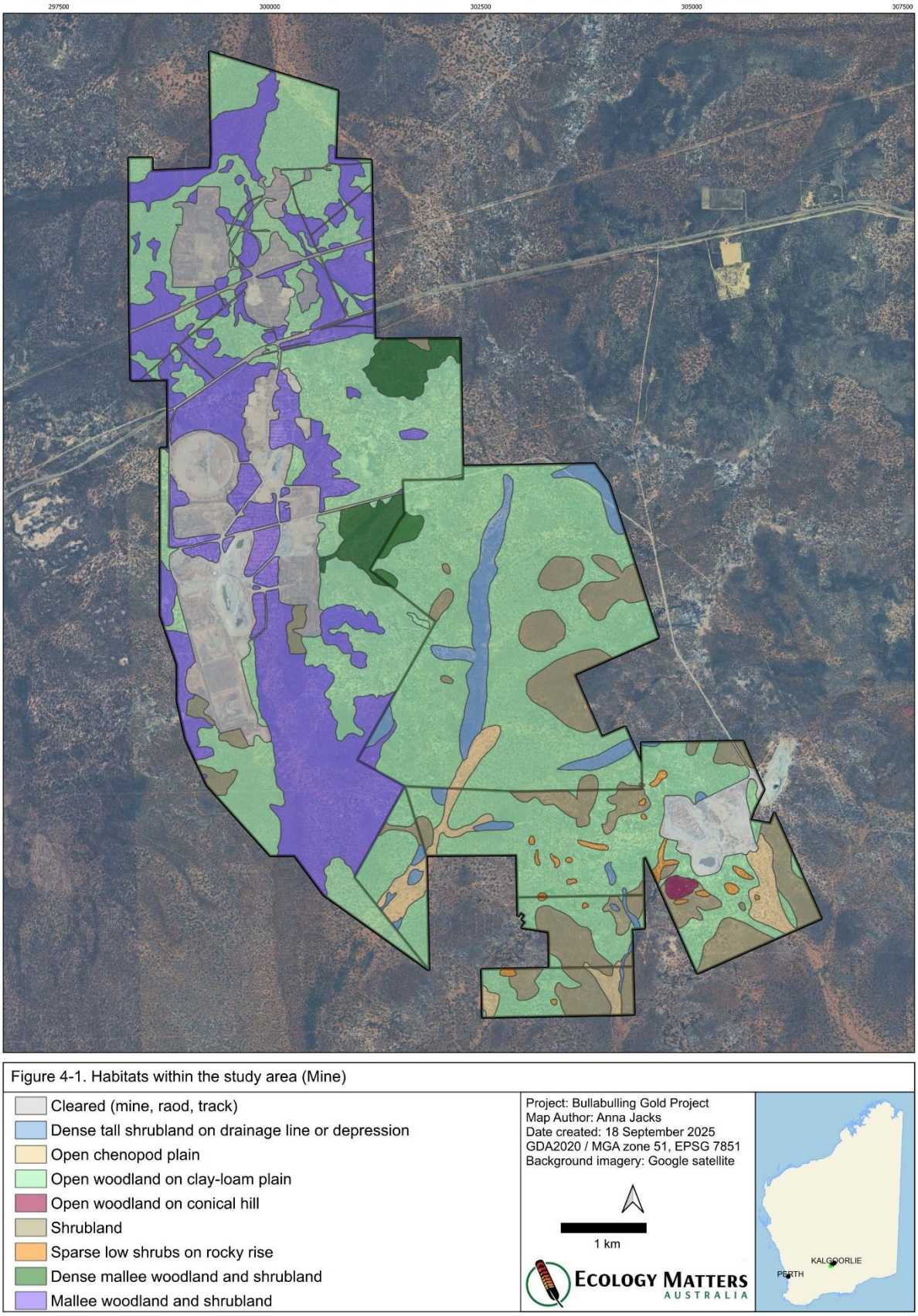


Figure 4-1. Habitat types within the study area (Mine)

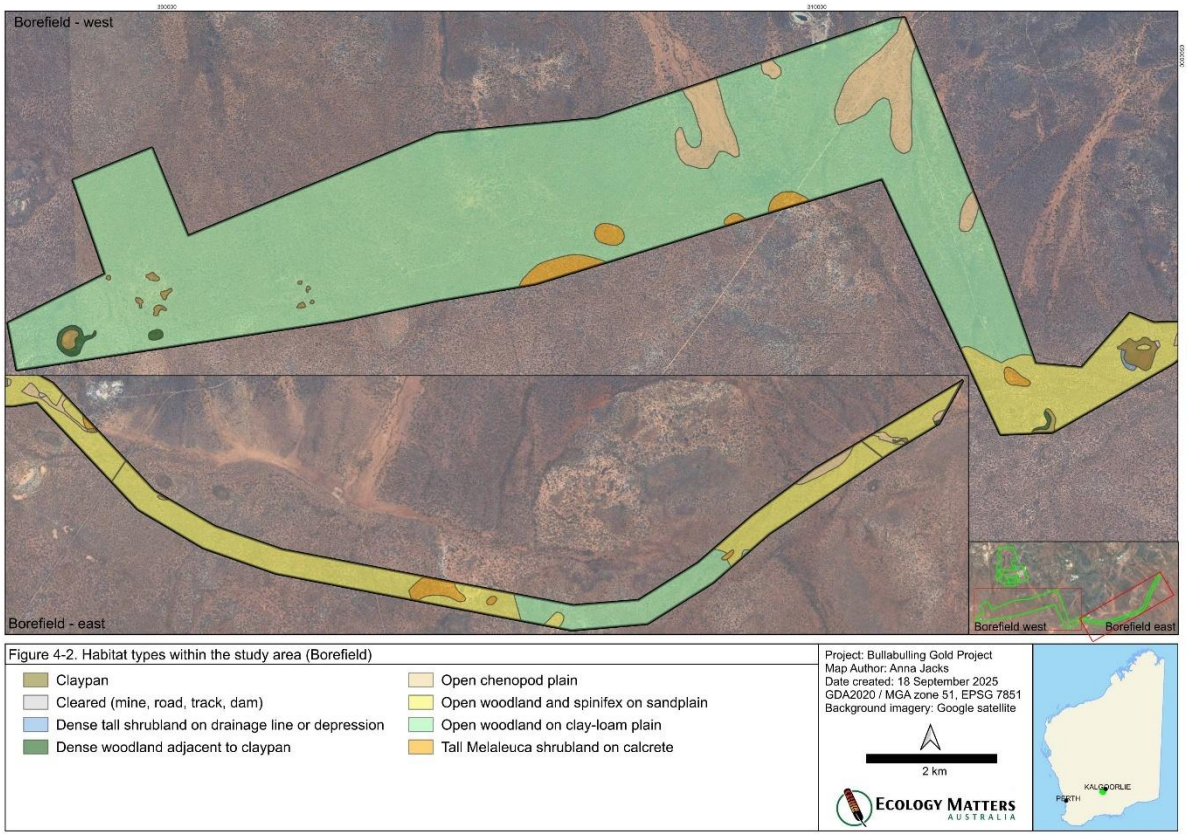


Figure 4-2. Habitat types within the study area (Borefield)

4.2 General Species assemblage

4.2.1 Desktop study

A total of 284 terrestrial vertebrate fauna species was returned from the desktop search area, of which 272 species may occur within the study area. This includes 67 reptiles, four amphibians, 179 birds and 24 mammals (Appendix 2). Of these, 267 are native and five are introduced species. A total of 16 are conservation significant species:

- Malleefowl (*Leipoa ocellata*) – VU (EPBC Act/ BC Act)
- Blue Billed Duck (*Oxyura australis*) – P4 (BC Act)
- Fork-tailed Swift (*Apus pacificus*) – MI (EPBC Act/ BC Act)
- Common Sandpiper (*Actitis hypoleucos*) – MI (EPBC Act/ BC Act)
- Sharp-tailed Sandpiper (*Calidris acuminata*) – MI (EPBC Act/ BC Act)
- Curlew Sandpiper (*Calidris ferruginea*) – CR and MI (EPBC Act/ BC Act)
- Pectoral Sandpiper (*Calidris melanotos*) – MI (EPBC Act/ BC Act)
- Red-necked Stint (*Calidris ruficollis*) – MI (EPBC Act/ BC Act)
- Wood Sandpiper (*Tringa glareola*) – MI (EPBC Act/ BC Act)
- Common Greenshank (*Tringa nebularia*) – EN and MI (EPBC Act/ BC Act)
- Grey Falcon (*Falco hypoleucos*) – VU (EPBC Act/ BC Act)
- Peregrine Falcon (*Falco peregrinus*) – OS (BC Act)
- Western Rosella (inland) (*Platycercus icterotis* (*xanthogenys*)) – P4 (BC Act)
- Princess Parrot (*Polytelis alexandrae*) – VU/P4 (EPBC Act/ BC Act)
- Southern Whiteface (*Aphelocephala leucopsis*) – VU (EPBC Act/ BC Act)
- Central Long-eared Bat (*Nyctophilus major tor*) – P3 (BC Act)

Based on DBCA data and the previous study (Terrestrial Ecosystems, 2022), two conservation significant vertebrate fauna have been previously recorded in the study area (Figure 4-3):

- Malleefowl – Fifteen records were located within the study area, 14 in the Mine area and one in the Borefield area, and a further 64 records ranging between 1965 and 2023 occur within the desktop search area (40 km buffer of the study area) (DBCA, 2025b). More information on Malleefowl in the desktop search area is provided in 4.4.1.
- Peregrine Falcon – One record was located within the Borefield area (ALA, 2025) and several records in the local and regional area.

A further ten species have previously been reported within 40 km of the study area: Common Sandpiper, Fork-tailed Swift, Sharp-tailed Sandpiper, Red-necked Stint, Central long-eared Bat, Common Greenshank, and Grey-tailed Tattler (Figure 4-3), however the Grey-tailed Tattler is not considered likely to occur in the study area given it only occurs in coastal wetlands and large inland salt lakes.

An additional 12 species were excluded from the assemblage (Appendix 3):

- Out of range (9 species)
    - One fish, three amphibians (frogs), one reptile, and four mammals (Chuditch and three bats).
- Extinct or locally extinct (one species)
    - Boodie (inland)

- No suitable habitat (two species)
    - Night parrot (no large ring-forming, long unburnt spinifex or mixed chenopod shrubland adjacent to spinifex shrubland).
    - Grey-tailed Tattler (no coast (main habitat) or large inland salt lakes (rare))

In addition, two species of conservation significant invertebrates were returned from the desktop review:

- Inland Hairstreak Butterfly (*Jalmenus aridus*) – P1 (BC Act). Several records of this species are within the desktop search area.
- Arid Bronze Azure Butterfly (*Ogyris petrina*) – CR (EPBC/BC Act). The type locality for this species is approximately 50 km east of the study area. Additional populations are known from 260 km west of the study area and at a very small number of undisclosed locations north and north-east of the study area.

4.2.1.1 2021 fauna assessment and targeted Malleefowl assessment

Two previous fauna assessments for the Bullabulling Gold Project located in the north and western part of the Mine area (RPS, 2012; Terrestrial Ecosystems, 2022). Opportunistic records of non-significant fauna were not made, however both surveys reported observations of significant fauna. Malleefowl (VU), including tracks and mounds, of which some were recently active were recorded during both surveys.

4.2.2 Field assessment

A total of 55 species were observed during the field assessment (Appendix 4). All but one of the species recorded in the field assessment were returned from the desktop study (the horse). Two conservation significant fauna were recorded during the 'basic' field assessment, Malleefowl and Southern Whiteface, both Vulnerable (Figure 4-4).

- A single long unused (very old) Malleefowl mound was recorded in the north-eastern part of the Mine area. An additional eight inactive (recently used) or long unused (old or very old) mounds were recorded in the study area as part of the targeted survey. These are discussed further in Section 4.4.
- A pair of Southern Whitefaces were recorded in the north-western part of the Mine area in 'Dense tall shrubland on drainage line/depression' habitat.

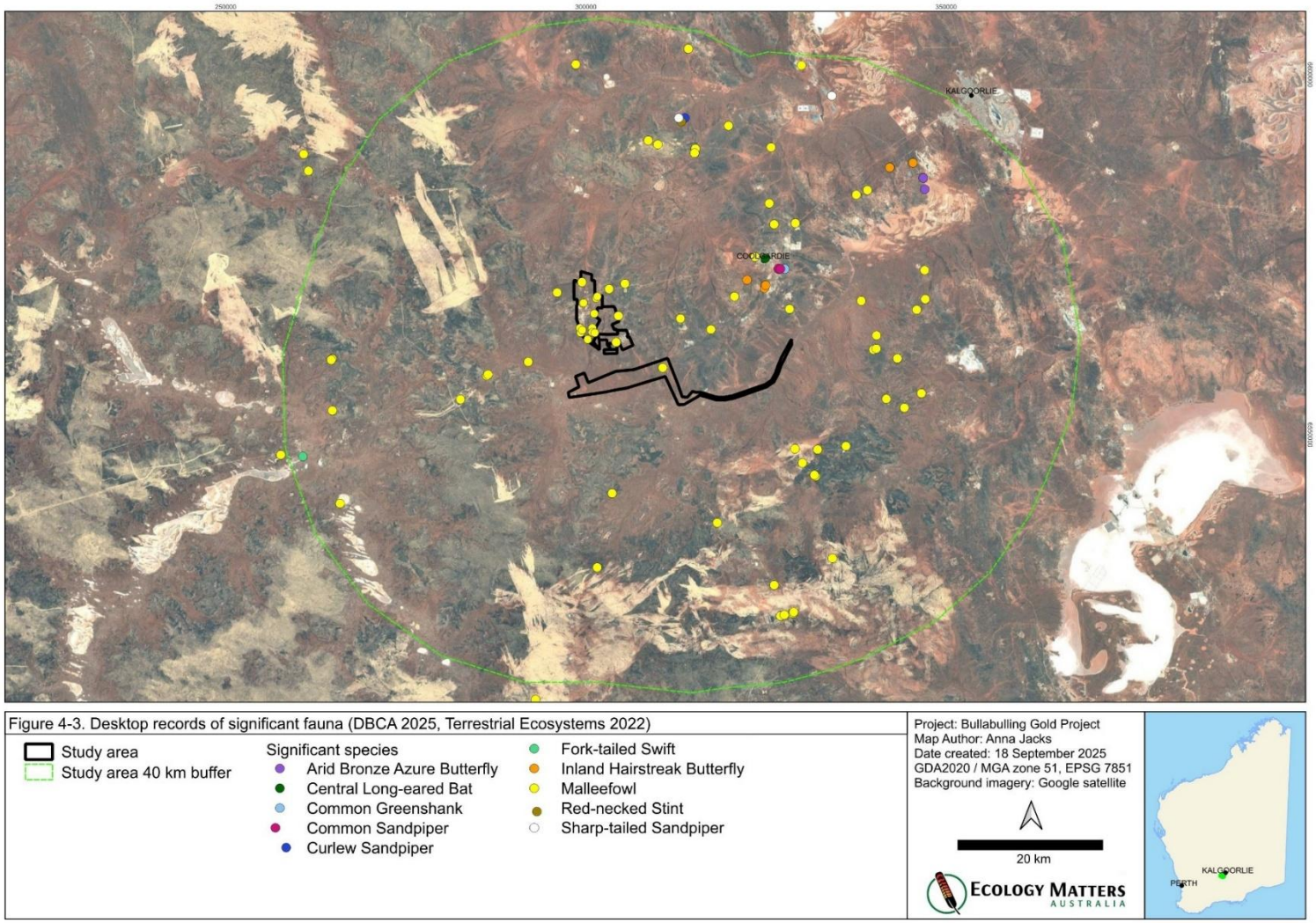


Figure 4-3. Desktop records of significant fauna (DBCA 2025, Terrestrial Ecosystems 2022)

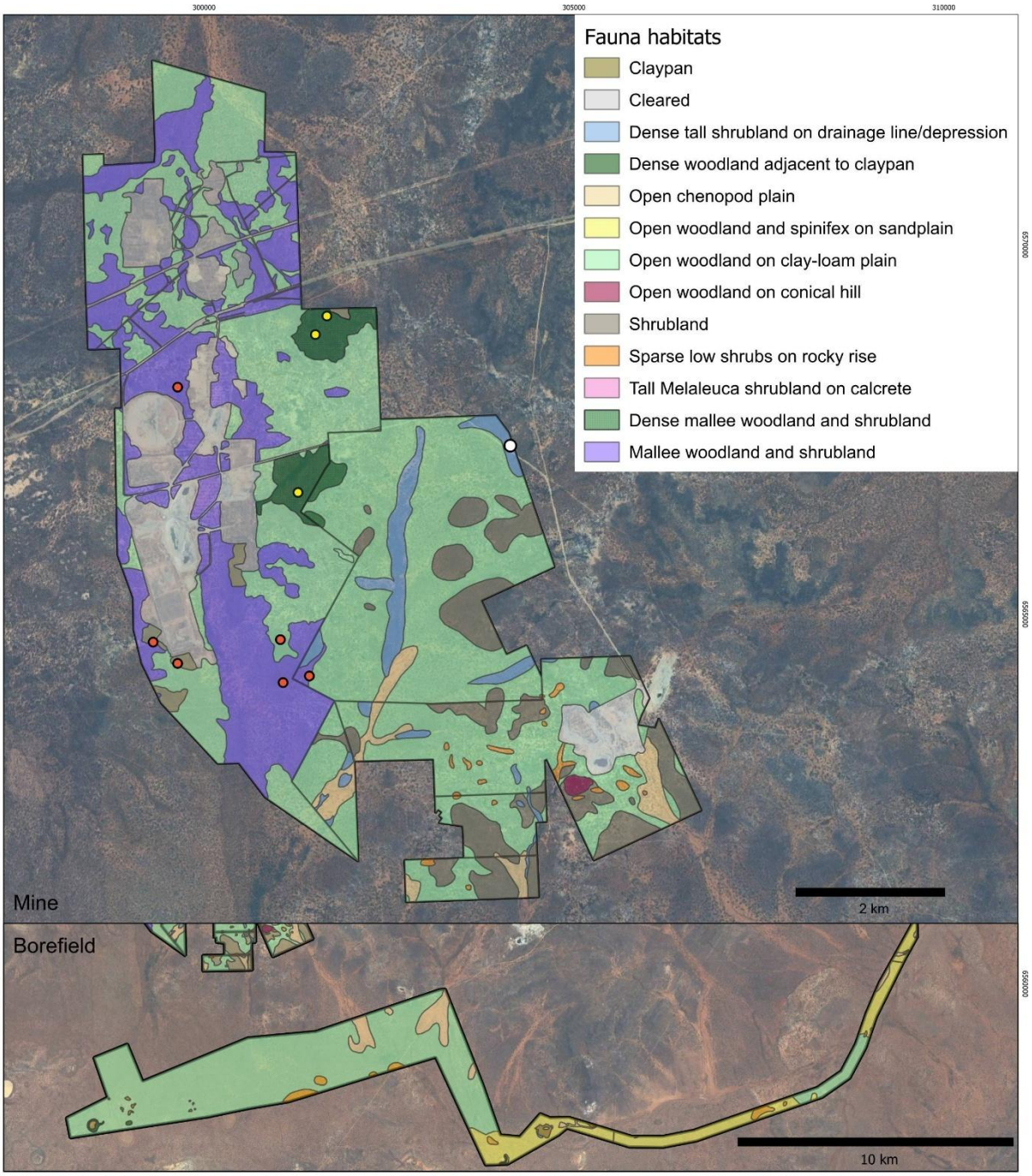


Figure 4-4. Records of conservation significant species and Malleefowl mounds observed during the field assessment

Study area

Significant species

- Malleefowl mound - Inactive (recently used)
- Malleefowl mound - Long unused (Old or Very old)
- Southern Whiteface - Direct sighting of pair

Project: Bullabulling Gold Project
Map Author: Anna Jacks
Date created: 18 October 2025
GDA2020 / MGA zone 50, EPSG 7851
Background imagery: Google satellite

ECOLOGY MATTERS AUSTRALIA



Figure 4-4. Records of conservation significant species and Malleefowl mounds observed during the field assessment.

4.2.3 Expected fauna assemblage

Considering both the desktop study and field assessment, there is a total of 273 vertebrate fauna species considered likely to occur in the study area, consisting of 66 reptiles, four amphibians, 137 birds and 25 mammals (Table 4-2). Of these, 16 are conservation significant.

Table 4-2. Summary of species potentially occurring within the study area

Group	Non-significant	Significant	Total
Amphibians	4	0	4
Reptiles	67	0	67
Birds	162	15	177
Mammals (native)	19	1	20
Mammals (introduced)	5	0	5
Total	257	16	273

4.3 Significant species

The 16 conservation significant species and their expected occurrences are:

- Two residents
  - Malleefowl (*Leipoa ocellata*) – VU (EPBC Act/ BC Act).
  - Southern Whiteface (*Aphelocephala leucopsis*) – VU (EPBC Act/ BC Act).
- Two regular visitors
  - Peregrine Falcon (*Falco peregrinus*) – OS (BC Act).
  - Western Rosella (inland) (*Platycercus icterotis (xanthogenys)*) – P4 (BC Act).
- Fifteen vagrants
  - Blue Billed Duck (*Oxyura australis*) – P4 (BC Act)
  - Fork-tailed Swift (*Apus pacificus*) – MI (EPBC Act/ BC Act).
  - Common Sandpiper (*Actitis hypoleucos*) – MI (EPBC Act/ BC Act).
  - Sharp-tailed Sandpiper (*Calidris acuminata*) – MI (EPBC Act/ BC Act).
  - Curlew Sandpiper (*Calidris ferruginea*) – CR and MI (EPBC Act/ BC Act).
  - Pectoral Sandpiper (*Calidris melanotos*) – MI (EPBC Act/ BC Act).
  - Red-necked Stint (*Calidris ruficollis*) – MI (EPBC Act/ BC Act).
  - Wood Sandpiper (*Tringa glareola*) – MI (EPBC Act/ BC Act).
  - Common Greenshank (*Tringa nebularia*) – EN and MI (EPBC Act/ BC Act).
  - Grey Falcon (*Falco hypoleucos*) – VU (EPBC Act/ BC Act).
  - Princess Parrot (*Polytelis alexandrae*) – VU/P4 (EPBC Act/ BC Act).
  - Central Long-eared Bat (*Nyctophilus major tor*) – P3 (BC Act).

It is possible the residents and regular visitors may breed within suitable habitat in the study area while vagrants may use the site for minimal foraging or dispersal. Conservation significant species, their predicted occurrence, and likely use of each habitat type is listed in Table 4-3.

Table 4-3. Predicted occurrence of and use of each habitat type by significant vertebrate fauna

[1] WP = Open woodland on clay-loam plain, WS = Open woodland and spinifex on sandplain, SH = Shrubland on stony slopes, CP = Open chenopod plain; SD = Dense tall shrubland on drainage line or depression, C = Claypan, SR = Sparse low shrubs on rocky rise, WC = Dense woodland adjacent to claypan, WH = Open woodland on conical hill, MW= Mallee woodland and shrubland, DM = Dense mallee woodland and shrubland, SC = Tall *Melaleuca* shrubland on calcrete.

B = breeding or denning, D = dispersal, F = foraging.

Species	Conservation status	Occurrence status	Habitat[1]											
			WP	WS	SH	CP	SD	C	SR	WC	WH	MW	DM	SC
Birds														
Malleefowl	VU (EPBC Act/BC Act)	Resident	D,F		B,D,F	D,F	D,F	-	D,F	D,F	D,F	B,D,F	B,D,F	D,F
Blue-billed Duck	P4 (BC Act)	Vagrant	-	-	-	-	-	F	-	-	-	-	-	-
Fork-tailed Swift	MI (EPBC Act/ BC Act)	Vagrant	D,F	D,F	D,F	D,F	D,F	D,F	D,F	D,F	D,F	D,F	D,F	D,F
Common Sandpiper	MI (EPBC Act/ BC Act)	Vagrant	-	-	-	-	-	F	-	-	-	-	-	-
Sharp-tailed Sandpiper	MI (EPBC Act/ BC Act)	Vagrant	-	-	-	-	-	F	-	-	-	-	-	-
Curlew Sandpiper	CR and MI (EPBC Act/ BC Act)	Vagrant	-	-	-	-	-	F	-	-	-	-	-	-
Pectoral Sandpiper	MI (EPBC Act/ BC Act)	Vagrant	-	-	-	-	-	F	-	-	-	-	-	-
Red-necked Stint	MI (EPBC Act/ BC Act)	Vagrant	-	-	-	-	-	F	-	-	-	-	-	-
Wood Sandpiper	MI (EPBC Act/ BC Act)	Vagrant	-	-	-	-	-	F	-	-	-	-	-	-
Common Greenshank	EN and MI (EPBC Act/ BC Act)	Vagrant	-	-	-	-	-	F	-	-	-	-	-	-
Grey Falcon	VU (EPBC Act/BC Act)	Vagrant	D,F	D,F	D,F	D,F	D,F	D,F	D,F	D,F	D,F	D,F	D,F	D,F
Peregrine Falcon	OS (BC Act)	Regular visitor	D,F	D,F	D,F	D,F	D,F,	D,F	D,F	D,F	D,F	D,F	D,F	D,F
Western Rosella (inland)	P4 (BC Act)	Regular visitor	B,D,F	B,D,F	D,F	D,F	D,F	-	D,F	B,D,F	B,D,F	D,F	D,F	D,F
Princess Parrot	VU/P4 (EPBC Act/BC Act)	Vagrant	B,D,F	B,D,F	B,D,F	D,F	B,D,F	-	D,F	D,F	D,F	D,F	D,F	D,F
Southern Whiteface	VU (EPBC Act/BC Act)	Resident	B,D,F	D,F	B,D,F	D,F	B,D,F	-	D,F	D,F	B,D,F	B,D,F	D,F	D,F
Mammals														
Central Long-eared Bat	P3 (BC Act)	Vagrant	D,F	D,F	D,F	D,F	D,F	-	D,F	D,F	D,F	D,F	D,F	D,F

4.3.1 Significant species profiles

Conservation significant species are discussed further in this section and listed according to expected occurrence.

4.3.1.1 Resident

4.3.1.1.1 Malleefowl (*Leipoa ocellata*); VU (EPBC Act/BC Act)

Malleefowl are expected as resident in the study area. All content from desktop and field assessments in relation to Malleefowl is consolidated in Section 4.4 for ease of reference.

4.3.1.1.2 Southern Whiteface (*Aphelocephala leucopsis*); VU (EPBC Act/BC Act)

Southern Whiteface is commonly recorded throughout arid Australia and is associated with open woodlands and shrublands. However, it is under threat from habitat loss and numbers are reducing in some areas of Australia. The nearest desktop record is 15 km south of the Borefield area and there are several additional records within 40 km of the study area (ALA, 2025).

Southern Whitefaces live in a wide range of open woodlands and shrublands where there is an understorey of grasses or shrubs, or both. These areas are usually in habitats dominated by acacias or eucalypts on ranges, foothills and lowlands, and plains (Higgins and Peter, 2002). Primary habitat for this species within the study area are: 'Open woodland on clay-loam plain', 'Mallee woodland and shrubland', and 'Shrubland' habitats, which provide trees or tall shrubs for nesting, some areas of moderately dense vegetation, and some areas of more open ground interspersed within shrub and ground cover layers; however as the species is ubiquitous, it may also occupy other habitats with areas of low trees, shrubs and ground cover. The size (in ha) of suitable Southern Whiteface habitat in the study area is given in Table 4-4.

A pair of Southern Whiteface was recorded in the Drainage line habitat type within the Mine area during the field assessment. Given more suitable habitat is present in the study area, and the species is known in the area, Southern Whiteface are considered Resident; however, as Southern Whiteface is common in the region, the local population is not likely to be significantly impacted by the proposal.

Table 4-4. Southern Whiteface habitat

Habitat	Area (ha)
Breeding and foraging	6,029.7
Foraging	2,294.5
None	697.4
Total	**9,021.5**

4.3.1.2 Regular visitor

4.3.1.2.1 Western Rosella (inland) (*Platycercus icterotis* (*xanthogenys*)); P4 (BC Act)

The Western Rosella is distributed throughout south-western WA but is divided into two sub-populations based on range and appearance, with the inland sub-species being slightly larger and more colourful than the south-western sub-species. The nearest record of this species is located between the Mine and the western part of the Borefield area, with an additional two records 20 km south of the Borefield (ALA, 2025). The Open eucalypt woodland habitat may support breeding if suitable hollows are present; this habitat is widespread throughout the region.

4.3.1.2.2 Peregrine Falcon (*Falco peregrinus*); OS (BC Act)

The Peregrine Falcon occurs throughout Australia, with the nearest record being within Borefield area, with many additional records in the local and regional area (ALA, 2025). Its habitat is variable and includes coastal, inland, and arid areas but it is mostly associated with hills, ranges, and rivers. The Peregrine Falcon may forage throughout the study area, however, given the lack of large trees in the study area, breeding is unlikely to occur.

4.3.1.3 Vagrant

4.3.1.3.1 Blue-billed Duck (*Oxyura australis*); P4 (BC Act)

The Blue-billed Duck is most common in temperate regions, however there are some records in semi-arid regions occur, mostly likely in response to large rainfall events or in permanent water such as dams. A record occurs in a dam approximately 5 km north of the eastern end of the Borefield (ALA, 2025). Given the Blue-billed Duck prefers permanent freshwater sources and deeper water, the Claypan habitat does not offer critical habitat for this species.

4.3.1.3.2 Fork-tailed Swift (*Apus pacificus*); MI (EPBC Act/ BC Act)

The Fork-tailed Swift breeds in Siberia, and overwinters in Australia between about August and mid-April (DCCEEW, 2023b). The nearest record of this species is 38 km west of the study area, however additional records in the region are sparse. The species is exclusively aerial, but may occur over a variety of habitats, preferring open plains, but are also known from coastal areas, urban areas, cliffs, and forests (DCCEEW, 2023b). The Fork-tailed Swift may occur above all habitats within the study area, however given this species is primarily aerial, none of the habitat types are significant for this species' survival.

4.3.1.3.3 Grey Falcon (*Falco hypoleucos*); VU (EPBC Act/BC Act)

The Grey Falcon occurs throughout Australia, in a variety of habitats, including coastal, inland, and arid areas; it is generally associated with hills, ranges, and rivers. The nearest record is 100 km south-east of the study area but this record is from between 1977 and 1981 (ALA, 2025), and all other records within 500 km of the study area are historical (prior to 1977). Given the rarity of records in the region, this species is only likely to be a vagrant.

4.3.1.3.4 Princess Parrot (*Polytelis alexandrae*); VU/P4 (EPBC Act/BC Act)

The Princess Parrot is mostly known from arid inland Australia, generally occurring in open woodland or shrubland habitats. The species is nomadic, and occurrence is thought to be highly dependent on rainfall (DCCEEW, 2023c). The study area appears to be on the south-western extent of its range (ALA, 2025), with the nearest record being 6 km north of the eastern part of the Borefield and 23 km east of the Mine area (ALA, 2025). It may use the woodland habitats for foraging.

4.3.1.3.5 Central Long-eared Bat (*Nyctophilus major tor*); P3 (BC Act)

The Central Long-eared Bat occurs in southern regions of Western Australia and South Australia. Little is known about this species of bat, however, its habitat is mixed eucalypt woodlands with prominent shrub layers, and around the fringes of she-oak and wattle thickets (Van Dyck and Strahan, 2008b). The nearest record is 12 km north of the Borefield and 22 km east of the Mine area (ALA, 2025; DBCA, 2025c) (Figure 4-3). None of the habitats within the study area represent primary habitat for this species, however, it may still occur in woodland or shrubland habitats.

4.3.1.3.6 Migratory shorebirds

Seven species of migratory shorebirds may occur in the study area as vagrants. These species are summer migrants (i.e. migrate from the northern hemisphere to Australia during their non-breeding season between September and March). They generally gather along the coastline, but may also opportunistically take advantage of inundation events occurring at inland ephemeral wetlands (DotE, 2015). There are no records within the desktop search area, however there are records of six species within 100 km of the study area at various inland lakes (ALA, 2025; DBCA, 2025c) (Figure 4-3). Given the sparsity of records and unpredictability of rainfall events in the region, it is possible that migratory shorebirds may infrequently forage in Claypan habitats when conditions are suitable (during summer and shortly after large rainfall events). However, there are no major salt lakes nearby and claypans are small. It is unlikely that large areas of inundation would occur within and near the study area to attract shorebirds on a regular basis.

4.4 Malleefowl

4.4.1 Desktop assessment

The DBCA search results show records of direct sightings of individuals, individuals on camera traps, mounds, and tracks within 15km and 40km of the study area (Figure 4-5). A total of fifteen records were located within the study area, 14 in the Mine area and one in the Borefield area. Of these:

- Twelve are mounds assessed in 2021 by Terrestrial Ecosystems (2022), of which two were considered recently active, and the remaining ten classed as long-unused.
- Three are DBCA records, of which one was an active mound in 1994 (northern-most record in the mine area), and two were opportunistic sightings in 2006 and 2007.

A further 64 records ranging between 1965 and 2023 occur within the desktop search area (40 km buffer of the study area) (DBCA, 2025b). These consist of 50 direct observations (sightings or calls heard), ten mounds, three remote camera detections, and one track.

There have been consistent Malleefowl records in the area since the 1990s, with grouping of records in some years likely related to increased survey effort during those years as a result of gold demand. This suggests a population of Malleefowl, with successful breeding, persists in the local area (ie within 15 km of the survey area).

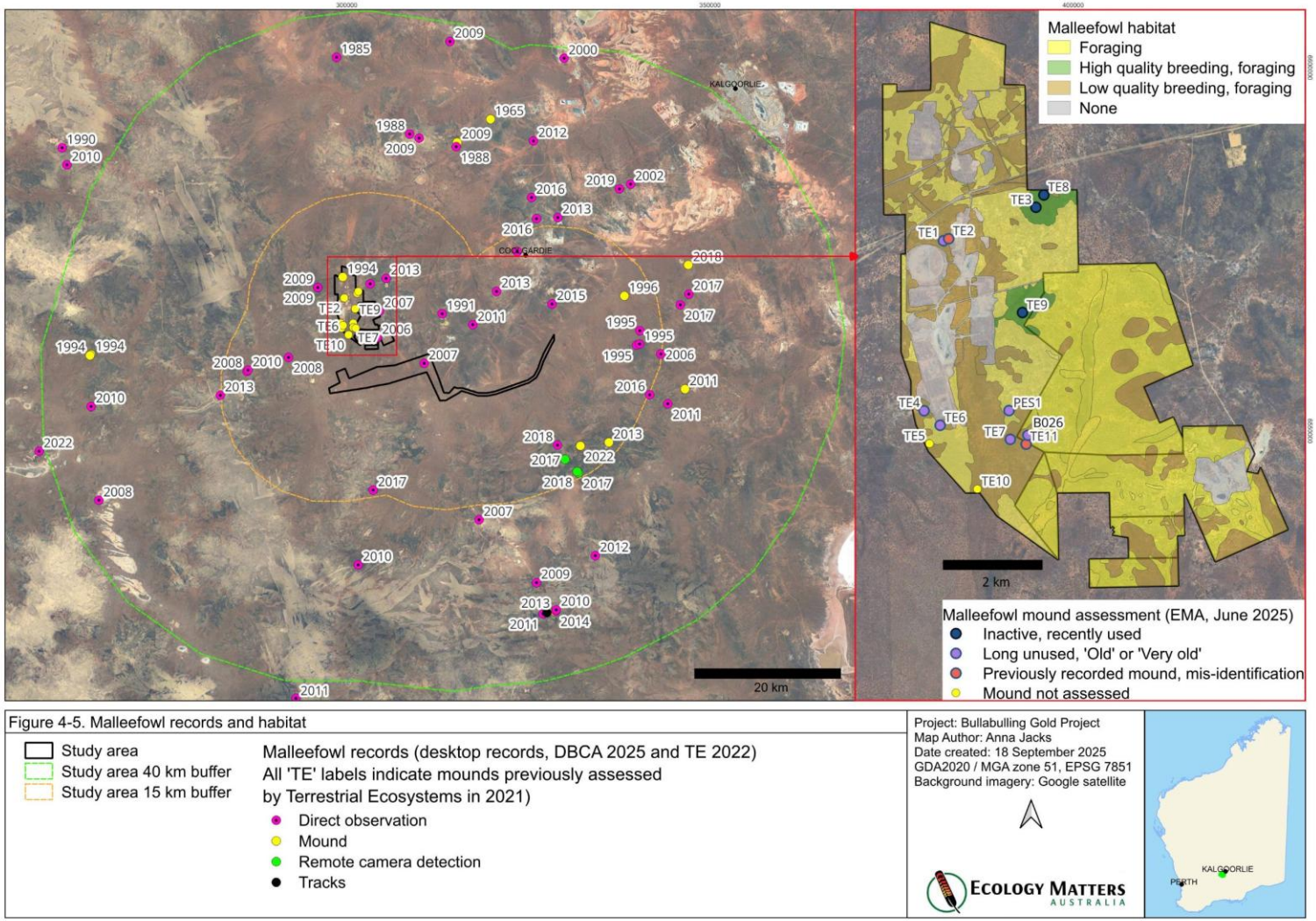


Figure 4-5. Malleefowl records and habitat (DBCA search results indicated with year of record, Terrestrial Ecosystems 2022 data, present survey results)

4.4.2 Habitat assessment

4.4.2.1 Distribution of breeding, foraging and dispersal habitat

Malleefowl habitat within the study area contained a mix of 'high-quality breeding and foraging' habitat, 'low-quality breeding and foraging' habitat, and 'foraging and dispersal' only habitat. Cleared areas constituted not suitable habitat. Areas of suitable Malleefowl habitat in the study area are given in Table 4-5.

All suitable breeding habitat types occur only in the Mine area. Small pockets of suitable breeding habitat may exist in the eucalypt woodland or dense woodland along drainages habitat types; however, breeding success is generally poor in these areas due to the surrounding habitat which does not provide suitable protection or mound building material. The Borefield area supports habitats that are suitable for foraging and dispersal only.

All native habitat types within the study area (8,363.9 ha (92.6%)) provide suitable foraging and dispersal habitat, particularly those that provide protection and food sources (primarily seeds, fruits, berries, flowers), particularly in the woodland and shrubland habitats.

Regionally, Malleefowl are widespread, with almost the entirety of the region being considered suitable for foraging and/or dispersal due to the high prevalence of eucalypt woodland, interspersed with various types of shrublands, some of which are suitable for breeding. Due to their presence and abundance in the region, it is not unexpected for Malleefowl to be present within the study area, particularly in the areas of high-quality habitat.

Table 4-5. Malleefowl habitat

Malleefowl Habitat	Area (ha)
High quality breeding, foraging	116.0
Low quality breeding, foraging	1,272.3
Foraging and dispersal	6,975.5
Not suitable	657.7
Total	**9,021.5**

4.4.2.2 High quality breeding habitat

Of the 12 native habitat types known in the study area, only one is considered high quality breeding habitat for Malleefowl: 'Dense mallee woodland and shrubland' (116.0 ha (1.3%)), Plate 13. The extent of this habitat is shown in Figure 4-5. This habitat type supports breeding because it has the following attributes required for successful breeding:

- Vegetation structure (density and canopy)
  - Suitably dense vegetation providing protection.
  - Provides shade and shelter for exposure and temperature regulation.
  - Provides a source of leaf litter for mound construction.
- Substrate
  - Consists of a mixture of loose soils, gravels, and leaf litter suitable for mound construction.
  - Well-drained and with good moisture retention.
- Negligible or gentle slope

- Though this habitat is located on hills, there are flat areas within the hills that provide suitable slope for nest stability.
- Not subject to inundation.



Plate 13. High quality breeding habitat showing dense vegetation and suitable soils, photo taken adjacent to recently used mound (TE3).

4.4.2.3 Low quality breeding habitat

An additional two habitat types are considered low quality breeding habitat: 'Mallee woodland and shrubland', and 'Shrubland'. These habitats occupy approximately 1,274.2 ha (14.1%) of the study area; their extents are shown in Figure 4-5. They are considered less likely to provide quality breeding habitat for Malleefowl because of apparent habitat degradation due to historical mining activity and cattle grazing. This has led to the following:

- More open understorey and mid-storey vegetation than the high quality areas, affecting temperature regulation, shade, shelter, protection, and sufficient leaf litter production for mound construction.
- Compacted ground, making the soils unfavourable for mound construction.

Mounds were recorded in these low-quality breeding habitat areas, but they were all long unused (over 50 years) and it is possible that they were active prior to mining and cattle disturbance.

It is noted that these areas still contain habitat features which may be considered suitable for Malleefowl breeding – the presence of shrubby vegetation to provide shelter and leaf litter, gravelly soils (though compacted in areas), and negligible or gentle slope. However, the level of habitat

degradation, presence of more suitable habitat nearby, lack of recently-used mounds in the area, suggest Malleefowl may preferentially breed in the higher quality habitat in the local area, at least until this area regenerates.

4.4.3 Mound assessment

4.4.3.1 2021 assessment (Terrestrial Ecosystems, 2022)

The 2021 survey assessed a total of 22 Malleefowl mounds within the study area (Terrestrial Ecosystems, 2022). Of these, 12 were found to "be significant enough to warrant monitoring as the remainder are never likely to be reused" with seven 'Profile 1' mounds (good shape, some with recent evidence of use such as egg shells) and five 'Profile 6' mounds (flat, long unused) recorded (Terrestrial Ecosystems, 2022).

4.4.3.2 2025 assessment (Current survey)

Only ten mounds were requested by GVA to be re-assessed by EMA because two were outside the 'planned infrastructure footprint' and will not be impacted. The status and locations of the ten mounds that were re-assessed in the present survey are shown in Table 4-6 and Figure 4-5. Details of the mounds were as follows:

- Three were inactive (recently used) but recently used mounds, with evidence of eggshells, loose soils, leaf litter and sticks within 'Profile 1' crater mound (TE3, TE8, and TE9).
- Three were long unused (old) mounds with no evidence of recent use, low mound with small or absent crater, often with vegetation growing over the mound with 'Profile 6' (PES1, TE4 and TE7).
- Two were long unused (very old) with a very low and weathered mound with absent crater and vegetation growing in the mound (TE1 and TE6).
- Two were mounds considered previously mis-identified as Malleefowl mounds and more likely remnants of historical groundworks in the area (TE2 and TE11).

An additional mound was recorded during the 2025 survey (B027), and this mound is considered long unused (very old) (Table 4-6 and Figure 4-4). Photographs of each mound are shown below in Plates 15 to 25.

Table 4-6. Malleefowl mound assessment

Mound code (Source)	Status (June 2025)	Comment	Easting	Northing
PES1 (RPS, 2012) Plate 16	Long unused (old)	Malleefowl mound, 4m diameter, 0.3high, 0.1m crater. Lateritic gravel. 50-100yo.	300883	6564831
TE1 (Terrestrial Ecosystems, 2022) Plate 17	Long unused (very old)	Malleefowl mound, slightly raised with minimal crater. Mature dead trees in mound, low in landscape. >100yo.	299554	6568271
TE2 (Terrestrial Ecosystems, 2022) Plate 18	Unlikely mound	Was identified by previous consultant as a 'very old' Malleefowl mound but looks more like spoil pushed up. Mallee growing in pile.	299661	6568312
TE3 (Terrestrial Ecosystems, 2022) Plate 19	Inactive (recently used)	Malleefowl Mound. 6m diameter, 1m high, crater to 0.5m, shell in mound, loose soil in crater walls. Eggshells were recorded in 2021.	301428	6568950
TE4 Plate 14	Long unused (old)	5m diameter, 0.3m high, 0.5m crater, gum tree growing in wall, lateritic gravel	299163	6564828
TE5	Not assessed	Not re-assessed as it is located outside the development footprint;	299272	6564162
TE6 Plate 15	Long unused (very old)	Very flat, with fallen tree over it.	299488	6564534
TE7 (Terrestrial Ecosystems, 2022) Plate 22	Long unused (old)	8m diameter, 0.4m high, 0.1m crater, lateritic gravel, mature trees dead and fallen around mound. 50-100yo.	300910	6564250
TE8 (Terrestrial Ecosystems, 2022) Plate 23	Inactive (recently used)	7m diameter, 1m high, 0.6m crater, lot of eggshells in mound, soil loose in crater wall, sand, and gravel in mound. Eggshells were recorded in 2021.	301589	6569198
TE9 (Terrestrial Ecosystems, 2022) Plate 24	Inactive (recently used)	Eggshell in wall, 6m diameter, 0.8m high, crater to 1m, sticks and leaf litter in soil in crater, soft inner walls <5YO.	301156	6566818
TE10	Not assessed	Not re-assessed as it is located outside the development footprint;	300242	6563243
TE11 (Terrestrial Ecosystems, 2022) Plate 25	Unlikely mound	Was identified by previous consultant as a 'very old' Malleefowl mound but appears as just a pile of stoney spoil.	301230	6564151
B027 (EMA, this survey) Plate 26	Long unused (very old)	New mound. mound 10 m diameter, 0.8m high, crater 0.2m lateritic gravel, mature shrubs in crater. 50-100yo.	301266	6564333



Plate 16. PES1 - long unused (old)



Plate 17. TE1 - long unused (very old)



Plate 18. TE2 (unlikely Malleefowl mound)



Plate 19. TE3 - inactive (recently used)



Plate 20. TE4 – long unused (old)



Plate 21. TE6 - long unused (very old)



Plate 22. TE7 - long unused (old)



Plate 23. TE8 - inactive (recently used)



Plate 24. TE9 - inactive (recently used)



Plate 25. TE11 - unlikely Malleefowl mound



Plate 26. B027 - long unused (very old)

4.4.3.3 LiDAR mound assessment (GVA)

Of the 15 “likely” LiDAR Malleefowl mound, nine were ground-truthed and only two were found to be potential old mounds. Of the 122 “unlikely” sites, 34 were ground-truthed and confirmed as not Malleefowl mounds (Figure 5-6) (Appendix 9).

The false detections were a combination of spoil heaps from historical ground disturbance, inundation leading to erosion, and raised ground from tree growth. Examples of spoil heaps which came up as potential mounds by LiDAR are shown in Figure 4-7 to Figure 4-9.

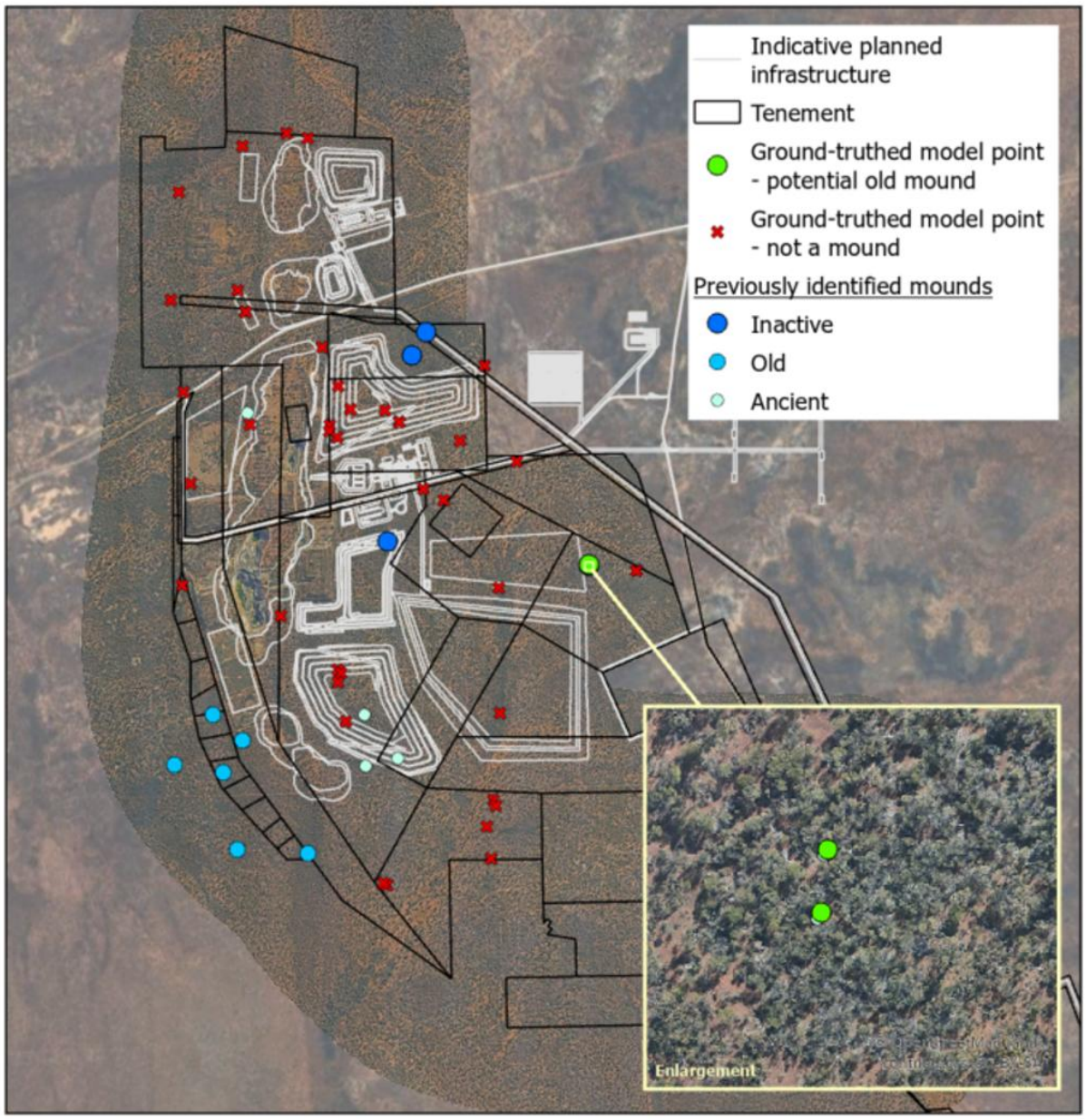


Figure 4-6. Location and assessment of GVA LiDAR mounds. Image supplied by GVA.



Figure 4-7 Spoil heap misidentified by LiDAR model as Malleefowl mound



Figure 4-8 Inundation misidentified by LiDAR model as Malleefowl mound



Figure 4-9 Clump of trees with raise earth around base misidentified by LiDAR model as Malleefowl mound

4.5 Significant butterflies

4.5.1 Desktop assessment

Two species of significant butterfly were considered to potentially occur in the study area:

- The Inland Hairstreak Butterfly (*Jalmenus aridus*); P1 (BC Act) occurs in the Goldfields region, however very little is known about the biology of this species due to its short life cycle, with adult butterflies only emerging for a few weeks during spring. Since 2021, over 25 new populations of this species have been recorded in the region, primarily south and east of the study area. The nearest two subpopulations being located 8 to 10 km north of the eastern end of the Borefield area, and 18 km and east of the Mine area (DBCA, 2025b). Suitable habitat exists in the study area where known host plants *Senna artemisioides* ssp. *filifolia* and *Acacia tetragonophylla* occur, these include shrubland and woodland habitat types.
- The Arid Bronze Azure Butterfly (*Ogyris petrina*); CR (EPBC/BC Act) is a very rare species due to its specific ecological requirements. The butterfly can only survive in the presence of its host ant *Camponotus* sp. nr. *terebrans*, an undescribed species of ant which builds distinctive nests eucalypt woodland. While eucalypt woodland is common, the ants are not common. Furthermore, the butterfly can only be searched for during its flight period, which lasts only a few weeks each year and emergence is unpredictable, however searches for host ant nests outside of the flight period may narrow down search areas, thus the absence of host ant nests indicates the butterfly is not present. Suitable habitat for this species may occur in the eucalypt woodland habitat within the study area.

4.5.2 Field assessment

The Inland Hairstreak Butterfly was not detected during the targeted survey. Given the survey was conducted in its flight period and the species was flying in other areas in the region at the time of survey, it is considered unlikely that this species occurs within the study area.

For Arid Bronze Azure Butterfly, the field assessment concluded that the potential habitats within study area were unsuitable due to a combination of factors – there was the wrong mix of or insufficient understorey plants, presence of recent disturbance, the habitat not being large enough, and the presence of areas of low-lying and flood prone, waterlogged or sheet water drainage.

No *Camponotus* sp. nr. *terebrans* nests were found during the survey. In some areas *Crematogaster* ants dominated the bases of the trees (they can displace *Camponotus*), and the meat ant, *Iridomyrmex purpureus* was ubiquitous. Meat ants are a major competitor of *Camponotus* ants.

Given the above, the Arid Bronze Azure Butterfly is also considered unlikely to occur in the study area.

5 Discussion

5.1 Species assemblage

The fauna assemblage within the study area primarily consists of species which are generally widespread and common throughout semi-arid and arid regions. The assemblage comprises a variety of birds, reptiles, mammals, and amphibians. Although only birds were recorded during the survey, it is certain that a range of mammals and reptiles commonly occur within the study area that were not detectable during the survey due to their shy behaviours or cryptic features.

Two conservation significant species are likely to be resident in the study area - Malleefowl (VU) and Southern Whiteface (VU). Malleefowl and Southern Whiteface are common in the local and regional area and are also found throughout arid Australia. However, they are at risk from habitat loss and fragmentation (particularly in developed areas), and feral predators.

Two species may occur as a regular visitor (Western Rosella and Peregrine Falcon), and fifteen species as vagrants (Fork-tailed Swift, Grey Falcon, Princess Parrot, Central Long-eared Bat, Blue-billed duck and seven species of migratory shorebird). Although there are very few records of the vagrant species in the region, their occurrence for foraging cannot be categorically ruled out; however, the habitats within the study area are not considered suitable for breeding.

5.2 Malleefowl

Malleefowl are commonly recorded in the region, with 14 records in the Mine area, one in the Borefield area, and a further 64 records within 40 km of the study area (DBCA, 2025b). There was recent breeding activity (within the past 5 years) recorded in the north of the study area.

The ‘Dense mallee woodland and shrubland’ habitat represents high-quality breeding habitat and is located mostly to the north of the study area, where the recently-active mounds are located. This habitat contains suitable vegetation coverage, density, soils, and leaf litter to support successful breeding.

An additional two habitats support low-quality breeding habitat: ‘Mallee woodland and shrubland’ and ‘Shrubland’, covering 1,274.2 ha (14.1%) of the study area. These habitats contain features that may support mound building; however, these features are less suitable due to historical degradation or the features not being present together (e.g. only very small patches of suitable vegetation density, or unsuitable slope or substrate), and Malleefowl are more likely to breed in patches of high-quality habitat until these areas regenerate further.

The remaining habitats are only likely to be suitable for foraging and dispersal as they lack key characteristics (vegetation type and density, substrate, and low level of disturbance) required for successful breeding. Due to the presence of suitable breeding and foraging habitat, recent successful breeding events, and several recent records of Malleefowl in the local area, it is considered that the Malleefowl is resident in the study area.

Regionally, Malleefowl habitat is common. The regional and local population is less under threat than populations in more disturbed areas (such as the Wheatbelt), where clearing is widespread and feral predators are abundant. The local population is not likely to be significantly impacted from the proposal due to the presence of suitable habitat locally and regionally. Further detail on Malleefowl and its occurrence in the study area is given in Section 4.4 above.

5.3 Biodiversity value of habitat types

The study area represents a typical Goldfields landscape, dominated by eucalypt woodland, and is within the Great Western Woodlands (GWW), an area defined by large expanses of intact woodlands interspersed with a diversity of other habitats (e.g. shrublands, grasslands and mallee). The GWW is known to support a very high diversity of flora and fauna, particularly in the southern areas of the GWW (Watson et al., 2008). There are historical mining and cattle grazing disturbance throughout the study area.

The 'Open woodland on clay-loam plain' habitat is the most common of the four habitat types within the study area, occupying 61.7% of the study area and is representative of the open eucalypt woodland habitat that occurs throughout the region. Southern Whiteface and Malleefowl (both VU) may occur in this habitat type. Trees within this habitat may support hollows for hollow-nesting species, such as Western Rosella (P4) and Peregrine Falcon (OS). Open eucalypt woodlands provide habitat for many non-significant species birds, reptiles, and mammals and is important for connectivity (foraging and dispersal habitat) across the landscape.

The 'Open woodland and spinifex on sandplain' habitat dominates the eastern end of the Borefield. This vegetation in this habitat is structurally similar to the 'Open woodland on clay-loam plain', however the substrate differs markedly. The sandplain substrates are softer and more penetrable, being more suitable for fauna adapted to burrowing such as some reptiles and invertebrates.

Shrubland dominated habitats are represented by three habitat types: 'Mallee woodland and shrubland', 'Dense woodland and shrubland', and 'Shrubland'. These habitats provide habitat for a diversity of species, particularly due to its structural complexity providing habitat diversity. It likely supports a higher diversity of insectivorous and nectar feeding birds due to its higher density of flowering shrubs (compared to the open woodland habitat type). They are the suitable habitat for the two resident conservation significant species Malleefowl and Southern Whiteface.

The Drainage line habitat contains a dense mix of trees and shrubs. This habitat primarily occurs in the Mine area where the main draining line runs north to south where it merges into the 'Open chenopod plain. It is moderately suitable for the Southern Whiteface, however due to its tendency to become inundated, it does not make good Malleefowl mound building habitat. This habitat type provides habitat for a diversity of fauna species due to its higher habitat complexity (density, variety, and layers of vegetation habitat features such as coarse woody debris, leaf litter, and moisture).

The 'Open chenopod plain' comprises a broad drainage system subject to seasonal inundations so has large areas of bare ground with wash channels. Vegetation within the 'Open chenopod plain' is sparse and primarily contains low shrubs on a substrate of sandy loam with some fine quartz and ironstone gravels. It does not provide habitat for conservation significant species except for occasional foraging and dispersal. Regardless of its sparse vegetation, this habitat supports fauna that forage and bask in open areas (such as reptiles and kangaroos, seed-eating and aerial feeding birds, and birds of prey).

Five fauna habitats occupy less than 1% of the study area, these include 'Claypans', 'Dense woodland next to claypan', 'Tall *Melaleuca* shrubland on calcrete', 'Sparse low shrubs on rocky rise' and 'Open woodland on conical hill'. None of these habitats are likely to support critical or restricted habitat for any vertebrate fauna species. The claypans still may provide habitat for wetland species, such as waterbirds, however, given their small size and temporary nature, and unpredictability in inundation, they are unlikely to support critical life stages for terrestrial vertebrate fauna.

Locally (within 15 km of the study area), several timber and protected reserves occur. Due to the relative remoteness of the study area, much of the site is less disturbed from human impacts such as development (other than small mining pits), vehicles and recreation, as well as from feral animals. Some parts of the Mine area, particularly that surveyed by Terrestrial Ecosystems in 2021 shows a higher degree of disturbance from previous mining activities.

5.4 Ecological processes

The functionality of an ecosystem is influenced by the ecological processes that operate within and around it. These processes are governed by a dynamic interaction between biotic factors (such as plants and animals), and abiotic factors (such as climate, soils, water, and sunlight), and may be natural or anthropogenic. Common ecological processes present in the WA environment are described in Appendix 7. Within the region of the study area, four primary ecological processes have been identified:

- Habitat degradation – the study area has experienced historical mining exploration and cattle grazing disturbance which has resulted in habitat degradation (vegetation clearance and soil compaction) in areas across the study area.
- Landscape hydrology – the study area is situated in a generally flat area with poor drainage. The area receives generally low rainfall to which the native vegetation is adapted. Some species, such as Malleefowl, are sensitive to climactic and vegetation changes. Malleefowl require sufficiently dense vegetation for protection, as well as specific soils, drainage, and litter for nest building, and rainfall to assist in egg incubation.
- Connectivity and large areas of intact vegetation communities – the area has not been subject to significant influences of development and associated anthropogenic impacts due to its remoteness from large urban centres. It remains connected to large areas of native vegetation which are largely intact.
- Introduced species Several competitive and predatory species are present in the region, such as Cattle, Donkey, Cats, Foxes, Horses, and Rabbits. Feral predators are present in the region (foxes and cats), and these species are known to predate native species such as mammals and birds, including Malleefowl.
- Light/vibration, habitat loss, ongoing mortality as a result of mining activity – the region supports a strong mining sector, primarily focussed on gold. Open pit mining is common in the region and involves direct removal of habitat. The indirect impacts of mining include introduction of weeds and feral animals, increases in light and vibration, and increases in traffic. These impacts are usually localised to each development; however cumulative impacts may occur.
- Mining of other minerals such as iron ore is known to occur along ranges in the region, typically in the western areas. Ranges contain unique habitats due to their geological structure, hydrology, and unique vegetation assemblages. They provide refugia for many species and may provide regionally significant breeding habitat for conservation significant species such as Chuditch.

5.5 Threatening processes

Common impacts of a mining project to fauna and faunal communities are presented in Table 5-1. Note, this is not an impact assessment of the Project. For this Project, the processes which may impact

upon fauna, communities, and their habitats within the study area is dependent on the extent of the threatening process, and the sensitivity of the species/community/environment.

Table 5-1. Threatening processes

Threat	Potential impact to fauna
Removal of habitat	Primary impact directly leading to population decline and/or fragmentation.
Mortality during construction/development	Direct impact leading to decline in species abundance.
Introduction/increase in feral predators or non-native competitors	Reduction in species abundance and/or presence due to predation (cats, foxes, cane toads) or competition for resources (rabbits, cane toads, introduced corellas), or alteration of habitat (cattle).
Trophic level species interactions	A reduction of a single species or group of animals may impact the abundance/presence of other species, particularly those that have symbiotic relationships.
Introduction/spread of weeds or soil pathogens during construction or increased traffic	Encroachment/destruction on to native foraging/roosting/breeding species leading to population decline.
Hydrological change	May alter habitats, particularly those that support flora/fauna communities that are dependent on specific drainage conditions.
Altered fire regimes	An increase or decrease in frequency/intensity/ distribution of fire results in habitat alteration or destruction, such as reduced denning/breeding/sheltering habitat or foraging species.
Disturbance (dust, noise, light, vibration)	Some species may be deterred by noise, dust, light, and vibration.
Altered traffic	Direct physical impact. Risk is increased with speed, low visibility (hill crests, dust, dusk/dawn), and increase in traffic.

5.6 Summary of fauna values

Habitat

Thirteen broad habitat types were identified based on observations made during the field assessment. The area has experienced historical mining exploration and cattle grazing disturbance which has degraded areas. The habitat types are dominated by open eucalypt woodland, which is a regionally common habitat type, but provides important habitat for fauna and connectivity across the landscape. The shrubland provides suitable habitat for conservation significant species Malleefowl, particularly the 'Dense mallee and shrubland' habitat type. The open woodland and shrubland habitat types are most suitable for Southern Whiteface. The Drainage line also provides suitable habitat for many species, including Southern Whiteface, which was recorded in this habitat. The Open chenopod plain likely supports a lower diversity of fauna due to its sparse vegetation.

General assemblage

A total of 273 vertebrate fauna species could occur in the study area, with 55 birds recorded during the field assessment. The fauna assemblage is typical of arid and semi-arid regions, with mostly

widespread and common species associated with open eucalypt woodland, moderately dense shrubland, and open chenopod plain habitat types, expected to occur within the study area.

Significant taxa

Two significant vertebrates were recorded during the field assessment and are considered to be residents - Malleefowl and Southern Whiteface, both VU. Two species are likely to be regular visitors (Western Rosella (P4), and Peregrine Falcon (OS)), and 12 species may occur in the area as vagrants.

Two species of conservation significant invertebrates (Arid Bronze Azure Butterfly (CR) and Inland Hairstreak Butterfly (P1)) which are known from the region are considered unlikely to occur in the study area due to unsuitable habitat.

Biodiversity values of habitat

The most extensive habitat in the study area (also widespread in the surrounding landscape) is Open eucalypt woodland which provides habitat for many species of fauna and acts as an important habitat for connectivity for fauna. Shrubland habitats ('Mallee woodland and shrubland', 'Dense mallee woodland and shrubland', and 'Shrubland') occur throughout the Mine area. Where the shrublands are dense, topography is gentle, and there is suitable substrates and other mound building materials, this represents High-quality Malleefowl breeding habitat. In contrast, the more open areas of woodland and shrubland habitats are more suitable for Southern Whiteface, which requires trees or tall shrubs for nesting, and patchy bare earth with a variety of understorey and midstorey species for movement and foraging. Drainage line habitats occur in the Mine area and contains dense vegetation, supporting a diversity of species. 'Open chenopod plain' is sparsely vegetated and supports a lower diversity of fauna. Within the Borefield area, the 'Open woodland and spinifex on sandplain' is dominant to the east. The remaining habitats occupy less than 1% of the study area, and while they provide habitat for many species of fauna, none are likely to represent critical habitat given their small areas.

Overall, the study area is characteristic of the Eastern Goldfields bioregion, predominantly comprising 'Open eucalypt woodland', which is typical of the broader landscape. It is within the Great Western Woodlands, which occur over 16 million ha of south-western Australia and is relatively intact with known high biodiversity values.

All identified habitat types were assessed to be in good ecological condition. This is likely attributable to the site's remoteness from major population centres and associated impacts, such as habitat disturbance and loss and increased feral predator abundance; however, some impacts from previous mining activities were present in parts of the Mine area.

Key ecological processes

The ecological processes that are likely to have had, or continue to have, major effects upon the fauna assemblage include habitat degradation, connectivity and large areas of intact vegetation communities, the presence and abundance of introduced species, mining, and local hydrology.

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Appendices

Appendix 1. 2025 survey results; habitat assessment and Malleefowl mounds

Site Code	Easting	Northing	Zone	Record Type
B001	300883	6564831	51	Significant species record: Malleefowl mound - old
B002	299554	6568271	51	Significant species record: Malleefowl mound - very old
B003	299661	6568312	51	Significant species record: Malleefowl (Mis-identification record), Previously recorded mound
B004	301428	6568950	51	Significant species record: Malleefowl mound - recently used
B005	301589	6569198	51	Significant species record: Malleefowl mound - recently used
B006	303923	6566659	51	Habitat assessment
B007	303920	6566763	51	Habitat assessment
B008	303577	6566817	51	Habitat assessment
B009	303577	6566622	51	Habitat assessment
B010	302657	6566873	51	Habitat assessment
B011	302342	6566957	51	Habitat assessment
B012	301606	6567077	51	Habitat assessment
B013	304037	6567401	51	Significant species record: Southern Whiteface, Direct sighting
B014	301283	6566502	51	Habitat assessment
B015	301526	6566570	51	Habitat assessment
B016	302412	6566600	51	Habitat assessment
B017	302221	6566607	51	Habitat assessment
B018	302086	6566593	51	Habitat assessment
B019	302059	6566192	51	Habitat assessment
B020	302031	6565806	51	Habitat assessment
B021	302038	6565608	51	Habitat assessment
B022	302055	6565236	51	Habitat assessment
B023	301726	6563997	51	Habitat assessment
B024	301156	6566818	51	Significant species record: Malleefowl mound - recently used
B025	301240	6564257	51	Habitat assessment
B026	301230	6564151	51	Significant species record: Malleefowl (Mis-identification record), Previously recorded mound
B027	301266	6564333	51	Significant species record: Malleefowl mound - old
B028	300910	6564250	51	Significant species record: Malleefowl mound - old
B029	301227	6564574	51	Habitat assessment
B030	301238	6564352	51	Habitat assessment
B031	303719	6564030	51	Habitat assessment
B032	303986	6564072	51	Habitat assessment
B033	301721	6567470	51	Habitat assessment
B034	302329	6567614	51	Habitat assessment
B035	303479	6567698	51	Habitat assessment
B036	303684	6567666	51	Habitat assessment
B037	303646	6567564	51	Habitat assessment
B038	304037	6567401	51	Habitat assessment
B039	304210	6566687	51	Habitat assessment

Site Code	Easting	Northing	Zone	Record Type
B040	304235	6566556	51	Habitat assessment
B041	302712	6567514	51	Habitat assessment
B042	302788	6567367	51	Habitat assessment
B043	303084	6567175	51	Habitat assessment
B044	303629	6567250	51	Habitat assessment
B045	303652	6564767	51	Habitat assessment
B046	303654	6565192	51	Habitat assessment
B047	303300	6562042	51	Habitat assessment
B048	303472	6562030	51	Habitat assessment
B049	303646	6562016	51	Habitat assessment
B050	303889	6561975	51	Habitat assessment
B051	304078	6562065	51	Habitat assessment
B052	303662	6562178	51	Habitat assessment
B053	303445	6562246	51	Habitat assessment
B054	303765	6562261	51	Habitat assessment
B055	304171	6562398	51	Habitat assessment
B056	303963	6562533	51	Habitat assessment
B057	303658	6562548	51	Habitat assessment
B058	303733	6562573	51	Habitat assessment
B059	303493	6562679	51	Habitat assessment
B060	303095	6562564	51	Habitat assessment
B061	303192	6562664	51	Habitat assessment
B062	303718	6563123	51	Habitat assessment
B063	303540	6563116	51	Habitat assessment
B064	303670	6563377	51	Habitat assessment
B065	303722	6563318	51	Habitat assessment
B066	302849	6563881	51	Habitat assessment
B067	302504	6563597	51	Habitat assessment
B068	302412	6563498	51	Habitat assessment
B069	302211	6563411	51	Habitat assessment
B070	302196	6563263	51	Habitat assessment
B071	301845	6563146	51	Habitat assessment
B072	301839	6562975	51	Habitat assessment
B073	301822	6562715	51	Habitat assessment
B074	301818	6562436	51	Habitat assessment
B075	301685	6562675	51	Habitat assessment
B076	301657	6562907	51	Habitat assessment
B077	301533	6562985	51	Habitat assessment
B078	301302	6563138	51	Habitat assessment
B079	301086	6563277	51	Habitat assessment
B080	301087	6563277	51	Habitat assessment
B081	301087	6563277	51	Habitat assessment
B082	301994	6563604	51	Habitat assessment

Site Code	Easting	Northing	Zone	Record Type
B083	301637	6563686	51	Habitat assessment
B084	301648	6563281	51	Habitat assessment
B085	301902	6563299	51	Habitat assessment
B086	302032	6563295	51	Habitat assessment
B087	302118	6563267	51	Habitat assessment
B088	304671	6563838	51	Habitat assessment
B089	305557	6564035	51	Habitat assessment
B090	306072	6562610	51	Habitat assessment
B091	306188	6562687	51	Habitat assessment
B092	306225	6562873	51	Habitat assessment
B093	306064	6562941	51	Habitat assessment
B094	305941	6562895	51	Habitat assessment
B095	305449	6562419	51	Habitat assessment
B096	305538	6562493	51	Habitat assessment
B097	305601	6562579	51	Habitat assessment
B098	305652	6562647	51	Habitat assessment
B099	305758	6562691	51	Habitat assessment
B100	305809	6562857	51	Habitat assessment
B101	306121	6562306	51	Habitat assessment
B102	305410	6562031	51	Habitat assessment
B103	305225	6561836	51	Habitat assessment
B104	305029	6561984	51	Habitat assessment
B105	305019	6562401	51	Habitat assessment
B106	305057	6562461	51	Habitat assessment
B107	305152	6562627	51	Habitat assessment
B108	305162	6562698	51	Habitat assessment
B109	304559	6562941	51	Habitat assessment
B110	304591	6562952	51	Habitat assessment
B111	304739	6562985	51	Habitat assessment
B112	304864	6562885	51	Habitat assessment
B113	305284	6562874	51	Habitat assessment
B114	305561	6563101	51	Habitat assessment
B115	305190	6563860	51	Habitat assessment
B116	305047	6563946	51	Habitat assessment
B117	305127	6563880	51	Habitat assessment
B118	305546	6564027	51	Habitat assessment
B119	305326	6564386	51	Habitat assessment
B120	305265	6564435	51	Habitat assessment
B121	305004	6564447	51	Habitat assessment
B122	304859	6564354	51	Habitat assessment
B123	304695	6564205	51	Habitat assessment
B124	304674	6564114	51	Habitat assessment
B125	304576	6564053	51	Habitat assessment

Site Code	Easting	Northing	Zone	Record Type
B126	304063	6562629	51	Habitat assessment
B127	304196	6562759	51	Habitat assessment
B128	304359	6562833	51	Habitat assessment
B129	304359	6563134	51	Habitat assessment
B130	303905	6563426	51	Habitat assessment
B131	303965	6563465	51	Habitat assessment
B132	304122	6563442	51	Habitat assessment
B133	304350	6563432	51	Habitat assessment
B134	304412	6563511	51	Habitat assessment
B135	304425	6563627	51	Habitat assessment
B136	304393	6563799	51	Habitat assessment
B137	304408	6563971	51	Habitat assessment
B138	304410	6564021	51	Habitat assessment
B139	303632	6563802	51	Habitat assessment
B140	302508	6563279	51	Habitat assessment
B141	301768	6563212	51	Habitat assessment
B142	301489	6563211	51	Habitat assessment
B143	301321	6562980	51	Habitat assessment
B144	301256	6562752	51	Habitat assessment
B145	301567	6562544	51	Habitat assessment
B146	301547	6562365	51	Habitat assessment
B147	301633	6562253	51	Habitat assessment
B148	301757	6562094	51	Habitat assessment
B149	311430	6560425	51	Habitat assessment
B150	310712	6559404	51	Habitat assessment
B151	310428	6559011	51	Habitat assessment
B152	310331	6558870	51	Habitat assessment
B153	309910	6558275	51	Habitat assessment
B154	309613	6557862	51	Habitat assessment
B155	310146	6558630	51	Habitat assessment
B156	309417	6558622	51	Habitat assessment
B157	309427	6559015	51	Habitat assessment
B158	308647	6559146	51	Habitat assessment
B159	308349	6559039	51	Habitat assessment
B160	307943	6558783	51	Habitat assessment
B161	307591	6558459	51	Habitat assessment
B162	307112	6557710	51	Habitat assessment
B163	306710	6557401	51	Habitat assessment
B164	306146	6557462	51	Habitat assessment
B165	305256	6557439	51	Habitat assessment
B166	304552	6557008	51	Habitat assessment
B167	303944	6556723	51	Habitat assessment
B168	303640	6556738	51	Habitat assessment

Site Code	Easting	Northing	Zone	Record Type
B169	304542	6557238	51	Habitat assessment
B170	303833	6557396	51	Habitat assessment
B171	302928	6557666	51	Habitat assessment
B172	302554	6557025	51	Habitat assessment
B173	298665	6555331	51	Habitat assessment
B174	298567	6555464	51	Habitat assessment
B175	298541	6555515	51	Habitat assessment
B176	298797	6555347	51	Habitat assessment
B177	299917	6555725	51	Habitat assessment
B178	298860	6557867	51	Habitat assessment
B179	299980	6557880	51	Habitat assessment
B180	299938	6556821	51	Habitat assessment
B181	300015	6556363	51	Habitat assessment
B182	300326	6556366	51	Habitat assessment
B183	301434	6556358	51	Habitat assessment
B184	301640	6555962	51	Habitat assessment
B185	302518	6556056	51	Habitat assessment
B186	302176	6556449	51	Habitat assessment
B187	302329	6556460	51	Habitat assessment
B188	302394	6557787	51	Habitat assessment
B189	302384	6557785	51	Habitat assessment
B190	303237	6562787	51	Habitat assessment
B191	303231	6562853	51	Habitat assessment
B192	303220	6562888	51	Habitat assessment
B193	303171	6563020	51	Habitat assessment
B194	303153	6563084	51	Habitat assessment
B195	303100	6563234	51	Habitat assessment
B196	303115	6563318	51	Habitat assessment
B197	303144	6563375	51	Habitat assessment
B198	303166	6563410	51	Habitat assessment
B199	303153	6563460	51	Habitat assessment
B200	303249	6563610	51	Habitat assessment
B201	303257	6563776	51	Habitat assessment
B202	301976	6563439	51	Habitat assessment
B203	301767	6563464	51	Habitat assessment
B204	301599	6563475	51	Habitat assessment
B205	301386	6563508	51	Habitat assessment
B206	301485	6563188	51	Habitat assessment
B207	303532	6562866	51	Habitat assessment
B208	303398	6563040	51	Habitat assessment
B209	303311	6563012	51	Habitat assessment
B210	303146	6562969	51	Habitat assessment
B211	303232	6562771	51	Habitat assessment

Site Code	Easting	Northing	Zone	Record Type
B212	321883	6555704	51	Habitat assessment
B213	321754	6555646	51	Habitat assessment
B214	321528	6555579	51	Habitat assessment
B215	321412	6555542	51	Habitat assessment
B216	321247	6555449	51	Habitat assessment
B217	321082	6555412	51	Habitat assessment
B218	320718	6555328	51	Habitat assessment
B219	320590	6555302	51	Habitat assessment
B220	315545	6555657	51	Habitat assessment
B221	315496	6555803	51	Habitat assessment
B222	315185	6555889	51	Habitat assessment
B223	314968	6555888	51	Habitat assessment
B224	315004	6555733	51	Habitat assessment
B225	315123	6555669	51	Habitat assessment
B226	315202	6555633	51	Habitat assessment
B227	315376	6555327	51	Habitat assessment
B228	314055	6554576	51	Habitat assessment
B229	311601	6558655	51	Habitat assessment
B230	311397	6559320	51	Habitat assessment
B231	311196	6559834	51	Habitat assessment
B232	320295	6555150	51	Habitat assessment
B233	320064	6555325	51	Habitat assessment
B234	319836	6555171	51	Habitat assessment
B235	319232	6554917	51	Habitat assessment
B236	318945	6554988	51	Habitat assessment
B237	318518	6555196	51	Habitat assessment
B238	317833	6555073	51	Habitat assessment
B239	317618	6555175	51	Habitat assessment
B240	317037	6555480	51	Habitat assessment
B241	316769	6555583	51	Habitat assessment
B242	316954	6555234	51	Habitat assessment
B243	316863	6555372	51	Habitat assessment
B244	316549	6555700	51	Habitat assessment
B245	316545	6555478	51	Habitat assessment
B246	316520	6555582	51	Habitat assessment
B247	315791	6555536	51	Habitat assessment
B248	315530	6555558	51	Habitat assessment
B249	315235	6555538	51	Habitat assessment
B250	315314	6555433	51	Habitat assessment
B251	315127	6555134	51	Habitat assessment
B252	314884	6555238	51	Habitat assessment
B253	314812	6555209	51	Habitat assessment
B254	314623	6555060	51	Habitat assessment

Site Code	Easting	Northing	Zone	Record Type
B255	314537	6555009	51	Habitat assessment
B256	314339	6555072	51	Habitat assessment
B257	314161	6555159	51	Habitat assessment
B258	313994	6554977	51	Habitat assessment
B259	313920	6554825	51	Habitat assessment
B260	313435	6554354	51	Habitat assessment
B261	313503	6554470	51	Habitat assessment
B262	313541	6554544	51	Habitat assessment
B263	313512	6554849	51	Habitat assessment
B264	313155	6555008	51	Habitat assessment
B265	312714	6555083	51	Habitat assessment
B266	312940	6555119	51	Habitat assessment
B267	312588	6555812	51	Habitat assessment
B268	312367	6556400	51	Habitat assessment
B269	312073	6557338	51	Habitat assessment
B270	311980	6557663	51	Habitat assessment
B271	311688	6558422	51	Habitat assessment
B272	311506	6558805	51	Habitat assessment
B273	311204	6558689	51	Habitat assessment
B274	310958	6558632	51	Habitat assessment
B275	310801	6558537	51	Habitat assessment
B276	310616	6558469	51	Habitat assessment
B277	310274	6558341	51	Habitat assessment
B278	309357	6557794	51	Habitat assessment
B279	308995	6557612	51	Habitat assessment
B280	308719	6557599	51	Habitat assessment
B281	307811	6557571	51	Habitat assessment
B282	307904	6558233	51	Habitat assessment
B283	307931	6558504	51	Habitat assessment
B284	307771	6559166	51	Habitat assessment
B285	328541	6562480	51	Habitat assessment
B286	328535	6562922	51	Habitat assessment
B287	328539	6562566	51	Habitat assessment
B288	327875	6561489	51	Habitat assessment
B289	327634	6561269	51	Habitat assessment
B290	327375	6560992	51	Habitat assessment
B291	327295	6560788	51	Habitat assessment
B292	327374	6560385	51	Habitat assessment
B293	327239	6560177	51	Habitat assessment
B294	326911	6559733	51	Habitat assessment
B295	326877	6559235	51	Habitat assessment
B296	326855	6559141	51	Habitat assessment
B297	326812	6559081	51	Habitat assessment

Site Code	Easting	Northing	Zone	Record Type
B298	326673	6558984	51	Habitat assessment
B299	326486	6558907	51	Habitat assessment
B300	326384	6558232	51	Habitat assessment
B301	326149	6557730	51	Habitat assessment
B302	325700	6557383	51	Habitat assessment
B303	325438	6556979	51	Habitat assessment
B304	324995	6556813	51	Habitat assessment
B305	324750	6556681	51	Habitat assessment
B306	324644	6556660	51	Habitat assessment
B307	324497	6556666	51	Habitat assessment
B308	324174	6556572	51	Habitat assessment
B309	324188	6556471	51	Habitat assessment
B310	323937	6556448	51	Habitat assessment
B311	323711	6556384	51	Habitat assessment
B312	323506	6556364	51	Habitat assessment
B313	323415	6556342	51	Habitat assessment
B314	323144	6556348	51	Habitat assessment
B315	323006	6556262	51	Habitat assessment
B316	322795	6556148	51	Habitat assessment
B317	322624	6556092	51	Habitat assessment
B318	322374	6555993	51	Habitat assessment
B319	322021	6555841	51	Habitat assessment
B320	304055	6561858	51	Habitat assessment
B321	304154	6561855	51	Habitat assessment
B322	304189	6561838	51	Habitat assessment
B323	304201	6561699	51	Habitat assessment
B324	303863	6561561	51	Habitat assessment
B325	303644	6561517	51	Habitat assessment
B326	303475	6561492	51	Habitat assessment
B327	303376	6561439	51	Habitat assessment
B328	303164	6561475	51	Habitat assessment
B329	303039	6561700	51	Habitat assessment
B330	302967	6561753	51	Habitat assessment
B331	302884	6561758	51	Habitat assessment
B332	302704	6561592	51	Habitat assessment
B333	302616	6561579	51	Habitat assessment
B334	302515	6561489	51	Habitat assessment
B335	302282	6561563	51	Habitat assessment
B336	302043	6563909	51	Habitat assessment
B337	302115	6563926	51	Habitat assessment
B338	301302	6563138	51	Habitat assessment
B339	301533	6562985	51	Habitat assessment
B340	301657	6562907	51	Habitat assessment

Site Code	Easting	Northing	Zone	Record Type
B341	301685	6562675	51	Habitat assessment
B342	301818	6562436	51	Habitat assessment
B343	301822	6562715	51	Habitat assessment
B344	301839	6562975	51	Habitat assessment
B345	301845	6563146	51	Habitat assessment
B346	301633	6562253	51	Habitat assessment
B347	301547	6562365	51	Habitat assessment
B348	301567	6562544	51	Habitat assessment
B349	301256	6562752	51	Habitat assessment
B350	301321	6562980	51	Habitat assessment
B351	301489	6563211	51	Habitat assessment
B352	301768	6563212	51	Habitat assessment
B353	301648	6563281	51	Habitat assessment
B354	301637	6563686	51	Habitat assessment
B355	301485	6563188	51	Habitat assessment
B356	301386	6563508	51	Habitat assessment
B357	301599	6563475	51	Habitat assessment
B358	301767	6563464	51	Habitat assessment

Appendix 2. Expected vertebrate fauna assemblage of the study area.

Source: 1 = Atlas of Living Australia, 2 = Protected Matters Search Tool, 3 = DBCA (NatureMap and threatened and priority fauna database), 4 = Birdata, 5 = general literature

Conservation Status codes:
EPBC Act listings: CR = Critically Endangered, EN = Endangered, VU = Vulnerable, MI = Migratory.
BC Act listings: CR = Critically Endangered, EN = Endangered, VU = Vulnerable, MI = Migratory., OS = Oher Specially Protected, CD = Conservation Dependent.
DBCA Priority species: P1 to P4 = Priority 1 to 4.

Family	Latin Name	Common Name	EPBC status	WA status	Source	Observed
Class: Amphibia						
Limnodynastidae	*Neobatrachus kunapalari*	Wheatbelt Frog			1 3	
Limnodynastidae	*Neobatrachus pelobatoides*	Humming Frog			1 3	
Limnodynastidae	*Neobatrachus sutor*	Shoemaker Frog			1 3	
Myobatrachidae	*Pseudophryne occidentalis*	Orange-crowned Toadlet			1 3	
Class: Reptilia						
Carphodactylidae	*Underwoodisaurus milii*	Barking Gecko			1 3	
Diplodactylidae	*Crenadactylus ocellatus*	South-western Clawless Gecko			1 3	
Diplodactylidae	*Diplodactylus conspicillatus*	Fat-tailed Diplodactylus			1	
Diplodactylidae	*Diplodactylus granariensis*	Western Stone Gecko			1 3	
Diplodactylidae	*Diplodactylus pulcher*	Fine-faced Gecko			1 3	
Diplodactylidae	*Hesperoedura reticulata*	Reticulated Velvet Gecko			1 3	
Diplodactylidae	*Lucasium maini*	Main's Ground Gecko			1 3	
Diplodactylidae	*Oedura marmorata*	Marbled Velvet Gecko			1	
Diplodactylidae	*Rhynchoedura ornata*	Western Beaked Gecko			1 3	
Diplodactylidae	*Strophurus assimilis*	Goldfields Spiny-tailed Gecko			1 3	
Diplodactylidae	*Strophurus elderi*	Jewelled Gecko			1 3	
Gekkonidae	*Christinus marmoratus*	Marbled Gecko			6	
Gekkonidae	*Gehyra montium*	Centralian Dtella			1	
Gekkonidae	*Gehyra purpurascens*	Purplish Dtella			1 3	
Gekkonidae	*Gehyra variegata*	Tree Dtella			1 3	

Family	Latin Name	Common Name	EPBC status	WA status	Source	Observed
Gekkonidae	*Heteronotia binoei*	Bynoe's Gecko			1 3	
Pygopodidae	*Delma australis*	Marble-faced Delma			1 3 6	
Agamidae	*Ctenophorus cristatus*	Bicycle Lizard			1 3 6	
Agamidae	*Ctenophorus fordi*	Mallee Military Dragon			1 3	
Agamidae	*Ctenophorus isolepis*	Central Military Dragon			1 3	
Agamidae	*Ctenophorus maculatus*	Spotted Military Dragon			6	
Agamidae	*Ctenophorus nuchalis*	Central Netted Dragon			3	
Agamidae	*Ctenophorus ornatus*	Ornate Dragon			1 3	
Agamidae	*Ctenophorus reticulatus*	Western Netted Dragon			1 3	
Agamidae	*Ctenophorus salinarum*	Claypan Dragon			3	
Agamidae	*Ctenophorus scutulatus*	Lozenge-marked Dragon			1 3	
Agamidae	*Moloch horridus*	Thorny Devil			1 3	
Agamidae	*Pogona minor*	Dwarf Bearded Dragon			1 3	
Agamidae	*Tympanocryptis cephalus*	Pebble Dragon			1 3	
Agamidae	*Tympanocryptis pseudopsephos*	Goldfields Pebble-mimic Dragon			1	
Scincidae	*Cryptoblepharus buchananii*	Buchanan's Snake-eyed Skink			1 6	
Scincidae	*Ctenotus atlas*	Southern Mallee Ctenotus			1 3	
Scincidae	*Ctenotus australis*	Western Limestone Ctenotus			1	
Scincidae	*Ctenotus brooksi*	Brooks Ctenotus			1	
Scincidae	*Ctenotus schomburgkii*	Schomburgk's Ctenotus			1 3 6	
Scincidae	*Ctenotus uber*	Rich Ctenotus			1 3 6	
Scincidae	*Cyclodomorphus melanops*	Spinifex Slender Blue-tongue			1 3	
Scincidae	*Egernia depressa*	Pygmy Spiny-tailed Skink			1	
Scincidae	*Egernia formosa*	Goldfields Crevice-skink			1 3	
Scincidae	*Egernia richardi*	Bright Crevice-skink			1 3	
Scincidae	*Eremiascincus richardsonii*	Broad-banded Sand-swimmer			1 3	
Scincidae	*Hemiergis initialis*	Southwestern Earless Skink			1 3	

Family	Latin Name	Common Name	EPBC status	WA status	Source	Observed
Scincidae	*Lerista kingi*	King's Three-toed Slider			1 3	
Scincidae	*Lerista muelleri*	Wood Mulch-slider			1 3	
Scincidae	*Lerista picturata*	Southern Robust Slider			1 3	
Scincidae	*Lerista timida*	Timid Slider			1 3	
Scincidae	*Liopholis inornata*	Desert Skink			1 3	
Scincidae	*Menetia greyii*	Grey's Menetia			1 3 6	
Scincidae	*Morethia butleri*	Woodland Morethia Skink			1 3	
Scincidae	*Morethia obscura*	Shrubland Morethia Skink			1	
Scincidae	*Tiliqua occipitalis*	Western Blue-tongued Skink			6	
Scincidae	*Tiliqua rugosa*	Bobtail			1 3 6	
Varanidae	*Varanus gouldii*	Gould's Goanna			1 3 6	
Varanidae	*Varanus tristis*	Black-headed Monitor			1 3 6	
Typhlopidae	*Anilios australis*	Southern Blind Snake			1 3	
Typhlopidae	*Anilios bituberculatus*	Prong-snouted Blind Snake			1 3	
Pythonidae	*Morelia spilota imbricata*	Western Carpet Python			1 3	
Elapidae	*Acanthophis pyrrhus*	Desert Death Adder			1	
Elapidae	*Brachyurophis semifasciatus*	Southern Shovel-nosed Snake			1 3	
Elapidae	*Demansia psammophis*	Yellow-faced Whipsnake			3	
Elapidae	*Pseudechis australis*	Mulga Snake			1	
Elapidae	*Pseudonaja affinis*	Dugite			6	
Elapidae	*Pseudonaja modesta*	Ringed Brown Snake			1 3	
Elapidae	*Simoselaps bertholdi*	Jan's Banded Snake			1 3	
Elapidae	*Suta fasciata*	Rosen's Snake			1 3	
Elapidae	*Suta gouldii*	Gould's Hooded Snake			1 3	
Elapidae	*Suta monachus*	Monk Snake			1 3	
Class: Aves						
Casuariidae	*Dromaius novaehollandiae*	Emu			1 2 3 6	Y

Family	Latin Name	Common Name	EPBC status	WA status	Source	Observed
Megapodiidae	*Leipoa ocellata*	Malleefowl	VU	VU	1 2 3 4 5 6	
Phasianidae	*Coturnix pectoralis*	Stubble Quail			1 2 3	
Columbidae	*Columba livia*	Rock Dove			1 2 3	
Columbidae	*Geopelia cuneata*	Diamond Dove			1	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon			1 2 3	Y
Columbidae	*Phaps chalcoptera*	Common Bronzewing			1 2 3 6	Y
Columbidae	*Spilopelia senegalensis*	Laughing Dove			1 2 3	
Podargidae	*Podargus strigoides*	Tawny Frogmouth			1 2 3 6	Y
Eurostopodidae	*Eurostopodus argus*	Spotted Nightjar			1 2	
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar			1 2 3	
Apodidae	*Apus pacificus*	Fork-tailed Swift	MI	MI	4 5	
Cuculidae	*Cacomantis flabelliformis*	Fan-tailed Cuckoo			1 2 3	
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-cuckoo			1 2	Y
Anatidae	*Anas gracilis*	Grey Teal			1 2 3 6	
Anatidae	*Anas platyrhynchos*	Common Mallard	Int		1 2 3	
Anatidae	*Anas superciliosa*	Pacific Black Duck			1 2 3	Y
Anatidae	*Aythya australis*	Hardhead			1 2 3	
Anatidae	*Biziura lobata*	Musk Duck			1 2 3	
Anatidae	*Chenonetta jubata*	Australian Wood Duck			1 2 3	
Anatidae	*Cygnus atratus*	Black Swan			1 2 3	
Anatidae	*Malacorhynchus membranaceus*	Pink-eared Duck			1 2 3	
Anatidae	*Oxyura australis*	Blue-billed Duck		P4	1	
Anatidae	*Spatula rhynchotis*	Australasian Shoveler			1 2 3	
Anatidae	*Tadorna tadornoides*	Australian Shelduck			1 2 3	
Podicipedidae	*Poliocephalus poliocephalus*	Hoary-headed Grebe			1 2 3	
Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe			1 2 3	
Cuculidae	*Chalcites osculans*	Black-eared Cuckoo			1 2 6	Y

Family	Latin Name	Common Name	EPBC status	WA status	Source	Observed
Cuculidae	*Heteroscenes pallidus*	Pallid Cuckoo			1 2 3 6	
Otididae	*Ardeotis australis*	Australian Bustard			1 2 3	Y
Turnicidae	*Turnix velox*	Little Button-quail			1 2 3	
Rallidae	Fulica atra	Eurasian Coot			1 2 3	
Rallidae	Porzana fluminea	Australian Spotted Crake			3	
Rallidae	Tribonyx ventralis	Black-tailed Native-hen			1 2 3	Y
Threskiornithidae	Platalea flavipes	Yellow-billed Spoonbill			1 2 3	
Threskiornithidae	Threskiornis spinicollis	Straw-necked Ibis			1 2 3	
Ardeidae	Ardea alba	Great Egret			1 2 3	
Ardeidae	Ardea pacifica	White-necked Heron			1 2 3	
Ardeidae	Egretta novaehollandiae	White-faced Heron			1 2 3	
Phalacrocoracidae	Microcarbo melanoleucos	Little Pied Cormorant			1 2	
Phalacrocoracidae	Phalacrocorax sulcirostris	Little Black Cormorant			1 2 3	
Anhingidae	Anhinga novaehollandiae	Australasian Darter			1 2 3	
Recurvirostridae	Cladorhynchus leucocephalus	Banded Stilt			3 6	
Recurvirostridae	Himantopus himantopus	Black-winged Stilt			1 3	
Recurvirostridae	Himantopus leucocephalus	Pied Stilt			1 2	
Charadriidae	Charadrius ruficapillus	Red-capped Plover			1 2 3 6	
Charadriidae	Elseyornis melanops	Black-fronted Dotterel			1 2 3 6	
Charadriidae	Erythrogonys cinctus	Red-kneed Dotterel			1 2	
Charadriidae	Vanellus tricolor	Banded Lapwing			1 2 3	
Scolopacidae	Actitis hypoleucos	Common Sandpiper	MI	MI	1 2 3 4 5	
Scolopacidae	Calidris acuminata	Sharp-tailed Sandpiper	MI	MI	1 2 3 4 5	
Scolopacidae	Calidris ferruginea	Curlew Sandpiper	CR & MI	CR	1 2 3 4 5	
Scolopacidae	Calidris melanotos	Pectoral Sandpiper	MI	MI	5	
Scolopacidae	Calidris ruficollis	Red-necked Stint	MI	MI	1 2 3 4	
Scolopacidae	Tringa glareola	Wood Sandpiper	MI	MI	1	

Family	Latin Name	Common Name	EPBC status	WA status	Source	Observed
Scolopacidae	Tringa nebularia	Common Greenshank	EN & MI	MI	1 2 3 4 5	
Laridae	Larus novaehollandiae	Silver Gull			1 2	
Laridae	Larus pacificus	Pacific Gull			1	
Tytonidae	*Tyto alba*	Barn Owl			1 2	
Strigidae	*Ninox boobook*	Southern Boobook			1 2 3	
Accipitridae	*Accipiter cirrocephalus*	Collared Sparrowhawk			1 2 3	
Accipitridae	*Accipiter fasciatus*	Brown Goshawk			1 2 3	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle			1 2 3 6	Y
Accipitridae	*Circus assimilis*	Spotted Harrier			1 2 3	
Accipitridae	*Elanus axillaris*	Black-shouldered Kite			1 2 3	
Accipitridae	*Elanus caeruleus*	Black-winged Kite			6	
Accipitridae	*Haliastur sphenurus*	Whistling Kite			1 2 3	
Accipitridae	*Hamirostra melanosternon*	Black-breasted Buzzard			1 2 3	
Accipitridae	*Hieraaetus morphnoides*	Little Eagle			1 2 3	
Accipitridae	*Lophoictinia isura*	Square-tailed Kite			1 2	
Meropidae	*Merops ornatus*	Rainbow Bee-eater			1 2 3 6	
Alcedinidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher			1 2 3	
Alcedinidae	*Todiramphus sanctus*	Sacred Kingfisher			1 3 6	
Falconidae	*Falco berigora*	Brown Falcon			1 2 3	Y
Falconidae	*Falco cenchroides*	Nankeen Kestrel			1 2 3	
Falconidae	*Falco hypoleucos*	Grey Falcon			5	
Falconidae	*Falco longipennis*	Australian Hobby			1 2 3	
Falconidae	*Falco peregrinus*	Peregrine Falcon		OS	1 2 3	
Falconidae	*Falco subniger*	Black Falcon			1	
Cacatuidae	*Cacatua leadbeateri*	Major Mitchell's Cockatoo			1 2 3	
Cacatuidae	*Cacatua pastinator*	Western Corella			1	
Cacatuidae	*Cacatua sanguinea*	Little Corella			1 2 3	

Family	Latin Name	Common Name	EPBC status	WA status	Source	Observed
Cacatuidae	*Eolophus roseicapilla*	Galah			1 2 3 6	
Cacatuidae	*Nymphicus hollandicus*	Cockatiel			2	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck			1 2 3 6	Y
Psittaculidae	*Glossopsitta porphyrocephala*	Purple-crowned Lorikeet			1 2 3	Y
Psittaculidae	*Melopsittacus undulatus*	Budgerigar			1 2 3	
Psittaculidae	*Neophema elegans*	Elegant Parrot			1 2 3	
Psittaculidae	*Neophema splendida*	Scarlet-chested Parrot			1	
Psittaculidae	*Platycercus icterotis (xanthogenys)*	Western Rosella (inland)		P4	1 3	
Psittaculidae	*Polytelis alexandrae*	Princess Parrot, Alexandra's Parrot	VU	P4	1	
Psittaculidae	*Polytelis anthopeplus*	Regent Parrot			1 2 3 6	
Psittaculidae	*Psephotellus varius*	Mulga Parrot			1 2	Y
Ptilonorhynchidae	*Chlamydera guttata*	Western Bowerbird			1	
Climacteridae	*Climacteris affinis*	White-browed Treecreeper			2	
Climacteridae	*Climacteris rufus*	Rufous Treecreeper			1 2 3	Y
Maluridae	*Malurus assimilis (lamberti)*	Purple-backed Fairy-wren			1	
Maluridae	*Malurus leucopterus*	White-winged Fairy-wren			1 2 3	
Maluridae	*Malurus pulcherrimus*	Blue-breasted Fairy-wren			1 2 3	
Maluridae	*Malurus splendens*	Splendid Fairy-wren			1 2 3 6	
Meliphagidae	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater			1 2 3 6	Y
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird			1 2 3 6	Y
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater			1 2 3	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat			1 2 3 6	Y
Meliphagidae	*Epthianura tricolor*	Crimson Chat			1 6	
Meliphagidae	*Gavicalis virescens*	Singing Honeyeater			1 2 3 6	
Meliphagidae	*Lichenostomus cratitius*	Purple-gaped Honeyeater			2	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater			1 2 3 6	Y
Meliphagidae	*Manorina flavigula*	Yellow-throated Miner			1 2 3 6	Y

Family	Latin Name	Common Name	EPBC status	WA status	Source	Observed
Meliphagidae	*Melithreptus albogularis*	White-throated Honeyeater			1	
Meliphagidae	*Melithreptus brevirostris*	Brown-headed Honeyeater			1 2 3	Y
Meliphagidae	*Melithreptus lunatus*	White-naped Honeyeater			1	
Meliphagidae	*Nesoptilotis leucotis*	White-eared Honeyeater			1 2 3 6	Y
Meliphagidae	*Phylidonyris niger*	White-cheeked Honeyeater			1 2 3	
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater			1	
Meliphagidae	*Plectorhyncha lanceolata*	Striped Honeyeater			1	
Meliphagidae	*Ptilotula ornata*	Yellow-plumed Honeyeater			1 2 3 6	Y
Meliphagidae	*Ptilotula plumula*	Grey-fronted Honeyeater			1 2 3	
Meliphagidae	*Purnella albifrons*	White-fronted Honeyeater			1 2 3 6	Y
Meliphagidae	*Sugomel niger*	Black Honeyeater			1 2 3	
Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote			1 2 3	
Pardalotidae	*Pardalotus striatus*	Striated Pardalote			1 2 3 6	Y
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill			1 2 3	Y
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill			1 2 3 6	Y
Acanthizidae	*Acanthiza iredalei*	Slender-billed Thornbill			1 2	
Acanthizidae	*Acanthiza robustirostris*	Slaty-backed Thornbill			1 2	
Acanthizidae	*Acanthiza uropygialis*	Chestnut-rumped Thornbill			1 2 3 6	Y
Acanthizidae	*Aphelocephala leucopsis*	Southern Whiteface	VU	VU	1 2 3 5	Y
Acanthizidae	*Calamanthus campestris*	Rufous Fieldwren			6	
Acanthizidae	*Calamanthus cautus*	Shy Heathwren			2 3	
Acanthizidae	*Gerygone fusca*	Western Gerygone			1 2 3	
Acanthizidae	*Pyrrholaemus brunneus*	Redthroat			1 2 3 6	Y
Acanthizidae	*Sericornis frontalis*	White-browed Scrubwren			1 2 3	
Acanthizidae	*Smicrornis brevirostris*	Weebill			1 2 3 6	Y
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler			1 2 3 6	Y
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella			1 2 3	

Family	Latin Name	Common Name	EPBC status	WA status	Source	Observed
Oreoicidae	*Oreoica gutturalis*	Crested Bellbird			1 2 3 6	Y
Cinclosomatidae	*Cinclosoma clarum*	Copper-backed Quail-thrush			1 2 3 6	Y
Cinclosomatidae	*Cinclosoma marginatum*	Western Quail-thrush			1 2	
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush			1 2 3 6	Y
Pachycephalidae	*Pachycephala inornata*	Gilbert's Whistler			1 2 3	Y
Pachycephalidae	*Pachycephala pectoralis*	Golden Whistler			1 2 3	
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler			1 2 3 6	Y
Campephagidae	*Coracina maxima*	Ground Cuckoo-shrike			2	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike			1 2 3 6	Y
Campephagidae	*Lalage tricolor*	White-winged Triller			1 2	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow			1 2 3	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow			1 2 3	Y
Artamidae	*Artamus minor*	Little Woodswallow			1	
Artamidae	*Artamus personatus*	Masked Woodswallow			1 2 3	
Artamidae	*Artamus superciliosus*	White-browed Woodswallow			1	
Artamidae	*Cracticus nigrogularis*	Pied Butcherbird			1 2 3 6	Y
Artamidae	*Cracticus torquatus*	Grey Butcherbird			1 2 3 6	Y
Artamidae	*Gymnorhina tibicen*	Australian Magpie			1 2 3 6	Y
Artamidae	*Strepera versicolor*	Grey Currawong			1 2 3	Y
Rhipiduridae	*Rhipidura albiscapa*	Grey Fantail			1 2 3	
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail			1 2 3 6	Y
Monarchidae	*Grallina cyanoleuca*	Magpie-lark			1 2 3 6	
Corvidae	*Corvus bennetti*	Little Crow			1 2 3 6	
Corvidae	*Corvus coronoides*	Australian Raven			1 2 3 6	Y
Corvidae	*Corvus orru*	Torresian Crow			1 2 3	
Petroicidae	*Drymodes brunneopygia*	Southern Scrub-robin			1 2 3	
Petroicidae	*Eopsaltria griseogularis*	Western Yellow Robin			1 2 3	Y

Family	Latin Name	Common Name	EPBC status	WA status	Source	Observed
Petroicidae	*Melanodryas cucullata*	Hooded Robin			1 2	Y
Petroicidae	*Microeca fascinans*	Jacky Winter			1 2 3	Y
Petroicidae	*Petroica goodenovii*	Red-capped Robin			1 2 3 6	Y
Locustellidae	*Cincloramphus cruralis*	Brown Songlark			1 2 3	
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark			2	
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow			1 2 3	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow			1 2 3	
Hirundinidae	*Petrochelidon ariel*	Fairy Martin			1 2 3	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin			1 2 3	
Zosteropidae	*Zosterops lateralis*	Silvereye			1 2 3	
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird			1 2 3	Y
Estrildidae	*Taeniopygia castanotis*	Zebra Finch			1 2 3 6	
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit			1 2	Y
Motacillidae	*Motacilla cinerea*	Grey Wagtail			5	
Class: Mammalia						
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna			6	
Dasyuridae	*Ningaui yvonneae*	Southern Ningaui			1 3	
Dasyuridae	*Sminthopsis crassicaudata*	Fat-tailed Dunnart			1 3	
Dasyuridae	*Sminthopsis dolichura*	Little Long-tailed Dunnart			1 3	
Burramyidae	*Cercartetus concinnus*	Western Pygmy-possum			1 3	
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo			1 3 6	Y
Macropodidae	*Osphranter robustus*	Common Wallaroo			1 3	Y
Macropodidae	*Osphranter rufus*	Red Kangaroo			6	
Muridae	*Mus musculus*	House Mouse	Int		1 3	
Muridae	*Notomys mitchellii*	Mitchell's Hopping-mouse			1 3 6	
Muridae	*Pseudomys bolami*	Bolam's Mouse			1 3	
Muridae	*Pseudomys hermannsburgensis*	Sandy Inland Mouse			1 3	

Family	Latin Name	Common Name	EPBC status	WA status	Source	Observed
Leporidae	*Oryctolagus cuniculus*	Rabbit			1 6	Y
Molossidae	*Austronomus australis*	White-striped Free-tailed Bat			6	
Molossidae	*Ozimops kitcheneri*	South-western Free-tailed Bat			1 6	
Molossidae	*Ozimops petersi*	Inland Free-tailed Bat			1	
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat			1 3 6	
Vespertilionidae	*Nyctophilus geoffroyi*	Lesser Long-eared Bat			1 3	
Vespertilionidae	*Nyctophilus major tor*	Central Long-eared Bat		P3	1 3 4	
Vespertilionidae	*Vespadelus baverstocki*	Inland Forest Bat			6	
Vespertilionidae	*Vespadelus regulus*	Southern Forest Bat			1 3	
Canidae	*Canis familiaris*	Common Dog	Int		6	
Bovidae	*Bos taurus*	European Cattle	Int		6	
Bovidae	*Capra hircus*	Goat	Int		1	
Equidae	*Equus ferus caballus*	Horse				Y

Appendix 3. Species returned during database search and literature review that have been excluded

Some birds may still occur as rare vagrants depending on conditions.

Source: 1 = Atlas of Living Australia, 2 = Protected Matters Search Tool, 3 = DBCA (Naturemap and threatened and priority fauna database), 4 = Birdata, 5 = general literature

Species	Common name	Conservation status		Reason for omitting
		EPBC Act	BC Act	
Leiopotherapon unicolor	Spangled Perch			out of range
Litoria moorei	Western Green and Golden Bell Frog			out of range
Litoria rubella	Little Red Tree Frog			out of range
Litoria splendida	Magnificent Tree Frog			out of range
Tympanocryptis intima	Gibber Earless Dragon			out of range
Tringa brevipes	Grey-tailed Tattler	MI	P4 & MI	no habitat (coastline or large salt lakes)
Pezoporus occidentalis	Night Parrot	EN	EN	no habitat (large and long unburnt spinifex)
Dasyurus geoffroii	Chuditch, Western Quoll	VU	VU	out of range
Bettongia lesueur graii	Burrowing Bettong (inland), Boodie (inland)	EX	EX	extinct
Ozimops planiceps	South-eastern Free-tailed Bat			out of range
Nyctophilus timoriensis timoriensis	South-eastern Long-eared Bat			out of range
Vespadelus vulturnus	Little Forest Bat			out of range

Appendix 4. Species recorded during 2025 field assessment

Species	Common name
Acanthiza apicalis	Inland Thornbill
Gymnorhina tibicen	Australian Magpie
Glossopsitta porphyrocephala	Purple-crowned Lorikeet
Barnardius zonarius	Australian Ringneck
Psephotellus varius	Mulga Parrot
Dromaius novaehollandiae	Emu
Smicrornis brevirostris	Weebill
Cinclosoma clarum	Copper-backed Quail-thrush
Purnella albifrons	White-fronted Honeyeater
Aquila audax	Wedge-tailed Eagle
Corvus coronoides	Australian Raven
Oreoica gutturalis	Crested Bellbird
Coracina novaehollandiae	Black-faced Cuckoo-shrike
Strepera versicolor	Grey Currawong
Rhipidura leucophrys	Willy Wagtail
Pomatostomus superciliosus	White-browed Babbler
Climacteris rufus	Rufous Treecreeper
Pachycephala rufiventris	Rufous Whistler
Aphelocephala leucopsis	Southern Whiteface
Pyrrholaemus brunneus	Redthroat
Petroica goodenovii	Red-capped Robin
Artamus cyanopterus	Dusky Woodswallow
Phaps chalcoptera	Common Bronzewing
Ardeotis australis	Australian Bustard
Manorina flavigula	Yellow-throated Miner
Melanodryas cucullata	Hooded Robin
Dicaeum hirundinaceum	Mistletoebird
Anthochaera carunculata	Red Wattlebird
Pardalotus striatus	Striated Pardalote
Anthus novaeseelandiae	Australasian Pipit
Epthianura albifrons	White-fronted Chat
Anthochaera carunculata	Red Wattlebird
Ptilotula ornata	Yellow-plumed Honeyeater
Lichmera indistincta	Brown Honeyeater
Pachycephala inornata	Gilbert's Whistler
Acanthiza uropygialis	Chestnut-rumped Thornbill
Chalcites osculans	Black-eared Cuckoo
Cracticus nigrogularis	Pied Butcherbird
Cracticus torquatus	Grey Butcherbird
Acanthagenys rufogularis	White-eared Honeyeater
Nesoptilotis leucotis	Spiney-cheeked Honeyeater
Falco berigora	Brown Falcon
Colluricincla harmonica	Grey Shrike-thrush
Chalcites basalis	Horsfield's Bronze-cuckoo

Species	Common name
Acanthiza chrysorrhoa	Yellow-rumped Thornbill
Melithreptus brevirostris	Brown-headed Honeyeater
Podargus strigoides	Tawny Frogmouth
Eopsaltria griseogularis	Western Yellow Robin
Microeca fascinans	Jacky Winter
Tribonyx ventralis	Black-tailed Native-hen
Anas superciliosa	Pacific Black Duck
Osphranter robustus erubescens	Euro
Osphranter fuliginosus	Grey Kangaroo
Oryctolagus cuniculus	Rabbit
Equus caballu	Horse

Appendix 5. Habitat analysis

Veg code	Broad floristic composition (Botanica)	Vegetation Unit (Botanica)	Habitat type (TE)	TE veg match to Botanica description	MF mounds present	EMA habitat equivalent	Malleefowl habitat use
Cleared	n/a	Cleared.	cleared/rehab	Yes	No	Cleared	None
OD-AOW2	Acacia open woodland	*Eucalyptus salmonophloia* and *Eucalyptus salubris* woodland over *Eremophila interstans* subsp. *virgata* and *Santalum acuminatum* tall open shrubland over *Eremophila ionantha*, *Exocarpos aphyllus* and *Acacia hemiteles* open shrubland over sparse tussock grassland.	Mixed eucalypt woodland	Yes	No	Open woodland on clay loam plain	Foraging and dispersal
SP-AOW1	Euc low open woodland	Eucalyptus low open woodland over *Allocasuarina acutivalvis* subsp. *acutivalvis*, *Acacia resinimarginea*, and *Melaleuca hamata* tall open shrubland over *Olearia pimeleoides*, *Westringia cephalantha* and *Beyeria sulcata* var. *brevipes* low open shrubland.	Mallee woodland	Yes		Mallee woodland over shrubland	Low quality breeding
CLP-AOS2	Acacia Tall open shrubland	*Allocasuarina acutivalvis* subsp. *acutivalvis* and *Acacia resinimarginea* tall open shrubland over *Leucopogon* sp. Clyde Hill (M.A. Burgman 1207) and *Thryptomene kochii* low open shrubland.	Acacia and Allocasuarina shrubland	Yes	No	Shrubland	Low quality breeding
RP-EOW2	Euc low open woodland	*Eucalyptus* spp. low open woodland over *Acacia crenulata*, A. *acuminata* and *A. tetragonophylla* tall open shrubland over *Dodonaea adenophora*, *Eremophila* granitica and *E. oppositifolia* subsp. *angustifolia* open shrubland.	Mallee woodland	Yes	No	Mallee woodland over shrubland	Low quality breeding
CLP-EW1	Euc open woodland	*Eucalyptus salmonophloia*, *E. transcontinentalis* and *E. salubris* open woodland over *Eremophila interstans* subsp. *interstans* and *Santalum spicatum* tall open shrubland over *Eremophila* spp. shrubland over open tussock grassland/ low open shrubland.	Mixed eucalypt woodland	Yes	No	Open woodland on clay loam plain	Foraging and dispersal
RP-EOW1	Euc open woodland	*Eucalyptus* spp. open woodland over *Acacia acuminata*, *Eremophila oppositifolia* subsp. *angustifolia* and *Alyxia buxifolia* tall open shrubland over *Scaevola spinescens*, *Acacia erinacea* and *Eremophila glabra* subsp. *glabra* shrubland.	Mallee woodland	Yes	Yes - 3 recently used, 1 old and 1 very old	Dense Mallee woodland over shrubland	High quality breeding
DD-EOW1	Euc low open woodland	*Eucalyptus loxophleba* low open woodland over *Acacia acuminata*, *Acacia gibbosa* and *Eremophila alternifolia* tall open shrubland over *Senna artemisioides* subsp. *filifolia*, *Eremophila ionantha* and *E interstans* subsp. *virgata* open shrubland.	Mallee woodland	Yes	No	Open woodland on clay loam plain	Foraging and dispersal

Veg code	Broad floristic composition (Botanica)	Vegetation Unit (Botanica)	Habitat type (TE)	TE veg match to Botanica description	MF mounds present	EMA habitat equivalent	Malleefowl habitat use
RH-EOW1	Euc open woodland	Mixed Eucalyptus open woodland over *Acacia crenulata*, *Alyxia buxifolia* and *Melaleuca leiocarpa* tall open shrubland over *Exocarpos aphyllus* open shrubland over mixed forbs.	Mixed eucalypt woodland	Yes	one polygon with old mound	Open woodland on clay loam plain	Foraging and dispersal
QRH-EOW1	Euc low open woodland	*Eucalyptus celastroides* subsp. *celastroides* low open woodland over *Melaleuca pauperiflora* subsp. *fastigiata* tall shrubland over *Eremophila oppositifolia* subsp. *angustifolia*, *E. ternata* and *Dodonaea adenophora* shrubland.	Mixed eucalypt woodland	Yes - very open on aerial imagery	No	Open woodland on clay loam plain	Foraging and dispersal
OD-AOW1	Acacia open woodland	*Eucalyptus salubris* and *E. salmonophloia* open woodland over Acacia *acuminata*, *Eremophila alternifolia* and *Santalum spicatum* tall *shrubland* over and *Acacia hemiteles*, *Eremophila decipiens* subsp. *decipiens* and *Lycium australe* shrubland over low open shrubs.	Mixed eucalypt woodland	Yes	No	Open woodland on clay loam plain	Foraging and dispersal
n/a	n/a	Mosaic of CLP-AOS2 and RH-EOW1.	Mallee woodland	Yes - some mallee spp. present + presence of shrubs	No	Mallee woodland over shrubland	Low quality breeding
CLP-AOS1	Acacia tall open shrubland	*Acacia acuminata*, *Melaleuca hamata* and *Alyxia buxifolia* tall open shrubland over *Prostanthera grylloana*, *Olearia pimeleoides* and *Leucopogon* sp. Clyde Hill (M.A. Burgman 1207) low open shrubland.	Acacia and Allocasuarina shrubland	Yes	No	Shrubland	Low quality breeding
CLP-EOW1	Euc open woodland	*Eucalyptus salubris* low open woodland over *Eremophila caerulea* subsp. *caerulea*, *E. ternata* and *E. microphylla* over mixed chenopod low sparse shrubland.	Mallee woodland	No - *Eualyptus salubris* a not a mallee. No shrubland.	No	Open woodland on clay loam plain	Foraging and dispersal

Appendix 6. Malleefowl mound ground checks

ID (EMA)	ID (GVA)	Result (GVA)	Result (EMA)	Latitude	Longitude	Northing	Easting
TE9, B024	Leipoa ocellata 3 (LC3)	Very old existing mound, no signs of activity.	Inactive (recently used), profile 1, eggshells found; PS photo matches GVA photo (EMA mound inspection June 2025)	-31.0155	120.917	301152	6566813
TE8, B005	Leipoa ocellata 2 (LC2)	Existing mound, no signs of use. Monitoring camera is present	Inactive (recently used), profile 1, lots of eggshells found; PS photo matches GVA photo, good shape. (EMA mound inspection June 2025)	-30.9941	120.922	301586	6569201
TE7, B028	Leipoa ocellata	Not ground truthed	Long unused (EMA mound inspection June 2025)	-31.0386	120.9138	300900	6564248
TE3, B004	Leipoa ocellata 1 (LC1)	Existing mound, no signs of use. Monitoring camera is present	Inactive (recently used), profile 1, eggshells found ; PS photo matches GVA photo, good shape. (EMA mound inspection June 2025)	-30.9964	120.9203	301430	6568944
TE2, B003	Leipoa ocellata 6 (LC6)	Not a mound, previously characterised as an ancient mound.	Not a mound (EMA mound inspection June 2025)	-31.0018	120.9016	299660	6568313
TE1, B002	Leipoa ocellata 5 (LC5)	Ancient mound, no signs of activity	Long unused, profile 6 (EMA mound inspection June 2025)	-31.002	120.9005	299551	6568280
PES1, B001	Leipoa ocellata	Not ground truthed	Long unused mound (EMA mound inspection June 2025)	-31.0334	120.9138	300887	6564832
TE10	Leipoa ocellata	Not ground truthed		-31.0476	120.9067	300242	6563243
TE11	Leipoa ocellata	Not ground truthed	Not a mound (EMA mound inspection June 2025)	-31.0395	120.9172	301227	6564153
TE5	Leipoa ocellata	Not ground truthed		-31.0391	120.8968	299272	6564162
TE6	Leipoa ocellata	Not ground truthed		-31.0358	120.8991	299488	6564534

ID (EMA)	ID (GVA)	Result (GVA)	Result (EMA)	Latitude	Longitude	Northing	Easting
TE4	Leipoa ocellata 4 (LC4)	Ancient mound, no signs of activity	Long unused, profile 1 (EMA Photo check)	-31.0331	120.8957	299163	6564828
MM9	MM9	Not a mound	Not a mound (EMA photo check)	-31.0047	120.9112	300578	6567999
MM8	MM8	Not a mound	Not a mound (EMA photo check)	-31.0041	120.9102	300485	6568072
MM7	MM7	Not a mound	Not a mound (EMA photo check)	-31.0035	120.9103	300492	6568137
MM6	MM6	Not a mound	Not a mound (EMA photo check)	-31.0033	120.9187	301288	6568172
MM5	MM5	Not a mound	Not a mound (EMA photo check)	-31.0032	120.9186	301283	6568180
MM43	MM43	Not a mound	Not a mound (EMA photo check)	-30.9733	120.9058	299996	6571478
MM42	MM42	Not a mound	Not a mound (EMA photo check)	-30.9745	120.9005	299492	6571330
MM41	MM41	Not a mound	Not a mound (EMA photo check)	-30.9792	120.8928	298764	6570803
MM40	MM40	Not a mound	Not a mound (EMA photo check)	-30.9738	120.9083	300241	6571421
MM4	MM4	Not a mound	Not a mound (EMA photo check)	-31.002	120.917	301123	6568309
MM39	MM39	Not a mound	Not a mound (EMA photo check)	-30.9894	120.8996	299437	6569682
MM38	MM38	Not a mound	Not a mound (EMA photo check)	-30.9916	120.9005	299530	6569435
MM37	MM37	Not a mound	Not a mound (EMA photo check)	-30.9916	120.9004	299520	6569436
MM36	MM36	Not a mound	Not a mound (EMA photo check)	-30.9903	120.8916	298673	6569570
MM35	MM35	Not a mound	Not a mound (EMA photo check)	-30.9998	120.8929	298818	6568517
MM34	MM34	Not a mound	Not a mound (EMA photo check)	-31.0032	120.9007	299578	6568146
MM33	MM33	Not a mound	Not a mound (EMA photo check)	-31.0092	120.8935	298898	6567470
MM32	MM32	Not a mound	Not a mound (EMA photo check)	-31.0197	120.8923	298804	6566309
MM31	MM31	Not a mound	Not a mound (EMA photo check)	-31.0485	120.9287	302337	6563180
MM30	MM30	Not a mound	Not a mound (EMA photo check)	-31.0452	120.9282	302288	6563548
MM3	MM3	Not a mound	Not a mound (EMA photo check)	-31.0019	120.9128	300729	6568319
MM29	MM29	Not a mound	Not a mound (EMA photo check)	-31.043	120.9293	302389	6563789

ID (EMA)	ID (GVA)	Result (GVA)	Result (EMA)	Latitude	Longitude	Northing	Easting
MM28	MM28	Not a mound	Not a mound (EMA photo check)	-31.0424	120.9291	302362	6563855
MM27	MM27	Not a mound	Not a mound (EMA photo check)	-31.0335	120.9301	302439	6564846
MM26	MM26	Not a mound	Not a mound (EMA photo check)	-31.0508	120.9157	301104	6562905
MM25	MM25	Not a mound	Not a mound (EMA photo check)	-31.051	120.9161	301145	6562877
MM24	MM24	Not a mound	Not a mound (EMA photo check)	-31.03	120.9107	300587	6565199
MM23	MM23	Not a mound	Not a mound (EMA photo check)	-31.029	120.9111	300620	6565305
MM22	MM22	Not a mound	Not a mound (EMA photo check)	-31.0287	120.9107	300582	6565343
MM21	MM21	Not a mound	Not a mound (EMA photo check)	-31.0341	120.9115	300674	6564749
MM20	MM20	Not a mound	Not a mound (EMA photo check)	-31.023	120.904	299932	6565959
MM2	MM2	Not a mound	Not a mound (EMA photo check)	-30.9995	120.9114	300589	6568586
MM19	MM19	Not a mound	Not a mound (EMA photo check)	-31.0206	120.9302	302425	6566278
MM18	MM18	Unsure/possible - not a typical mount however could be a very old one	Long unused (Low profile 1), in suitable habitat (EMA photo check)	-31.0184	120.941	303455	6566539
MM17	MM17	Unsure/possible - not a typical mount however could be an old one	Long unused (Low profile 1) - looks like may be an excavation but can't accurately tell from photo, in suitable habitat (EMA photo check)	-31.0185	120.941	303453	6566524
MM16	MM16	Not a mound	Not a mound (EMA photo check)	-31.0191	120.9467	303997	6566475
MM15	MM15	Not a mound	Not a mound (EMA photo check)	-31.0191	120.9467	304002	6566476
MM14	MM14	Not a mound	Not a mound (EMA photo check)	-30.9976	120.929	302262	6568820
MM13	MM13	Not a mound	Not a mound (EMA photo check)	-31.0053	120.9259	301980	6567960
MM12	MM12	Not a mound	Not a mound (EMA photo check)	-31.0076	120.9326	302630	6567725
MM11	MM11	Not a mound	Not a mound (EMA photo check)	-31.0114	120.9238	301796	6567282
MM10	MM10	Not a mound	Not a mound (EMA photo check)	-31.0102	120.9214	301561	6567408
MM1	MM1	Not a mound	Not a mound (EMA photo check)	-30.9954	120.9096	300404	6569031

ID (EMA)	ID (GVA)	Result (GVA)	Result (EMA)	Latitude	Longitude	Northing	Easting
Medium9	Medium	Not ground truthed		-30.9799	120.9114	300550	6570750
Medium8	Medium	Not ground truthed		-31.0463	120.9662	305911	6563488
Medium7	Medium	Not ground truthed		-31.0543	120.9581	305155	6562586
Medium6	Medium	Not ground truthed		-31.0543	120.9581	305155	6562586
Medium53	Medium	Not ground truthed		-31.038	120.9617	305472	6564405
Medium52	Medium	Not ground truthed		-30.9918	120.9101	300449	6569436
Medium51	Medium	Not ground truthed		-31.0586	120.9385	303299	6562074
Medium50	Medium	Not ground truthed		-31.0414	120.9729	306546	6564045
Medium5	Medium	Not ground truthed		-31.0465	120.9497	304338	6563441
Medium49	Medium	Not ground truthed		-31.0581	120.9566	305021	6562162
Medium48	Medium	Not ground truthed		-30.9757	120.8905	298539	6571176
Medium47	Medium	Not ground truthed		-31.0509	120.9565	304995	6562967
Medium46	Medium	Not ground truthed		-31.0417	120.9544	304781	6563976
Medium45	Medium	Not ground truthed		-31.0528	120.9627	305597	6562759
Medium44	Medium	Not ground truthed		-30.9902	120.9101	300445	6569607
Medium43	Medium	Not ground truthed		-31.0594	120.9564	305010	6562018
Medium42	Medium	Not ground truthed		-30.9919	120.9099	300430	6569422
Medium41	Medium	Not ground truthed		-31.052	120.9627	305592	6562856
Medium40	Medium	Not ground truthed		-31.0546	120.9449	303902	6562535
Medium4	Medium	Not ground truthed		-31.0491	120.9684	306127	6563188
Medium39	Medium	Not ground truthed		-31.0547	120.9445	303862	6562515
Medium38	Medium	Not ground truthed		-31.0442	120.9876	307952	6563759
Medium37	Medium	Not ground truthed		-31.032	120.9422	303594	6565035
Medium36	Medium	Not ground truthed		-30.9918	120.9101	300451	6569436

ID (EMA)	ID (GVA)	Result (GVA)	Result (EMA)	Latitude	Longitude	Northing	Easting
Medium35	Medium	Not ground truthed		-31.0501	120.9688	306168	6563076
Medium34	Medium	Not ground truthed		-31.0536	120.9574	305093	6562664
Medium33	Medium	Not ground truthed		-31.0464	120.9497	304340	6563455
Medium32	Medium	Not ground truthed		-31.0198	120.8808	297710	6566280
Medium31	Medium	Not ground truthed		-31.0507	120.9652	305829	6562997
Medium30	Medium	Not ground truthed		-31.0525	120.9572	305070	6562790
Medium3	Medium	Not ground truthed		-30.9764	120.9126	300654	6571147
Medium29	Medium	Not ground truthed		-31.0463	120.9665	305947	6563492
Medium28	Medium	Not ground truthed		-30.9902	120.9101	300445	6569612
Medium27	Medium	Not ground truthed		-31.0453	120.9457	303959	6563569
Medium26	Medium	Not ground truthed		-31.0473	120.9618	305496	6563370
Medium25	Medium	Not ground truthed		-31.052	120.9528	304646	6562834
Medium24	Medium	Not ground truthed		-31.0593	120.9566	305025	6562034
Medium23	Medium	Not ground truthed		-31.0507	120.9652	305831	6563003
Medium22	Medium	Not ground truthed		-31.0545	120.9577	305119	6562567
Medium21	Medium	Not ground truthed		-31.0498	120.9495	304331	6563075
Medium20	Medium	Not ground truthed		-31.0494	120.9669	305986	6563145
Medium2	Medium	Not ground truthed		-30.9918	120.9101	300451	6569431
Medium19	Medium	Not ground truthed		-31.0546	120.9449	303902	6562535
Medium18	Medium	Not ground truthed		-31.0509	120.9682	306116	6562983
Medium17	Medium	Not ground truthed		-30.9754	120.9156	300935	6571259
Medium16	Medium	Not ground truthed		-30.9739	120.9272	302046	6571448
Medium15	Medium	Not ground truthed		-31.045	120.9847	307683	6563664
Medium14	Medium	Not ground truthed		-31.0486	120.9663	305926	6563239

ID (EMA)	ID (GVA)	Result (GVA)	Result (EMA)	Latitude	Longitude	Northing	Easting
Medium13	Medium	Not ground truthed		-31.0491	120.9495	304325	6563150
Medium12	Medium	Not ground truthed		-31.0596	120.9562	304987	6562003
Medium11	Medium	Not ground truthed		-31.0508	120.9543	304792	6562968
Medium10	Medium	Not ground truthed		-31.0451	120.9497	304339	6563596
Medium1	Medium	Not ground truthed		-31.0484	120.966	305902	6563258

Appendix 7. Explanation of fauna values, adapted from Bamford (2024a)

1. Habitats

Habitats combine broad vegetation types, the soils or other substrate with which they are associated, and the landform. In the context of fauna assessment, habitats are the environments that provide habitats for fauna. The term habitat is widely used in this context, but by definition an animal's habitat is the environment that it utilises (Calver et al., 2009), not the environment as a whole. Habitat is a function of the animal and its ecology, rather than being a function of environment. For example, a species may occur in eucalypt canopy or in leaf-litter on sand, and that habitat may be found in only one or in several habitats. Habitats are not the same as vegetation types since these may not incorporate soil and landform and recognise floristics to a degree that habitats do not. Vegetation types may also not recognise minor but often significant (for fauna) structural differences in the environment. habitats also do not necessarily correspond with soil types but may reflect some of these elements.

Because habitats provide the habitat for fauna, they are important in determining assemblage characteristics. For the purposes of impact assessment, habitats can also provide a surrogate for detailed information on the fauna assemblage. For example, rare, relictual or restricted habitats should automatically be considered a significant fauna value. Impacts may be significant if the habitat is rare, a large proportion of the habitats is affected and/or the habitat supports significant fauna. The disturbance of even small amounts of habitat in a localised area can have significant impacts to fauna if rare or unusual habitats are disturbed.

Habitat assessments are made with reference to the key attributes provided by EPA (EPA, 2020). soil type and characteristics

- extent and type of ground surfaces and landforms
- height, cover and dominant flora within each vegetation stratum
- presence of specific flora or vegetation of known importance to fauna
- evidence of fire history including, where possible, estimates of time since fire
- evidence and degree of other disturbance or threats, e.g. feral species
- presence of microhabitats and significant habitat features, such as coarse woody debris, rocky
- outcrops, tree hollows, water sources and caves
- evidence of potential to support significant fauna
- function of the habitat as a fauna refuge or part of an ecological linkage.

2. Patterns of biodiversity across the landscape

This fauna value relates to how the assemblage is organised across the landscape. Generally, the fauna assemblage is not distributed evenly across the landscape or even within one habitat. There may be zones of high biodiversity such as particular environments or ecotones (transitions between habitats). There may also be zones of low biodiversity. Impacts may be significant if a wide range of species is affected even if most of those species are not significant per se.

3. Ecological processes upon which the fauna depend

These are the processes and conditions that apply to the existing environment and that affect and maintain fauna populations in an area. As such they are very complex; for example, populations are maintained through the dynamic of mortality, survival and recruitment being more or less in balance, and these are affected by a myriad of factors. The dynamics of fauna populations in a study area may be affected and effectively determined by processes such as:

- fire regime
- landscape patterns (such as extent of existing habitat, fragmentation and/or linkage)
- the presence of feral species
- hydrology.

Appendix 8. Explanation of threatening processes (Bamford, 2024b)

Potential impacts of proposed developments upon fauna values can be related to threatening processes. This is recognised in the literature and under the EPBC Act, in which threatening processes are listed. Processes that may impact fauna values are discussed below. Rather than being independent of one another, processes are complex and often interrelated. They are the mechanisms by which fauna can be affected by development. Impacts may be significant if large numbers of species or large proportions of populations are affected.

Note that the terms direct and indirect impacts are used by the DotE (2013a), DSEWPaC (2013) EPA (2016a), but there is some inconsistency in how these are defined. The federal guidance does not define direct impact but has a very broad definition of indirect, and makes the statement DotE (2013a) '*Consideration should be given to all adverse impacts that could reasonably be predicted to follow from the action, whether these impacts are within the control of the person proposing to take the action or not. Indirect impacts will be relevant where they are sufficiently close to the proposed action to be said to be a consequence of the action, and they can reasonably be imputed to be within the contemplation of the person proposing to take the action*.' Indirect impacts therefore can even include what the (2013b)calls facilitated impacts, which are the result of third party actions triggered by the primary action. In contrast, the EPA (2016a). defines direct impacts to '*include the removal, fragmentation or modification of habitat, and mortality or displacement of individuals or populations.*' This document then lists as indirect impacts what in many cases are the consequences of the removal, fragmentation or modification of habitat. For example, '*disruption of the dispersal of individuals required to colonise new areas inhibiting maintenance of genetic diversity between populations'* is a consequence of habitat fragmentation. Impacts of light, noise and even roadkill are defined as indirect but they are clearly the result of the action and in control of the person taking the action. Roadkill is as direct a form of mortality as can be observed, but it is considered as an indirect impact in the context of a development presumably because it is not directly linked to land clearing. The EPA (2016a). makes a strong distinction between removal of vegetation (direct impact) and the consequences of such clearing and other aspects of a development (indirect impacts). It is not obvious how this distinction between direct and indirect impacts is helpful in the EIA process, as the key aim is to ensure that all impacts that result from a project are addressed in this assessment process. Interestingly, (2012), in a major review of impacts of development on wildlife, do not use the terms direct or indirect. In the following outlines of threatening processes that can cause impacts, the emphasis is upon interpreting how a threatening process will cause an impact. For example, loss of habitat (threatening process) can lead to population decline and to population fragmentation, which are two distinct impacts, with population decline considered a direct impact and fragmentation an indirect impact by the EPA (2016a).

Loss of habitat affecting population survival

Clearing for a development can lead to habitat loss for a species with a consequent decline in population size. This may be significant if the smaller population has reduced viability. Conservation significant species or species that already occur at low densities may be particularly sensitive to habitat loss affecting population survival.

Loss of habitat leading to population fragmentation

Loss of habitat can affect population movements by limiting movement of individuals throughout the landscape as a result of fragmentation (Gleeson and Gleeson, 2012; Soule et al., 2004). Obstructions

associated with the development, such as roads, pipes and drainage channels, may also affect movement of small, terrestrial species. Fragmented populations may not be sustainable and may be sensitive to effects such as reduced gene flow.

Degradation of habitat due to weed invasion leading to population decline

Weed invasion, such as through introduction by human boots or vehicle tyres, can occur as a result of development and if this alters habitat quality, can lead to effects similar to habitat loss.

Increased mortality

Increased mortality can occur during project operations; for example from roadkill, animals striking infrastructure and entrapment in trenches. Roadkill as a cause of population decline has been documented for several medium-sized mammals in eastern Australia (Dufty, 1989; Jones, 2000). Increased mortality due to roadkill is often more prevalent in habitats that have been fragmented (Clevenger and Waltho, 2000; Jackson and Griffin, 2000; Scheick and Jones, 1999).

Increased mortality of common species during development is unavoidable and may not be significant for a population. However, the cumulative impacts of increased mortality of conservation significant species or species that already occur at low densities may have a significant impact on the population.

Species interactions, including predation and competition

Changes in species interactions often occur with development. Introduced species, including the feral Cat, Red Fox and Rabbit may have adverse impacts upon native species and development can alter their abundance. In particular, some mammal species are very sensitive to introduced predators and the decline of many mammals in Australia has been linked to predation by the Red Fox, and to a lesser extent the feral Cat (Burbidge and McKenzie, 1989). Introduced grazing species, such as the Rabbit, Goat, Camel and domestic livestock, can also degrade habitats and deplete vegetation that may be a food source for other species.

Changes in the abundance of some native species at the expense of others, due to the provision of fresh watering points, can also be a concern. Harrington (2002) found the presence of artificial fresh waterpoints in the semi-arid mallee rangelands to influence the abundance and distribution of certain bird species. Common, water-dependent birds were found to out-compete some less common, water-independent species. Similarly, Read *et al.* (2015) found a decline in some bird species but an increase in others in the vicinity of active mines and concluded this was due to the mine attracting large and aggressive species that displaced other species. Over-abundant native herbivores, such as kangaroos, can also adversely affect less abundant native species through competition and displacement.

Hydroecology

Interruptions of hydroecological processes can have major effects because they underpin primary production in ecosystems and there are specific, generally rare habitats that are hydrology-dependent. Fauna may be impacted by potential changes to groundwater level and chemistry and altered flow regime. These changes may alter vegetation across large areas and may lead to habitat degradation or loss. Impacts upon fauna can be widespread and major.

Changes to flow regime across the landscape may alter vegetation and may lead to habitat degradation or loss, affecting fauna. For example, Mulga has a shallow root system and relies on surface sheet flow

during flood events. If surface sheet flow is impeded, Mulga can die (Kofoed, 1998), which may impact on a range of fauna associated with this vegetation type.

Fire

The role of fire in the Australian environment and its importance to vertebrate fauna has been widely acknowledged (Fox, 1982; Gill et al., 1981; Letnic et al., 2004). It is also one of the factors that has contributed to the decline and local extinction of some mammal and bird species (Burbidge and McKenzie, 1989). Fire is a natural feature of the environment but frequent, extensive fires may adversely impact some fauna, particularly mammals and short-range endemic species. Changes in fire regime, whether to more frequent or less frequent fires, may be significant to some fauna. Impacts of severe fire may be devastating to species already occurring at low densities or to species requiring long unburnt habitats to survive. In terms of conservation management, it is not fire *per se* but the fire regime that is important, with evidence that infrequent, extensive and intense fires adversely affect biodiversity, whereas frequent fires that cover small areas and are variable in both season and intensity can enhance biodiversity. Fire management may be considered the responsibility of managers of large tracts of land, including managers of mining tenements.

Dust, light, noise and vibration

Impacts of dust, light, noise and vibration upon fauna are difficult to predict. Some studies have demonstrated the impact of artificial night lighting on fauna, with lighting affecting fauna behaviour more than noise (Rich and Longcore, 2006). Effects can include impacts on predator-prey interactions, changes to mating and nesting behaviour, and increased competition and predation within and between invertebrates, frogs, birds and mammals.

The death of very large numbers of insects has been observed around some remote mine sites and attracts other fauna, notably native and introduced predators (M. Bamford pers. obs). The abundance of some insects can decline due to mortality around lights, although this has previously been recorded in fragmented landscapes where populations are already under stress (Rich and Longcore, 2006). Artificial night lighting may also lead to disorientation of migratory birds. Aquatic habitats.

Appendix 9. GVA (2025). Malleefowl mound detection using LiDAR for Bullabulling

Technical Memorandum

27 October 2025

To:		Contact No.:	
Copy to:		Email:	
From:	L. Weggelaar	Project No.:	250005
Project Name:	Bullabulling		
Subject:	Malleefowl mound detection using LiDAR		

Introduction

Purpose of this Memorandum

Malleefowl are ground-dwelling birds currently listed as Vulnerable in Australia. When breeding, they construct a mound for the purpose of nesting. This memorandum describes the spatial pattern recognition process undertaken to detect the location of malleefowl mounds in the Bullabulling project area and surrounds using LiDAR data.

Limitations

Historic ground surveys have located very few malleefowl mounds in the project area. Additionally, the majority of mounds found during these surveys were very old and long disused. Malleefowl may return to an existing mound repeatedly, however the mounds lose their distinctive shape over time and with lack of use. For this reason, the results of the analysis could not be widely cross-checked to refine the methodology and reduce the excessive model output (initially 1974 potential mounds).

The project area has been extensively explored and features a profuse amount of historic exploration shafts, spoil mounds and related activity disturbances. Many of these exhibit very similar structure to malleefowl mounds. Consequently, most of the potential mounds detected via the recognition process were deemed to be exploration activity. See example in Figure 1 below. Similarly, large trees form an elevated ring of sand around the base of the trunk, also resembling malleefowl mounds.



Figure 1: Model output potential mound as seen in LiDAR-produced surface raster vs ground-truthed photo (not a mound)

Background

Malleefowl mounds are quite distinctive, typically having a diameter of 3-5m and a height of approximately 1m (see Figure 2 below).

Malleefowl mounds are generally conical or dome-shaped, with a broad base that tapers towards the top. These mounds are constructed using soil and leaf litter, which the malleefowl gathers and arranges to create an optimal environment for incubating their eggs. Newer mounds may have a smaller dip of between 10 to 20cms within the mound.

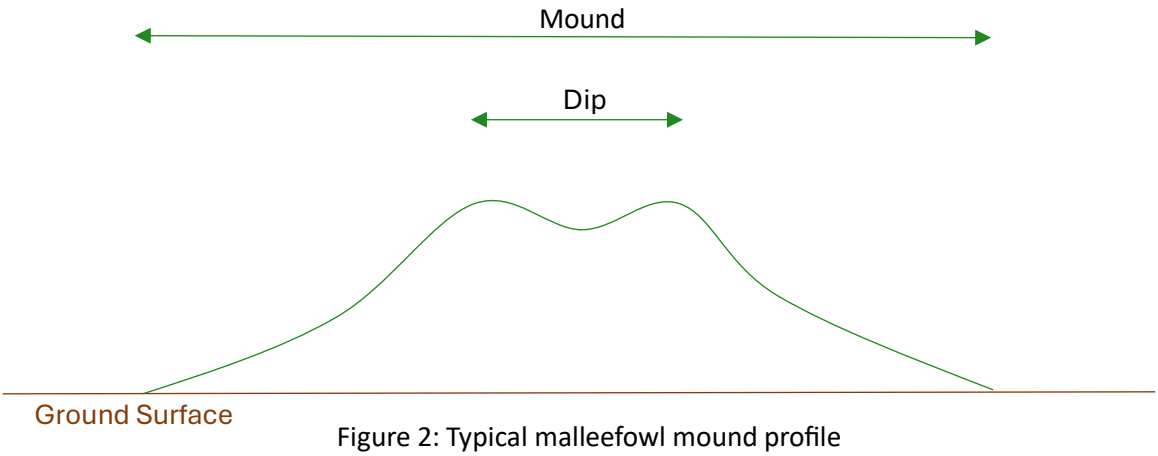


Figure 2: Typical malleefowl mound profile

The LiDAR (Light Detection and Ranging) data was collected using an airborne platform. The LiDAR system emits laser pulses that reflect off the ground and other objects. The time it takes for the pulses to return is measured, allowing for the calculation of distances and the creation of detailed three-dimensional maps.

The Lidar data is filtered to remove noise and classified into different categories such as ground, buildings and roads.

Methodology

This Malleefowl Mound Spatial Pattern Recognition model (illustrated in the flow chart in Figure 4 below) leverages LiDAR technology to create a continuous ground surface elevation model, which is then used to identify the distinctive patterns of malleefowl mounds.

Initially, the surface elevation model (Figure 3) was scanned on a broad scale to detect areas exhibiting both mounding and dipping characteristics. Following this, a clustering analysis was undertaken to identify regions with high concentrations of mounding or dipping.

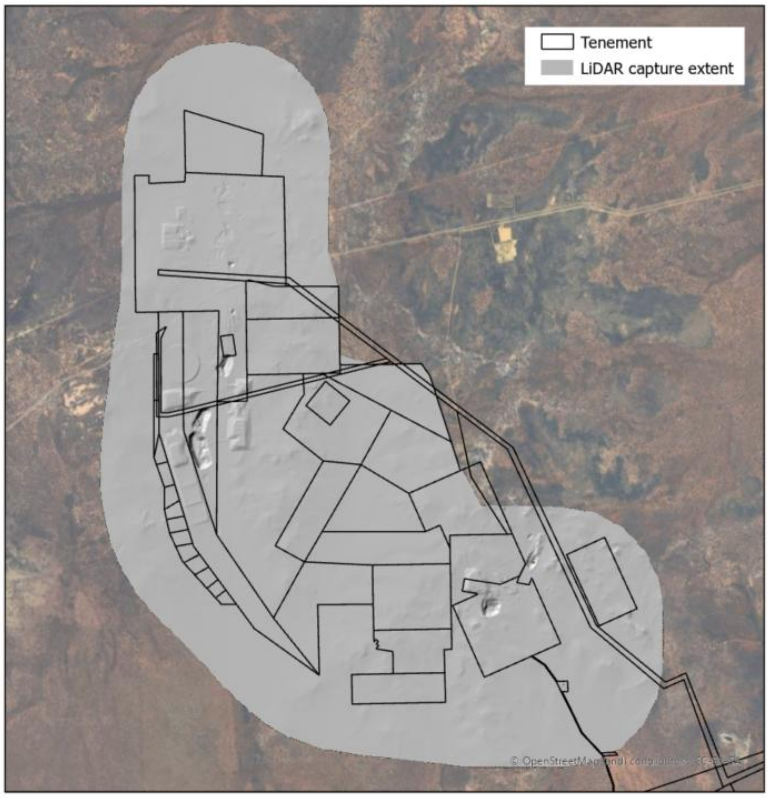


Figure 3: LiDAR capture extent (surface elevation)

This output was then filtered by size, shape and density to exclude areas that were highly unlikely to be malleefowl mounds. Further, more detailed searches were then performed around each of the output sites to identify specific mounding/dipping, again filtered against specific size, shape and density criteria.

The resulting sites were each assigned a confidence level based on their attributes (high/medium/low), which were derived from the filtering process. The sites with high and medium confidence were then validated using a visual check against both the surface elevation model and high resolution aerial imagery. Many sites were deemed to be old mine shafts, exploration spoil or tree bases.

As a result of the visual validation, the >1900 potential mounds output by the model were reduced to 137, with only 15 of these deemed to be “likely”, some of which were outside of the project tenement package (see Figure 5 below). Ground-truthing of potential mounds was focused within the planned infrastructure footprint (see Figure 6 below). Of the 15 “likely” sites, 9 were ground-truthed and only 2 were found to be possible mounds. Of the 122 “unlikely” sites, 34 were ground-truthed and confirmed as not malleefowl mounds (Figure 7 below).

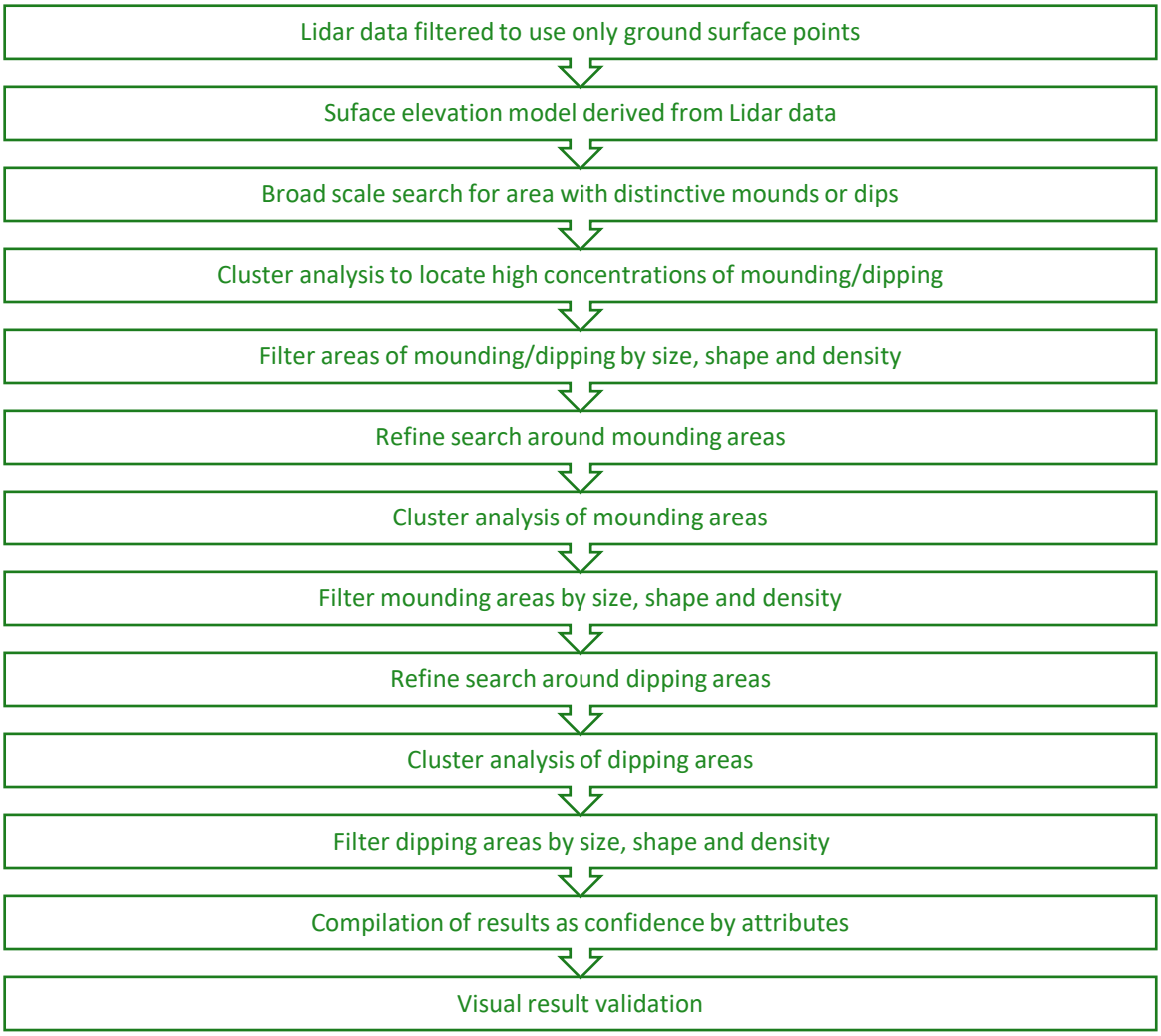


Figure 4: Malleefowl Mound Spatial Pattern Recognition model flow chart

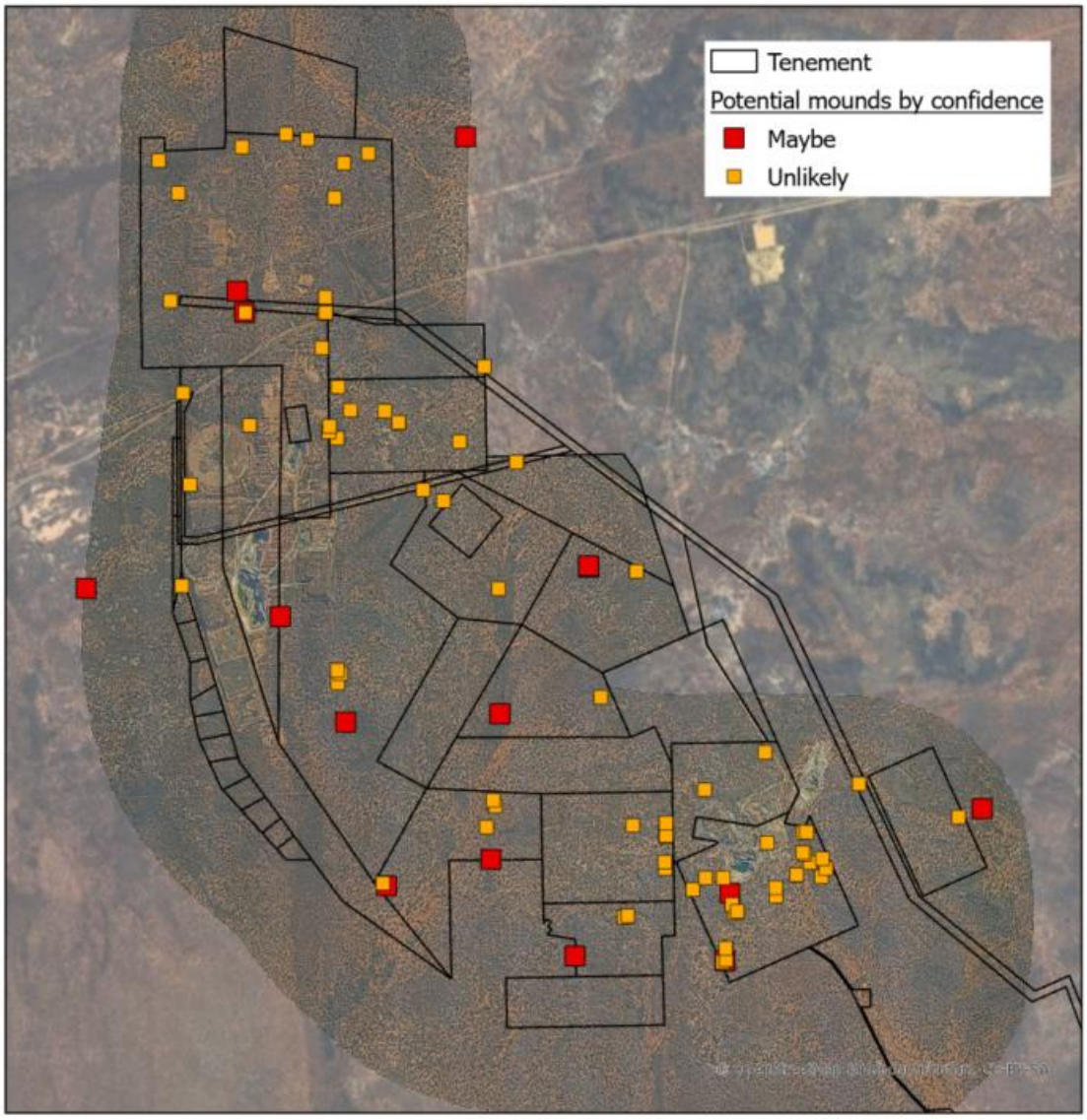


Figure 5: Bullabulling tenement package and potential malleefowl mounds determined from visual validation of model outputs

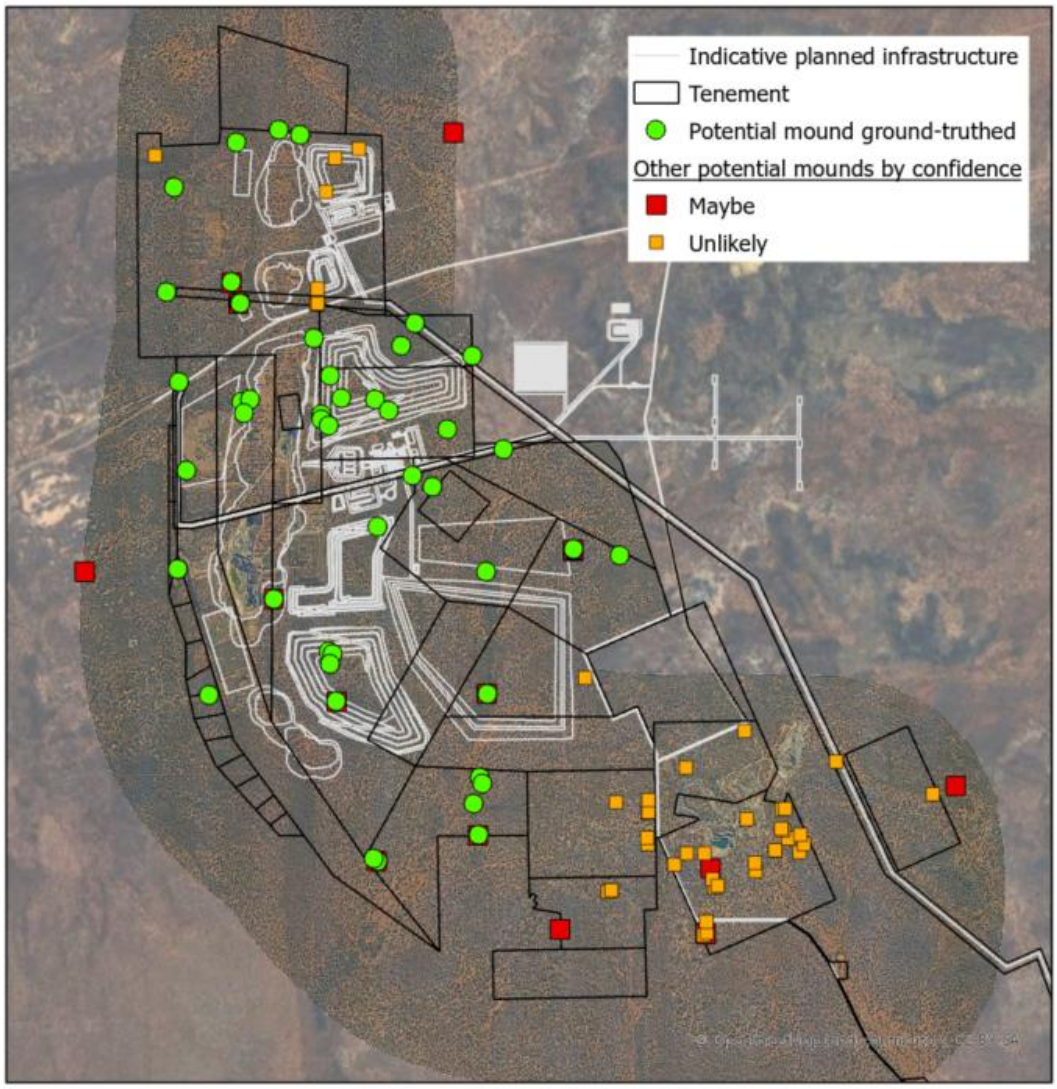


Figure 6: Bullabulling ground-truthed malleefowl mounds

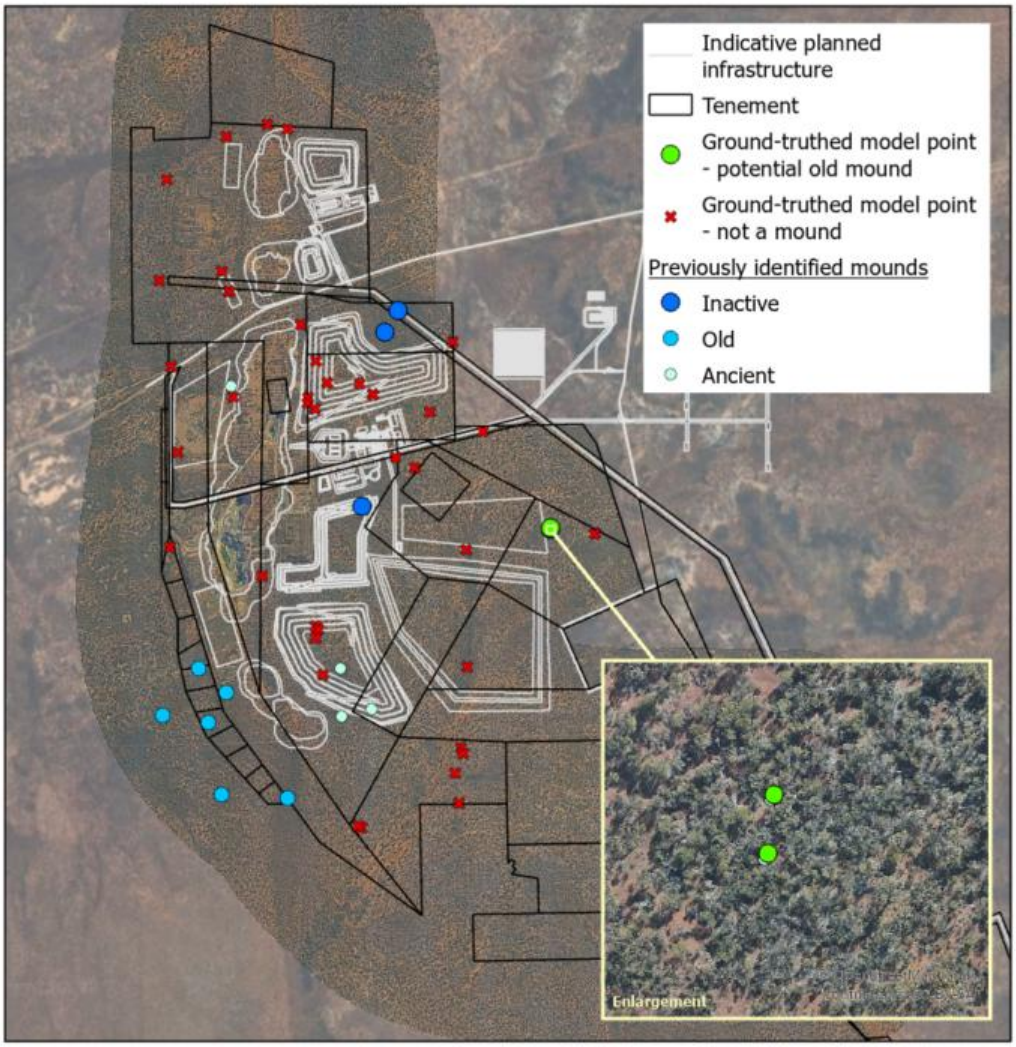


Figure 7: Bullabulling model outputs ground-truthing results

Conclusions

The model successfully identified two potential old malleefowl mounds and recognised a high number of exploration workings and tree bases as potential malleefowl mounds. Given the amount of features similar in composition to malleefowl mounds which were detected by the model, it is likely that the model detected most malleefowl mounds in the search area.

Ground-truthing of the model output determined that malleefowl mounds are not prolific in the Bullabulling project area.

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APPENDIX 3. SOIL ASSESSMENT - BULLABULLING GOLD PROJECT (MINE EARTH, 2026)

Bullabulling Project – Baseline Soil Assessment

Minerals 260

24 March 2026



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Executive Summary

Mine Earth was commissioned by Minerals 260 to complete a baseline soil assessment for the Bullabulling Gold Project (the Project). The Project is located approximately 70 km south-west of Kalgoorlie in the Goldfields region of Western Australia. The Project will include open pits, a tailings storage facility (TSF), processing facilities, workshops, accommodation and other associated infrastructure.

Assessment of the physical and chemical characteristics of soil resources within the study area is required to identify soil management requirements, develop rehabilitation prescriptions, and fulfil requirements for future regulatory approval.

The objectives of the assessment were to:

- Review local and regional soil and land system information.
- Characterise the physical and chemical characteristics of soils within the study area
- Develop recommendations for soil salvaging, management, stockpiling and application of soil resources in rehabilitation and mine closure activities.
- Develop a preliminary soil resource inventory for the Project.

Surface soil characteristics

The physical and chemical characteristics of the surface soils were assessed from 35 locations in total within the study area, 17 from the previous soil and landform assessment (Integrate Sustainability, 2022) and 18 from this assessment. Where available, soil chemical data from the previous assessment was merged with data from this assessment. Soil samples and relevant field-based information were collected for this assessment by Minerals 260 personnel in December 2025.

The surface soils were grouped into six (6) soil-landform associations (SLAs), based on landscape morphology, landforms and soil characteristics within the survey area. The landscape, soil profile morphology and physical and chemical soil characteristics of the SLAs from which samples were collected are outlined below:

Undulating plains

- Flat to undulating stony, broad and sandy loam plains.
- Ironstone gravel or calcrete mantle, characterised by sparsely vegetated sandy soils, with variable coarse rock fragments.
- Deeper soil profiles than other SLAs with fewer coarse fragments (> 2mm), with some areas of hardpan at approximately 90 to 100 cm.
- Generally, soils are non-saline, non-sodic, are potentially dispersive with repeated disturbance, have a low propensity to hard-set, have a generally moderate to very rapid hydraulic conductivity and are typically low in organic carbon and plant-available nutrients, with the exception of potassium which is present in moderate concentrations and high plant-available sulfur outliers.
- ‘Red-brown hardpan shallow loam’ (1605) and ‘Red loamy earth’ (1673) WA Soil Groups.

Clayey plains

- Flat to undulating clay-rich plains.
- High percentage of coarse rock fragments (>2 mm) present at the surface, often ironstone.
- Partially weathered rock and indurated clays at depth.

- Variable coarse fragments (>2 mm) throughout the soil profile.
- Generally, soils are saline, sodic, are potentially dispersive with repeated disturbance, have a relatively low propensity to hard-set, have a generally moderately slow to moderately rapid hydraulic conductivity and are typically low in organic carbon and plant-available nutrients, with the exception of sulfur which is present in high concentrations with depth.
- 'Red-brown hardpan shallow loam' (1605) and 'Red loamy earth' (1673) WA Soil Groups.

Low rises and hills

- Minor sloped uplands and rises, with some discrete hills.
- Higher percentage of coarse rock fragments (>2 mm) present at the surface.
- Shallow soil profiles with partially weathered / competent rock at depth.
- Many coarse fragments (>2 mm) throughout the soil profile.
- Hardpan in places at approximately 20 to 40 cm.
- Generally, soils showed variability, producing some highly saline and highly sodic values, are potentially dispersive with repeated disturbance, have a low propensity to hard-set, have a generally moderately slow to moderately rapid hydraulic conductivity and are typically low in organic carbon and high in concentrations of nitrate, sulfur and potassium at approximately 30-40 cm depth.
- 'Red-brown hardpan shallow loam' (1605) and 'Red loamy earth' (1673) WA Soil Groups.

Drainage lines

- Typically, broad and slightly incised channels.
- Seasonal flow into shallow lake systems.
- Consists of alluvial sediments, clay loams on surrounding plains and dense halophytic vegetation.
- Only one sample site was situated within this SLA, but analyses indicate that these soils are non-saline, non-sodic, and are typically low in organic carbon and plant-available nutrients, with the exception of potassium which is present in moderate concentrations.

Low slopes

- Low sandy footslopes and rises of low-relief plateaux.
- Typically, shallow surface soil profile with a low coarse fragment percentage.
- Partially weathered rock in places at approximately 25 cm.
- Soils are variable in salinity, sodic to highly sodic, are potentially dispersive with repeated severe disturbance, have a low propensity to hard-set, have a generally moderately slow to rapid hydraulic conductivity and are typically low in organic carbon and plant-available nutrients.
- 'Pale shallow sand' (1405) and 'Yellow sandy earth' (1467) WA Soil Groups.

Disturbed

- These areas have been previously disturbed by mining activity.
- Soils are variable in salinity and sodicity, are potentially dispersive with repeated severe disturbance and are typically low in organic carbon and plant-available nutrients with the exception of potassium and sulfur, present in high concentrations.

Soil management recommendations

Soils sampled from within the study area were variable, ranging from loamy sand to clays, with salinity classifications ranging from non-saline to extremely saline. Approximately half of samples tested were classed as sodic or highly sodic and potentially dispersive upon severe disturbance. The soils tested generally recorded a low propensity to hard-set, had a slow to very rapid hydraulic conductivity, low soil organic carbon and plant-available nutrients, and total concentrations of arsenic, chromium and selenium above the average crustal abundance.

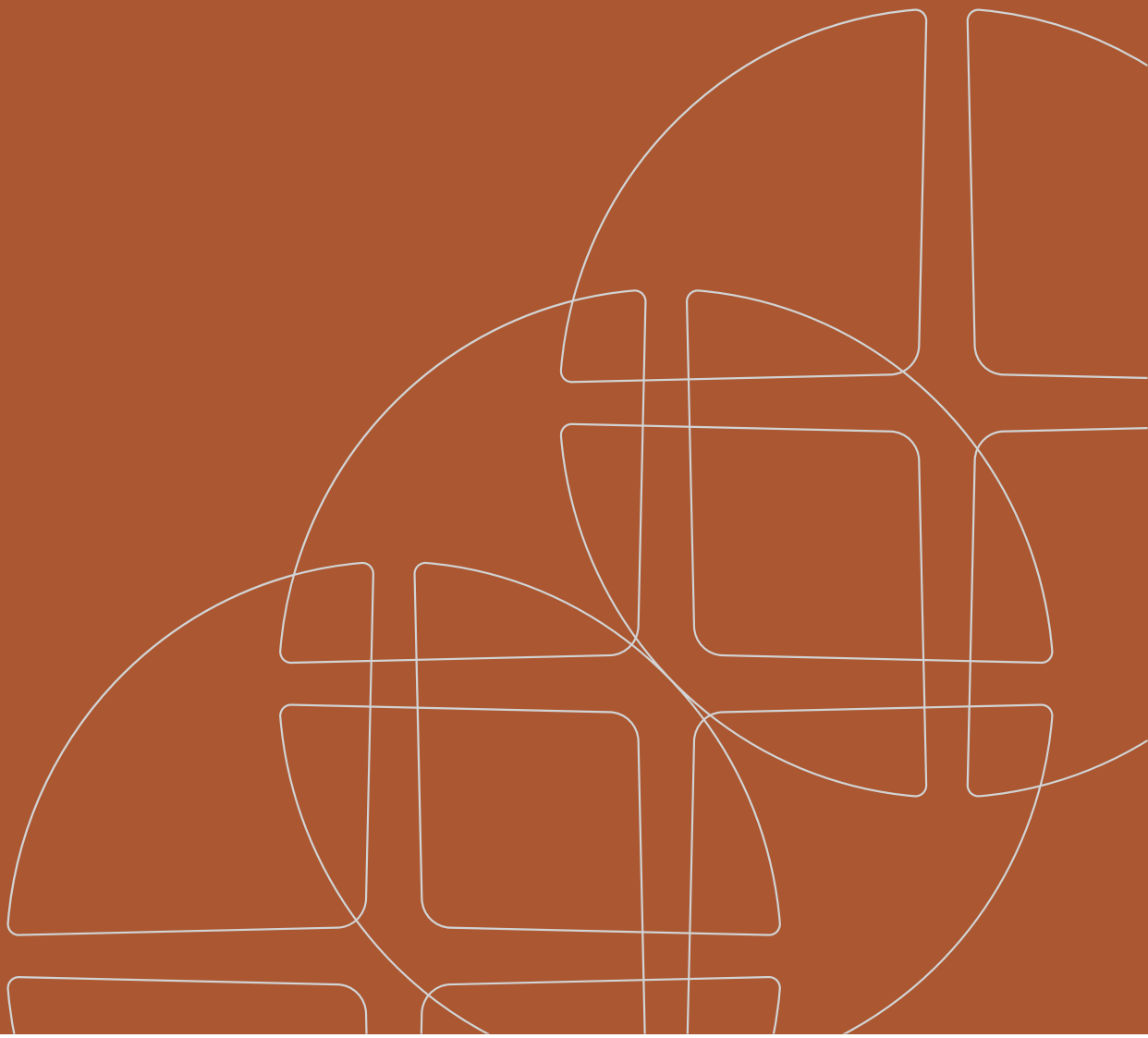
The topsoil (0 to 0.2m) from the 'Undulating plains' and 'Drainage lines' SLAs is considered suitable as a surface rehabilitation material for flat and sloped rehabilitation areas. Topsoils from the 'Clayey plains', 'Low slopes' and 'Low rises and hills' SLAs were largely sodic, had some elevated salinity concentrations and are considered less suitable for application to sloped rehabilitation areas. Where used on flat rehabilitation areas, these materials should be further tested prior to application, to further quantify the extent of salinity present and to determine an appropriate salt-tolerant seed mix for rehabilitation.

Any remaining topsoil salvaged from the 'Disturbed' SLA areas should be characterised before use, to determine suitability for rehabilitation.

The physical and chemical characteristics of the subsoils (0.2 m to approximately 1 m) were highly variable, both between SLAs and with depth. If there is a topsoil deficit, subsoils from the 'Undulating plains' SLA within the pit and TSF footprints could be salvaged and stockpiled for potential use as a rehabilitation resource. Further testing of the subsoil materials is recommended, prior to application to confirm suitability for use as a rehabilitation material.

Where salvaged soils are utilised as a surface rehabilitation medium on the slopes of waste rock landforms, the soils will require ripping into underlying competent waste rock to armour the surface and minimise erosion as far as practicable. Adequate surface water management on constructed landforms will be required to minimise the potential for surface water concentration and erosion.

Introduction



1. Introduction

Minerals 260 Ltd are proposing development of the Bullabulling Gold Project (the Project), located within the Goldfields region of Western Australia, approximately 70 km south-west of Kalgoorlie (Figure 1). The Project (Figure 2) currently consists of mining leases; M15/503, M15/282, M15/552, M15/554, M15/483, M15/529, M15/1414. The study area defined for this assessment covers a total approximate area of 5,055 hectares (Figure 3).

An assessment of the physical and chemical characteristics of the soil resources associated with the Project was undertaken to identify likely soil management requirements, develop appropriate rehabilitation prescriptions, and fulfil requirements for future regulatory approval.

This report includes:

- A description of the study area and summary of local and regional soil and landform information.
- A description of the materials and methods used during the sampling and analysis stages.
- A description of surface soil physical characteristics including surface soil profile morphology, soil texture, soil structure, structural stability, and hydraulic conductivity.
- A description of the surface soil chemical characteristics including pH, electrical conductivity, organic matter, exchangeable cations, exchangeable sodium percentage, and plant-available nutrients.
- Recommendations for soil resource management, including topsoil stripping, handling and placement as a rehabilitation resource.
- A preliminary topsoil inventory, detailing the approximate volumes of topsoil resources available for salvage from each of the major disturbance areas.

900000

1000000

6700000

6600000

6500000

Legend

- Towns
- Project Location
- National highways
- State highway
- DBCA Legislated Lands and Waters

Cue
Mt Magnet
Geraldton
Coolgardie
Kalgoorlie
Perth
Norseman
Bunbury
Esperance
Albany

Goongarrie National Park

Clear And Muddy Lakes Nature Reserve

Goldfields Hwy

Bullock Holes Timber Reserve

Kalgoorlie

Study area

Coolgardie

Great Eastern Hwy

Kangaroo Hills Timber Reserve

Scahill Timber Reserve

Yallari Timber Reserve

Randell Timber Reserve

Boorabbin National Park

Goldfields Woodlands National Park

Goldfields Woodlands Conservation Park

Great Eastern Hwy

Earthstar Geographics

MINE EARTH

Regional location

Author: S. Parnaby	Figure 1
Reviewed by: S. Perry	Date:13.11.2025

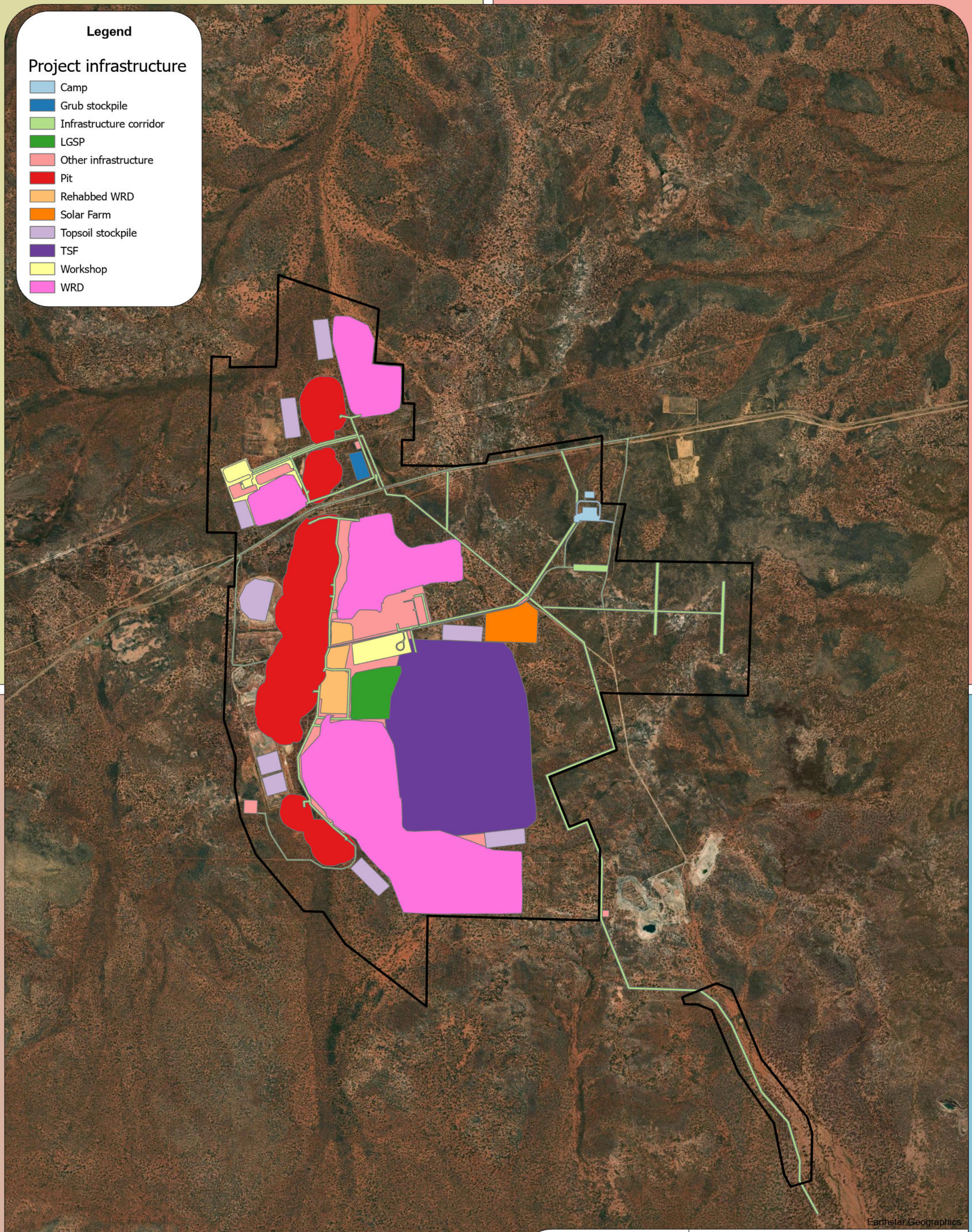
Spatial Reference
Name: GDA 1994 MGA Zone 50
PCS: GDA 1994 MGA Zone 50
GCS: GCS GDA 1994
Datum: GDA 1994

N

0 12.5 25 50

Kilometers

Scale: 1:750,000 at A3



MINE EARTH

Proposed site layout

Author: S. Parnaby	Figure 2
Reviewed by: S. Perry	Date:18.03.2026

Spatial Reference
Name: GDA 1994 MGA Zone 51
PCS: GDA 1994 MGA Zone 51
GCS: GCS GDA 1994
Datum: GDA 1994

N

0 0.8 1.6 3.2

Kilometers

Scale: 1:50,000 at A3

300000

315000

6570000

6570000

Legend

Study area

Earthstar Geographics

MINE EARTH

Study area

Author: S. Parnaby	Figure 3
Reviewed by: S. Perry	Date:18.03.2026

Spatial Reference
Name: GDA 1994 MGA Zone 51
PCS: GDA 1994 MGA Zone 51
GCS: GCS GDA 1994
Datum: GDA 1994

N

0 0.75 1.5 3

Kilometers

Scale: 1:50,000 at A3

300000

315000

Description of Study Area

2. Description of Study Area

2.1 Climate

The climate of the study area is characterised as local steppe (summer drought) with hot, dry summers and cold winters. Data from Coolgardie weather station located approximately 25 km northwest of the Project, has recorded the highest monthly mean maximum temperature of 33.3°C in January, and the lowest monthly minimum temperature of 16.1°C in July (Figure 4) (BOM, 2025).

The mean minimum temperature is 17.0° C in January and 5.2° C during July. Mean total annual rainfall for this region is 265.3 mm, ranging between a maximum average rainfall of 29.0 mm in June and a minimum of 13.5 mm in September. The average annual number of days with rainfall over 1 mm is 34.0 (Figure 4).

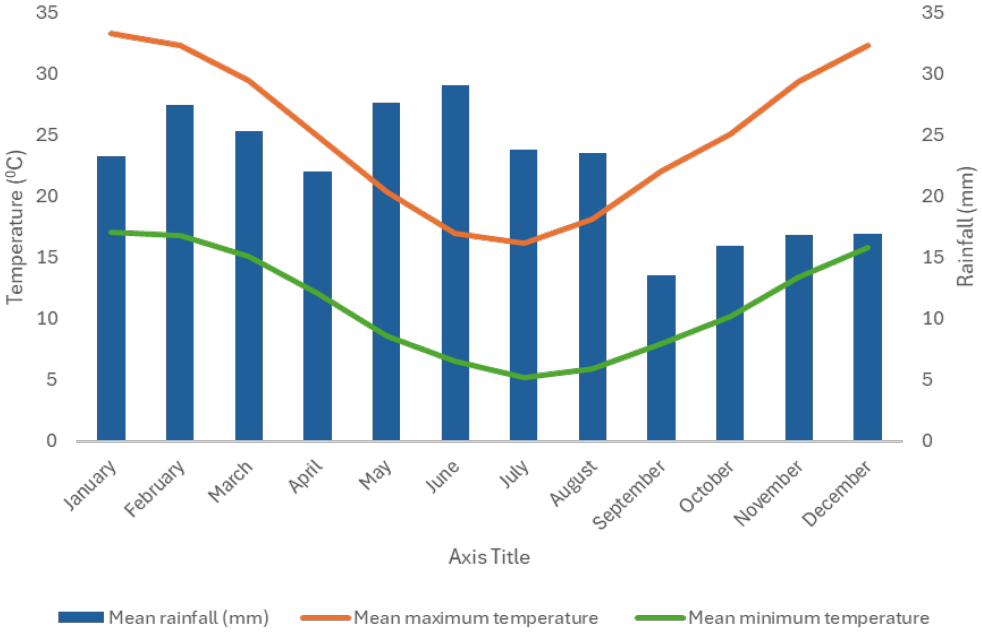


Figure 4: Monthly rainfall, mean, min and max temperatures at Coolgardie

2.2 Bioregion

The study area lies entirely within the Coolgardie biogeographic region of the Interim Biogeographic Regionalisation of Australia (IBRA), and entirely within the Eastern Goldfields IBRA sub-region (Figure 5). The Eastern Goldfields subregion lies on the Yilgarn Craton's 'Eastern Goldfields Terranes' of the Yilgarn Craton (CALM, 2002).

285000
300000
315000
6570000
6555000

Legend

Study area

IBRA Sub-region

Eastern Goldfield

Southern Cross

Earthstar Geographics

MINE EARTH

IBRA sub-regions of the study area (DCCEEW, 2025)

Author: S. Parnaby	Figure 5
Reviewed by: S. Perry	Date:18.03.2026

Spatial Reference
Name: GDA 1994 MGA Zone 51
PCS: GDA 1994 MGA Zone 51
GCS: GCS GDA 1994
Datum: GDA 1994

N

0 2 4 8

Kilometers

Scale: 1:120,000 at A3

2.3 Land systems

Land systems of the Southern Goldfields region were mapped in 2023 (Waddell PA and Galloway PD, 2023). There are ten land systems within the study area (Figure 6). The approximate total area of the land system in the region, area of land system within the study area, and the percentage of the study area represented by each land system is given in Table 1. Table 2 below, describes the largest land systems within the study area and the major landform features and soils present within each.

Table 1 Land systems within the study area

Land system	Area (ha) of land system in the region	Area (ha) of land system within study area	Percentage of study area represented by each land system
Coolgardie Land System	144,600	1125	22.3
Gumland Land System	573,100	1119	22.1
Bannar Land System	229,000	811	16.0
Illaara Land System	82,800	664	13.1
Doney Land System	1,051,800	450	8.9
Euchre Land System	157,700	367	7.3
Johnston Land System	660,600	291	5.8
Gransal Land System	352,000	163	3.2
Moriarty Land System	95,200	56	1.1
Sedgman Land System	225,100	9	0.2

300000
310000
6570000
6560000

Legend

Land system
- Bannar Land System
- Coolgardie Land System
- Doney system
- Euchre Land System
- Gransal system
- Gumland system
- Illaara system
- Johnston Land System
- Moriarty system
- Sedgeman Land System

Vantor

MINE EARTH

Land systems of the survey area (DPIRD, 2023)

Author: R. Magraith	Figure 6
Reviewed by: S. Perry	Date:19.03.2026

Spatial Reference
Name: GDA 1994 MGA Zone 51
PCS: GDA 1994 MGA Zone 51
GCS: GCS GDA 1994
Datum: GDA 1994

N

0 0.75 1.5 3
Kilometers

Scale: 1:50,000 at A3

Table 2 Characteristics of major land systems within the study area

Land System	Description	Major Landforms	Major Soils[1]	Area of land system within study area (ha)	Percentage of study area
Coolgardie Land System	Uplands and undulating plains associated with ultramafic greenstones, supporting eucalypt woodlands and halophytic shrublands.	Hillcrests (5%), Hillslopes (10%), Footslopes, pediments or stony plains (35%), Low rises (15%), Loamy plain (15%), Valley floors (10%), Drainage foci (5%), Narrow drainage tracts (5%)	Calcareous shallow loam (1602), Red loamy earth (1673), Yellow sandy earth (1467)	1125	22.3
Gumland Land System	Alluvial plains, supporting eucalypt woodlands with halophytic shrub understoreys.	Stony plains (or footslopes) (5%), Loamy plains (70%), Alluvial plains (10%), Drainage tracts (10%), Alluvial fan or drainage foci (5%), Low rises (<1%).	Calcareous shallow loam (1602), Red loamy earth (1673)	1119	22.1
Bannar Land System	Level to gently undulating gravelly sandy plains, supporting acacia and allocasuarina scrublands, commonly with scattered native pines and emergent mallees	Breakaways (5%), Low rises (5%), Gravelly sand sheets (45%), Sandplains (20%), Loamy plains (25%), Drainage tracts (<1%)	Calcareous shallow loam (1602), Red loamy earth (1673), Yellow sandy earth (1467)	811	16.0
Illaara Land System	Low rises and undulating plains with ironstone gravel or calcrete mantles, supporting eucalypt woodlands and mulga–casuarina shrublands.	Breakaways (5%), Loamy plains with ironstone lag (60%), Low rises and calcrete pavements (20%), Loamy plains (10%), Drainage tracts (5%)	Calcareous shallow loam (1602), Red loamy earth (1673)	664	13.1
Doney Land System	Calcareous sheetwash plains, supporting eucalypt woodlands with non-halophytic shrub understoreys.	Loamy plains (70%), Alluvial plains (15%), Sand sheet (5%), Narrow drainage tracts (10%), Drainage foci (<1%).	Calcareous shallow loam (1602), Red loamy earth (1673)	450	8.9
Euchre Land System	Low granite breakaways with alluvial plains and sandy tracts, supporting eucalypt woodlands and acacia shrublands.	Breakaways (12%), Footslopes (18%), Sandplain/gravelly sand sheets (15%), Stony pavements (10%), Gritty-surfaced plains (10%), Loamy plains (30%), Drainage tracts (5%)	Calcareous shallow loam (1602), Red loamy earth (1673), Yellow sandy earth (1467)	367	7.3

Land System	Description	Major Landforms	Major Soils[1]	Area of land system within study area (ha)	Percentage of study area
Gransal Land System	Stony plains and low rises on granite, supporting acacia and halophytic shrublands.	Breakaways (5%), Footslopes (5%), Low rises or stony plains (15%), Gritty-surfaced plains (10%), Saline stony plains (40%), Alluvial plains (10%), Hardpan plains (10%), Drainage tracts (5%), Calcrete rises (<1%)	Calcareous shallow loam (1602)	291	5.8
Johnston Land System	Gently undulating plains with occasional granite rises, supporting eucalypt woodlands and non-halophytic shrublands.	Low breakaways (<1%), Gravelly sand sheets (5%), Low rises and pediments (15%), Colluvial slopes and loamy plains (65%), Alluvial fans (5%), Drainage tracts (10%), Drainage foci (<1%).	Red loamy earth (1673)	163	3.2
Sedgman Land System	Low granite domes and outcrop with gritty-surfaced plains, supporting eucalypt stands and acacia dominated shrublands.	Domes (25%), Low rises (25%), Gritty-surfaced plains (40%), Loamy plains (10%), Drainage foci (<1%), Sand sheets (<1%)	Red loamy earth (1673), Yellow sandy earth (1467)	56	1.1
Moriarty Land System	Stony plains and low rises on granite, supporting acacia and halophytic shrublands.	Low rises (20%), Stony plains (includes footslopes) (35%), Loamy plains with ironstone lag (20%), Alluvial plains (includes alluvial fans) (20%), Drainage tracts (5%)	Red loamy earth (1673)	9	0.2

[1] Number in brackets indicates the soil group from the Soil groups of Western Australia; a simple guide to the main soils of Western Australia (Galloway, et al., 2024)

2.4 Regional soil information

Regional scale soil mapping for the Southern Goldfields region is detailed within (Waddell PA and Galloway PD, 2023). Only three WA Soil Groups have been mapped as occurring on site, with WA Soil Groups reported in the study area being; Calcareous shallow loam (1602), Red loamy earth (1673) and Yellow sandy earth (1673) (Galloway, et al., 2024).

2.5 Previous studies

Integrate Sustainability Pty Ltd (ISPL) was engaged in 2022 by Norton Gold Fields Ltd (Norton) on behalf of Bullabulling Operations Pty Ltd to undertake a soil and landform assessment (Integrate Sustainability, 2022) of the Bullabulling Heap Leach Project as part of evaluating the potential recommencement of activities.

The baseline soil and landform assessment was conducted to provide information on the soil properties associated with the mining area (the study area). The assessment sought to understand the soil resources and any potentially adverse soil properties which may influence rehabilitation and closure activities.

Using the site observations and laboratory results from the 2022 investigation, five soil types were mapped across the study area, these being:

- Lithocalcic Shallow Loams;
- Supracalcic Shallow Loams;
- Kandosol Loamy Earths;
- Dermosol Loamy Earths; and
- Potentially Altered Soils

The characteristics of the surface soils and subsoils are summarised below. Individual surface soil samples were taken from within the study area at varying depths up to 0.6 m, with characteristics summarised as follows:

- Red, brown or red-brown colour
- Predominantly clay loam texture
- Variable coarse fragments
- Soil pH ranges from extremely acidic to moderately alkaline
- Variable salinity, but elevated in ‘Potentially altered soils’
- Mostly sodic
- Low in nitrogen, organic carbon and phosphorus
- Adequate available K
- Low in iron, manganese, copper and zinc

Characteristics of the subsoils (0.6 to 1 m) were similar to the surface soils, however varied in texture from sandy loam to light clay (with increased % clay with depth) and less coarse fragments than the topsoils.

- Red or red-brown colour
- Sandy loam to clay, being mostly within the clay loam texture to light clay texture
- Increased coarse fragments compared to surface soils

- Soil pH ranges from very strongly acidic to moderately alkaline
- Variable salinity
- Mostly sodic
- Low in nitrogen, organic carbon and phosphorus
- Adequate available K
- Low in iron, manganese, copper and zinc

2.6 Surface geology

The surface geology mapping for the region indicates that there are 14 surface geology units within the study area as outlined in Table 3 and Figure 7 (DMIRS, 2023). The largest surface geological unit of the study area (25.6%) is the 'Czc' unit, described as Colluvium - gravel, sand, and silt as sheetwash or talus.

Table 3 Surface geology units within the study area (DMIRS, 2023)

Code	Description	Area (ha)	%
Czc	Colluvium - gravel, sand, and silt as sheetwash or talus	1293.5	25.6
Abm	Metamorphosed high - Mg basalt, Komatiitic basalt, includes variolitic basalt and basalt with relic (pyroxene) spinifex texture	850.6	16.8
Czl	Laterite and reworked products	703.7	13.9
Qa	Alluvium - clay, silt, sand, and gravel in channels	684.7	13.5
Czg	Quartzo-feldspathic sand over granitoid rock	410.6	8.1
Ag	Granitoid rock, undivided	305.2	6.0
Czs	Sandplain, yellow sand with limonitic pisoliths near base	288.5	5.7
Agp	Pegmatite	143.6	2.8
Ab	Mafic schist, metabasalt, metadolerite and amphobolite, doleritic layers and lenses	134.7	2.7
Aku	Metakomatite	80.6	1.6
Agb	Bullabulling Monzogranite: foliated, partly recrystallized monzogranite with scattered microcline phenocrysts	76.9	1.5
Agbl	Bali Monzogranite: porphyritic, with biotite	46.8	0.9
Ama	Amphibolite	26.7	0.5
Au	Ultramafic rocks, chist, includes tremolite(-chlorite) and talc-chlorite(-carbonate) schists	7.2	0.1

300000

310000

6570000

6560000

Legend

Study area

Surface geology unit

- Ab - Mafic schist, metabasalt, metadolerite and amphobolite
- Abm - Komatiitic basalt, includes variolitic basalt and basalt with relic (pyroxene) spinifex texture
- Ag - Granitoid rock, undivided
- Agb - Bullabulling Monzogranite: foliated, partly recrystallized monzogranite with scattered microcline phenocrysts
- Agbl - Bali Monzogranite: porphyritic, with biotite
- Agp - Pegmatite
- Aku - Metakomatiite
- Ama - Amphibolite
- Au - Ultramafic rocks, includes tremolite(chlorite) and talc-chlorite (carbonate) schists
- Czc - Colluvium - gravel, sand, and silt as sheetwash or talus
- Czg - Quartzo-feldspathic sand over granitoid rock
- Czl - Laterite and reworked products
- Czs - Sandplain, yellow sand with limonitic pisoliths near base
- Qa - Alluvium - clay, silt, sand, and gravel in channels

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MINE EARTH

Surface geology units of the study area (DMIRS, 2023)

Author: S. Parnaby	Figure 7
Reviewed by: S. Perry	Date:19.03.2026

Spatial Reference
Name: GDA 1994 MGA Zone 51
PCS: GDA 1994 MGA Zone 51
GCS: GCS GDA 1994
Datum: GDA 1994

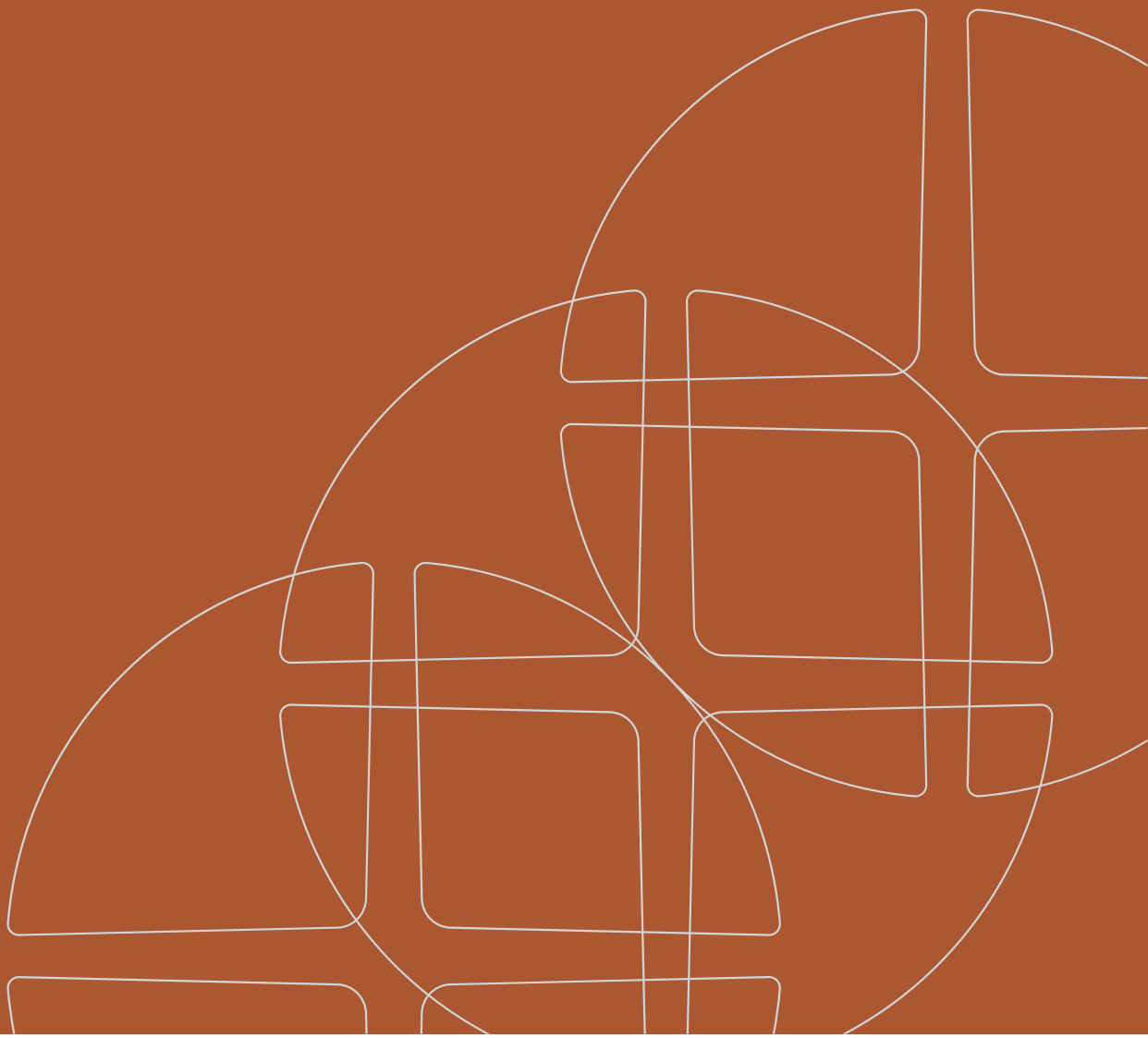
N

0 0.75 1.5 3

Kilometers

Scale: 1:50,000 at A3

Materials and Methods



3. Methods and Materials

3.1 Study area

The study area for the 2025 soil assessment comprised an area of approximately 5.055 ha (Figure 3). Sampling and test work was not undertaken within the infrastructure corridor to the south-east of the mine area.

3.2 Sampling regime

Soil samples were collected by Minerals 260 personnel from 18 sites within the study area in December 2025 (Figure 8). Details of sample locations, soils descriptions, and photographs of the soil profiles at each location are included in Appendix A. Sampling sites were focused within the proposed disturbance areas including the tailings storage facility (TSF) and waste rock dump (WRD). Soil pits were excavated at each sampling location to a maximum depth of 1m for the mechanical excavation sites, or to approximately 50cm at those sites excavated using hand tools.

3.3 Test work and procedures

Laboratory test work on the selected sampled soils was conducted at the Mine Earth laboratory for soil physical parameters and sent to the CSBP Laboratory for analysis of chemical parameters.

Laboratory based soil analyses included:

- Physical characteristics:
    - Soil texture and particle size distribution (Including coarse rock fraction >2 mm).
    - Emerson Aggregate test to indicate soil structural stability and potential for clay dispersion upon saturation.
    - Saturated hydraulic conductivity.
    - Soil strength (modified Modulus of Rupture).
- Chemical characteristics:
    - Soil pH and electrical conductivity.
    - Effective cation exchange capacity and exchangeable sodium percentage (ESP).
    - Total organic carbon (to indicate organic matter content).
    - Plant-available nutrients (N, P, K, S).
    - Total metal concentrations.

All physical soil test work was conducted in accordance with standard analytical procedures to assess potential soil erodibility and soil properties related to the support of plant growth (Rayment & Lyons, 2010). Descriptions of relevant soil classification categories are detailed in Appendix B. All CSBP laboratory results for the soils sampled are provided in Appendix C.

Legend

- Sample points (Mine Earth, 2026)
- Sample points (Integrate Sustainability, 2022)
- Study area

BB09A
BB11A
BBH12A
BUL-13
BUL-12
BB10A
BUL-14
BB13A
BBH16A
BUL-18
BUL-11
BBH20A
BB19A
BB21A
BUL-10
BUL-16
BUL-15
BBH22A
BUL-09
BUL-07
BUL-08
BBH25A
BUL-06
BUL-02
BBH27A
BB26A
BUL-01
BBH28A
BUL-17
BB30A
BBH31A
BUL-04
BUL-03
BUL-05
BBH33A

Vantor

MINE EARTH

Soil-landform associations of the study area

Author: S. Parnaby	Figure 8
Reviewed by: S. Perry	Date:19.03.2026

Spatial Reference
Name: GDA 1994 MGA Zone 51
PCS: GDA 1994 MGA Zone 51
GCS: GCS GDA 1994
Datum: GDA 1994

N

0 0.5 1 2

Kilometers

Scale: 1:35,000 at A3

Results and discussion

4. Results and discussion

The findings of the soil survey and laboratory test work program are presented and discussed in the following sections. Chemical data derived from the previous soil and landform assessment conducted for a portion of the study area (Integrate Sustainability, 2022) was incorporated with the data from this study to provide more data on soil characteristics. Data from topsoil samples taken up to 30 cm depth in the previous study (samples with the prefix BBH) were grouped and given an average depth of 15 cm. Data was grouped for the following parameters:

- Soil pH and electrical conductivity
- Soil organic matter
- Exchangeable cations and ESP%
- Soil nutrients
- Total metals

Samples that were taken below 30 cm in the previous study were not at consistent depth intervals, making direct integration into the results of this study problematic. As a result, these were omitted.

Chemical data from soil samples collected from the 'Disturbed' SLA is included in this assessment, as there are some disturbed areas with remaining topsoil resource e.g. between drill lines.

4.1 Notes on data interpretation

The results in this section are presented in tabulated form, scatter plot and, where applicable, in a ternary graph (soil texture triangle). The ternary figure in section 4.3.1 is a categorical diagram utilising the three particle size ranges of soils (< 2 mm fraction), classified as Sand, Silt and Clay where the composite percentage of each size range from a sample is represented as the intersection of the three particle size categories. This intersection defines the soil texture of the sampled material.

4.2 Soil profile morphology

Soils were grouped into six (6) soil-landform associations (SLAs) (Figure 9), based on landscape morphology, landforms and soil characteristics within the study area (using data from the previous study plus this study). Note that the transport corridor tenement was not mapped for SLAs, as no sampling or field observations were carried out there. The landscape and soil profile morphology of the SLAs from which samples were collected are outlined below:

Undulating plains

- Flat to undulating stony, broad and sandy loam plains.
- Ironstone gravel or calcrete mantle, characterised by sparsely vegetated sandy soils, with variable coarse rock fragments.
- Deeper soil profiles than other SLAs with fewer coarse fragments (> 2mm), with some areas of hardpan at approximately 90 to 100 cm.
- 'Red-brown hardpan shallow loam' (1605) and 'Red loamy earth' (1673) WA Soil Groups.

Clayey plains

- Flat to undulating clay-rich plains.
- High percentage of coarse rock fragments (>2 mm) present at the surface, often ironstone.
- Partially weathered rock and indurated clays at depth in some places.
- Variable coarse fragments (>2 mm) throughout the soil profile.
- 'Red-brown hardpan shallow loam' (1605) and 'Red loamy earth (1673)' WA Soil Groups.

Low rises and hills

- Minor sloped uplands and rises, with some discrete hills.
- Higher percentage of coarse rock fragments (>2 mm) present at the surface.
- Many coarse fragments (>2 mm) throughout the soil profile.
- Hardpan in some places at approximately 20 to 40 cm.
- 'Red-brown hardpan shallow loam' (1605) and 'Red loamy earth' (1673) WA Soil Groups.

Drainage lines

- Typically, broad drainage channels which are slightly incised in places.
- Seasonal flow into shallow lake systems.
- Consists of alluvial sediments in weakly incised channels, clay loams on surrounding plains and dense halophytic vegetation.

Low slopes

- Low sandy footslopes and rises of low-relief plateaux.
- Typically, shallow surface soil profile with a low coarse fragment percentage.
- Partially weathered rock in places at approximately 25 cm.
- 'Pale shallow sand' (1405) and 'Yellow sandy earth' (1467) WA Soil Groups.

Disturbed

- These areas have been previously disturbed by mining activity and were sampled in the previous assessment (Integrate Sustainability, 2022). Some of the areas contain a topsoil resource that has had limited disturbance e.g. adjacent to drill lines, but may still be a useful soil resource.

Legend

- Sample points (Mine Earth, 2026)
- Sample points (Integrate Sustainability, 2022)
- Study area

SLA

- Clayey plains
- Disturbed
- Drainage lines
- Low rises and hills
- Low slopes
- Undulating plains

BB09A
BB11A
BBH12A
BB10A
BB13A
BBH16A
BUL-13
BUL-12
BUL-14
BUL-18
BUL-11
BBH20A
BB19A
BB21A
BUL-16
BUL-10
BUL-15
BUL-09
BBH22A
BUL-07
BUL-08
BBH25A
BUL-06
BUL-02
BBH27A
BUL-01
BB26A
BBH28A
BUL-17
BB30A
BBH31A
BUL-04
BUL-03
BUL-05
BBH33A

Earthstar Geographics

MINE EARTH

Soil-landform associations of the study area

Author: S. Parnaby	Figure 9
Reviewed by: S. Perry	Date:19.03.2026

Spatial Reference
Name: GDA 1994 MGA Zone 51
PCS: GDA 1994 MGA Zone 51
GCS: GCS GDA 1994
Datum: GDA 1994

N

0 0.5 1 2

Kilometers

Scale: 1:35,000 at A3

4.3 Soil physical characteristics

The physical characteristics of the surface soils within the study area, as defined by the field sampling and laboratory analysis program are discussed in the following sections.

4.3.1 Soil texture

Soil texture describes the proportions of sand, silt and clay (the particle size distribution) within the <2 mm fraction of a soil. The particle size distribution and resulting textural class of a soil is an important factor influencing most physical, and many chemical and biological, properties. Soil structure, water holding capacity, hydraulic conductivity, soil strength, fertility, erodibility, and susceptibility to compaction are some of the factors closely linked to the texture of a soil material.

There were a range of soil textures recorded throughout the study area, with the majority of soils having a clay or clay loam texture, with individual soil textures ranging from 'loamy sand' (approximately 0-12% clay) to 'clay' (approximately 32% clay or higher) (Figure 10). Clay content in the 'Clayey plains' and 'Low rises and hills' SLAs was typically higher than the clay content in the 'Undulating plains' and 'Low slopes SLAs'. Average clay content was variable with depth between SLAs (Figure 11).

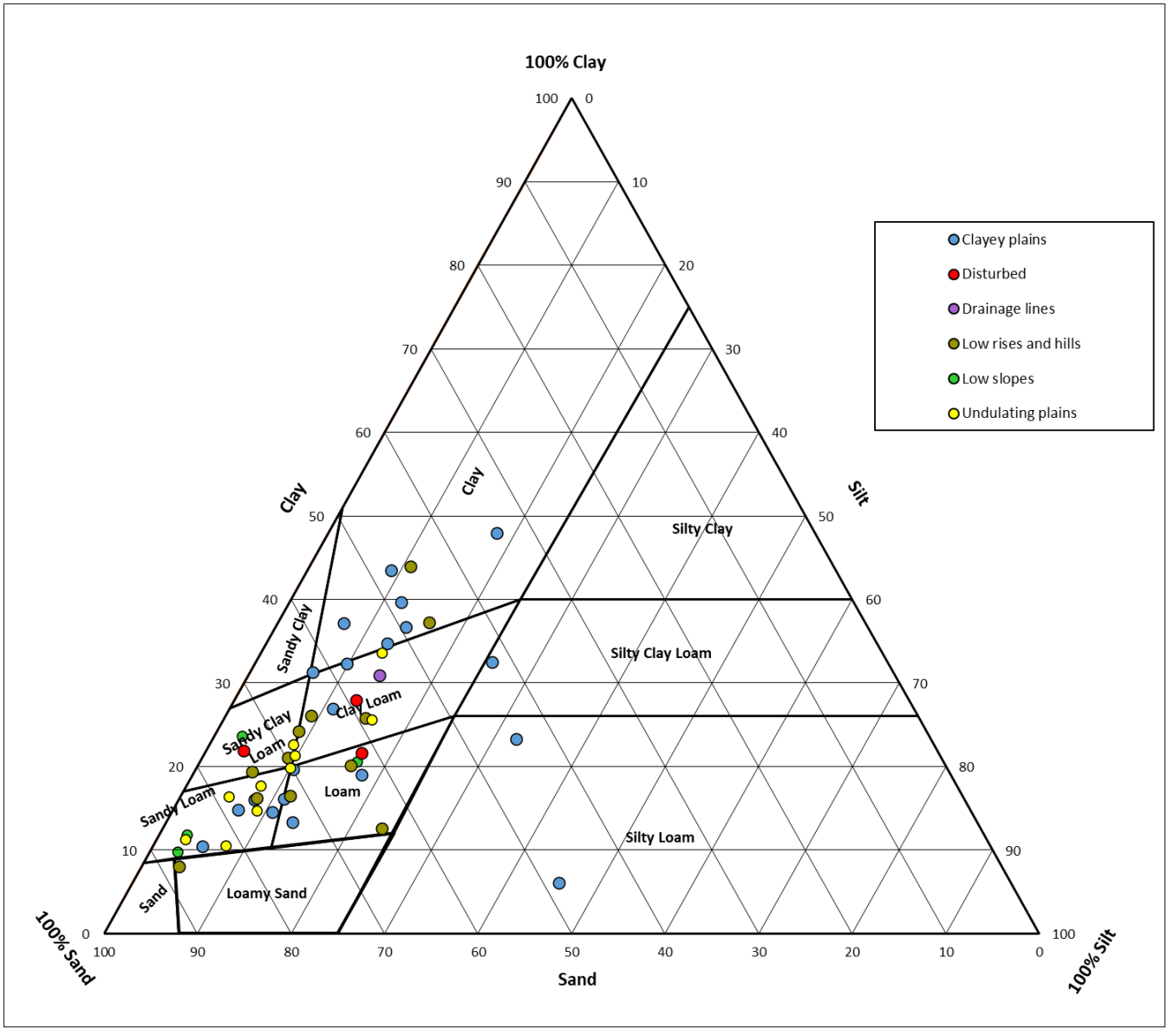


Figure 10: Soil texture triangle

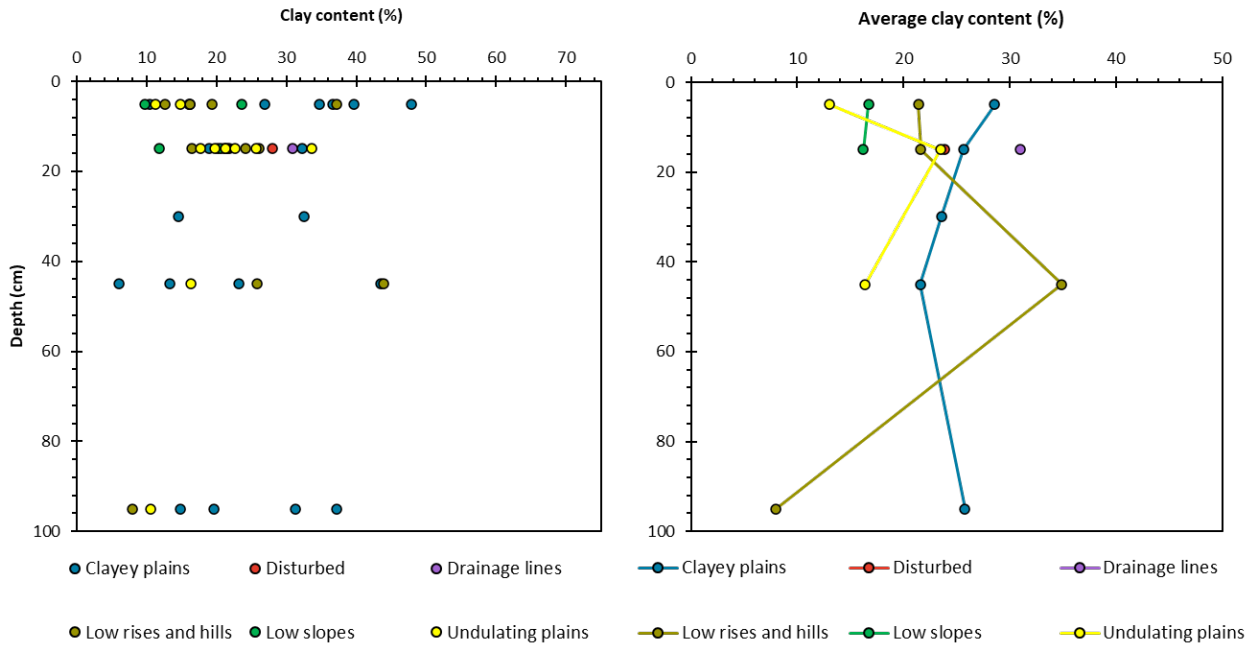


Figure 11: Individual and average clay contents for each SLA with depth

4.3.2 Soil structure

Soil structure describes the arrangement of solid particles and void space in a soil. It is an important factor influencing the ability of soil to support plant growth, store and transmit water and resist erosional processes. A well-structured soil is one with a range of different sized aggregates; with component particles bound together to give a range of pore sizes facilitating root growth and the transfer of air and water.

Soil structure can be influenced by the particle size distribution, chemical composition, and organic matter content of a soil. Soil structure is often influenced by root growth, vehicle compaction and, with respect to reconstructed soil profiles, the methods of soil handling and deposition. When a soil material is disturbed, the breakdown of aggregates into primary particles can lead to structural decline (Moore, 1998). This can result in hard-setting and crusting at the soil surface and a 'massive' soil structure at depth, potentially reducing the ability of seeds to germinate, roots to penetrate the soil matrix and water to infiltrate to the root zone.

Surface soils within the study area were variable, but generally can be characterised as having a weak structure (0-20 cm), with subsoils (>20 cm) typically having a massive to strong structure (Appendix A).

4.3.3 Structural stability

The structural stability of a soil and its susceptibility to structural decline is complex and depends on the net effect of several properties, including the amount and type of clay present, organic matter content, soil chemistry and the nature of disturbance. Soil aggregates that slake and, particularly those that disperse, indicate a weak soil structure that is easily degraded. These soils should be seen as potentially problematic when used as a rehabilitation medium, particularly if left exposed at the surface.

The Emerson Aggregate Test identifies the potential slaking and dispersive properties of soil aggregates. The dispersion test identifies the properties of the soil materials under a worst-case scenario, where severe stress is applied to the soil material. Generally, samples allocated into Emerson Classes 1 and 2 are those most likely to exhibit dispersion of the clay sized fraction and therefore can be the most problematic.

Most surface soils from the study area were identified as Emerson Class 3a or 3b (Table 4), indicating that the soils are not prone to dispersion in their natural state but may become more dispersive following repeated severe disturbance (e.g., earth works). Twelve samples were identified as Emerson Class 5, indicating a low tendency to disperse, only when saturated and subject to severe disturbance. In addition, five samples were classified as Emerson Class 6, indicating structurally stable soil aggregates. In general, care should be taken to minimise the handling of all soil materials where possible, particularly when wet.

Table 4 Soil texture, clay content and Emerson Test Class

Sample ID	SLA	Depth interval (cm)	Soil texture (<2mm soil fraction)	Clay content (%)	Emerson Class
BUL-01	Low rises and hills	0-10	Sandy Loam	16.3	Class 3b
		10-20	Clay Loam	26.1	Class 5
BUL-06	Low rises and hills	0-10	Sandy Clay Loam	19.4	Class 3a
		10-20	-	-	Class 3a
		40-50	-	-	Class 3a
		85-90	Loamy Sand	8.0	Class 3a
BUL-15	Low rises and hills	0-10	Clay	37.2	Class 6
		10-20	-	-	Class 3a
		20-40	-	-	Class 3a
		40-45	Clay	44.0	Class 3b
BUL-13	Low rises and hills	0-15	Loam	12.6	Class 5
		15-30	-	-	Class 6
		30-50	Clay Loam	25.8	Class 6
BUL-02	Undulating plains	0-10	Sandy Loam	11.3	Class 3b
		10-20	-	-	Class 3b
		40-50	-	-	Class 3a
		90-100	Sandy Loam	10.6	Class 3a
BUL-07	Undulating plains	0-10	Sandy Loam	14.8	Class 3a
		10-20	-	-	Class 3b
		40-50	-	-	Class 5
		90-100	-	-	Class 6
BUL-10	Undulating plains	0-10	-	-	Class 3a
		10-20	-	-	Class 3a
		20-35	-	-	Class 3a
		35-43	Sandy Loam	16.4	Class 3a
BUL-12	Low slopes	0-10	Sandy Clay Loam	23.6	Class 5
		10-25	-	-	Class 5

Sample ID	SLA	Depth interval (cm)	Soil texture (<2mm soil fraction)	Clay content (%)	Emerson Class
BUL-14	Low slopes	0-10	Sandy Loam	9.8	Class 3b
		10-25	Sandy Loam	11.8	Class 3b
		25-40		-	Class 3b
BUL-16	Clayey plains	0-10	Clay	47.9	Class 3b
		10-25	-	-	Class 3a
		25-45	Silty Clay Loam	32.5	Class 5
BUL-17	Clayey plains	0-10	Sandy Loam	16.0	Class 3a
		10-20	-	-	Class 3a
		40-50	-	-	Class 3a
		90-100	Loam	19.7	Class 3a
BUL-18	Clayey plains	0-10	Clay Loam	26.9	Class 3b
		10-20	-	-	Class 3b
		20-35	-	-	Class 3b
BUL-11	Clayey plains	0-10	Clay	39.7	Class 5
		10-20	-	-	Class 3b
		20-35	Sandy Loam	14.6	Class 3b
BUL-09	Clayey plains	0-10	Clay	36.7	Class 3b
		10-15	-	-	Class 3a
		15-30	-	-	Class 5
		30-45	Clay	43.5	Class 5
BUL-08	Clayey plains	0-10	Sandy Loam	10.5	Class 3a
		10-20	-	-	Class 3a
		40-50	Loam	13.4	Class 3a
		90-100	Clay	37.2	Class 5
BUL-03	Clayey plains	0-10	Clay	10.6	Class 3a
		10-20	-	-	Class 5
		40-50	Silty Loam	6.1	Class 3b
		90-100	-	-	Class 3b
BUL-04	Clayey plains	0-10	Loam	16.2	Class 3a
		10-20	-	-	Class 3b
		40-50	-	-	Class 3b
		80-90	Sandy Loam	14.8	Class 3b
BUL-05	Clayey plains	0-10	-	-	Class 3b

Sample ID	SLA	Depth interval (cm)	Soil texture (<2mm soil fraction)	Clay content (%)	Emerson Class
		10-20	-	-	Class 3b
		40-50	Silty Loam	23.3	Class 5
		90-100	Clay	31.3	Class 6

[1] Class 3a - aggregate slakes but does not disperse, complete dispersion of remoulded soil
Class 3b - aggregate slakes but does not disperse, partial dispersion of remoulded soil
Class 5 - aggregate slakes but does not disperse, no dispersion of remoulded soil, soil:water suspension remains dispersed
Class 6 - aggregate slakes but does not disperse, no dispersion of remoulded soil, soil:water suspension flocculates

4.3.4 Hydraulic conductivity

Hydraulic conductivity (K_{sat}) refers to the saturated permeability of soil, or the ability of water to infiltrate and drain through the soil matrix and is dependent on soil properties such as texture and structure (Moore, 1998). Freely draining soils with high K_{sat} values will generally be less susceptible to surface runoff and erosion. Slow draining soils with low K_{sat} values, are more likely to experience waterlogging, increased surface runoff and erosion.

The hydraulic conductivity of the samples tested ranged from 1.7 to 1325.0 mm/hr with an average of 145.1 mm/hr (Table 5). Drainage classes were determined according to their K_{sat} (Hunt, N and Gilkes, R, 1992). The most common classifications were 'Moderate' and 'Moderately rapid' drainage classes, with most of the remaining samples generally ranging between 'Moderately slow' and 'Rapid'. On average however, there was little consistent difference in the K_{sat} of the soils from the various SLAs (Figure 12).

Table 5 Saturated hydraulic conductivity (K_{sat})

Sample ID[1]	SLA	Depth interval (cm)	Clay content (%)	KSAT (mm/hr)	Drainage Class[2]
BUL-01	Low rises and hills	0-10	16.3	9.1	Moderately slow
		10-20	26.1	5.4	Moderately slow
BUL-06	Low rises and hills	0-10	19.4	15.0	Moderately slow
		10-20	-	-	-
		40-50	-	-	-
		85-90	8.0	1325.0	Very rapid
BUL-15	Low rises and hills	0-10	37.2	377.2	Very rapid
		10-20	-	-	-
		20-40	-	34.0	Moderate
		40-45	44.0	-	-
BUL-13	Low rises and hills	0-15	12.6	76.7	Moderately rapid
		15-30	-	-	-
		30-50	25.8	99.1	Moderately rapid
BUL-03	Clayey plains	0-10	34.8	244.8	Rapid

Sample ID[1]	SLA	Depth interval (cm)	Clay content (%)	KSAT (mm/hr)	Drainage Class[2]
		10-20	-	31.2	Moderate
		40-50	6.1	54.3	Moderate
		90-100	-		
BUL-04	Clayey plains	0-10	16.2	207.9	Rapid
		10-20	-	2.5	Slow
		40-50	-	-	-
		80-90	14.8	43.0	Moderate
BUL-05	Clayey plains	0-10	-	5.6	Moderately slow
		10-20	-	5.6	Moderately slow
		40-50	23.3	-	-
		90-100	31.3	74.4	Moderately rapid
BUL-08	Clayey plains	0-10	10.5	23.3	Moderate
		10-20	-	-	-
		40-50	13.4	1088.0	Very rapid
		90-100	37.2	4.3	Slow
BUL-09	Clayey plains	0-10	36.7	51.4	Moderate
		10-15	-	-	-
		15-30	-	151.8	Rapid
		30-45	43.5	151.8	Rapid
BUL-17	Clayey plains	0-10	16.0	38.7	Moderate
		10-20	-	225.3	Rapid
		40-50	-	-	-
		90-100	19.7	67.4	Moderately rapid
BUL-11	Clayey plains	0-10	39.7	147.4	Rapid
		10-20	-	234.2	Rapid
		20-35	14.6	-	-
BUL-16	Clayey plains	0-10	47.9	15.8	Moderately slow
		10-25	-	26.2	Moderate
		25-45	32.5	26.2	Moderate
BUL-18	Clayey plains	0-10	26.9	64.8	Moderately rapid
		10-20	-	-	-
		20-35	-	122.0	Moderately rapid
BUL-12	Low slopes	0-10	23.6	6.4	Moderately slow

Sample ID[1]	SLA	Depth interval (cm)	Clay content (%)	KSAT (mm/hr)	Drainage Class[2]
		10-25	-	91.3	Moderately rapid
BUL-14	Low slopes	0-10	9.8	99.9	Moderately rapid
		10-25	11.8	191.3	Rapid
		25-40	-	361.7	Very rapid
BUL-02	Undulating plains	0-10	11.3	114.2	Moderately rapid
		10-20	-	170.6	Rapid
		40-50	-	457.4	Very rapid
		90-100	10.6	405.5	Very rapid
BUL-07	Undulating plains	0-10	14.8	5.9	Moderately slow
		10-20	-	1.7	Slow
		40-50	-	-	-
		90-100	-	-	-
BUL-10	Undulating plains	0-10	-	91.5	Moderately rapid
		10-20	-	-	-
		20-35	-	-	-
		35-43	16.4	49.4	Moderate

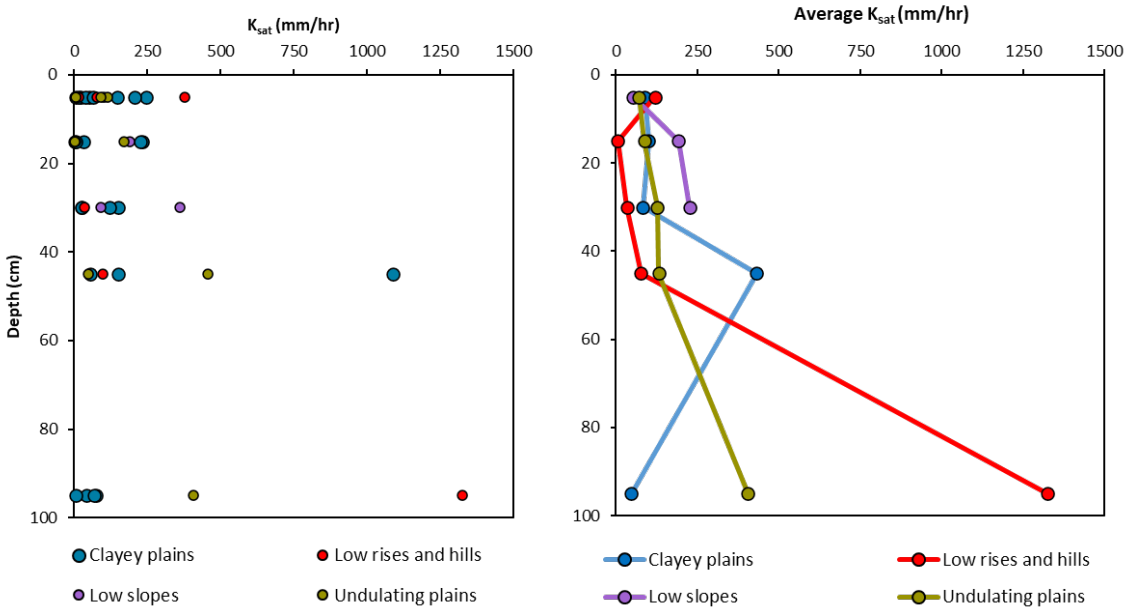


Figure 12: Individual and average hydraulic conductivity values for each SLA with depth

4.3.5 Soil strength

A modified Modulus of Rupture (MOR) test is a measure of soil strength and identifies the tendency of a soil to hard-set as a direct result of soil slaking and dispersion. An MOR of over 60 kPa has been described as the critical value for distinguishing potentially problematic soils in agricultural scenarios (Cochrane & Alymore, 1997; Cochrane & Alymore, 1997) (Cochrane & Alymore, 1997). Restricted root penetration into the soil matrix is a likely consequence of a high modulus of rupture. In reconstructed soil profiles, materials normally deep within the profile that may have a high MOR can often be re-deposited closer to the surface, leading to germination / emergence and root penetration problems.

As this test is conducted on reconstructed soil blocks composed of the < 2 mm soil fraction, it does not take into account the effect of soil structure on soil strength, nor any degree of compaction that may be present in the field. It does, however, provide insight into the potential for soils to hard-set and compact with repeated wetting and drying cycles, and the ability of roots to fracture the soil and penetrate crack faces.

All samples except two recorded MOR values below the 60 kPa threshold, indicating they are unlikely to hard-set with repeated wetting / drying cycles (Table 6). Two samples from sample site BUL-05 ('Clayey plains' SLA) recorded MOR values above the 60 kPa threshold, indicating a propensity to hard set. There was no apparent correlation between MOR values, SLA or sample depth.

Table 6 Modulus of Rupture (soil strength). MOR values above the 60 kPa threshold are indicated in red.

Sample ID	SLA	Depth interval (cm)	Modulus of Rupture (kPa)[1]
BUL-01	Low rises and hills	0-10	1.8
		10-20	15.5
BUL-06	Low rises and hills	0-10	0.9
		10-20	-
		40-50	0.0
		85-90	0.0
BUL-13	Low rises and hills	0-15	0.0
		15-30	-
		30-50	0.0
BUL-15	Low rises and hills	0-10	6.2
		10-20	0.8
		20-40	-
		40-45	4.9
BUL-02	Undulating plains	0-10	0.0
		10-20	0.6
		40-50	0.7
		90-100	0.2
BUL-07	Undulating plains	0-10	3.7
		10-20	0.0
		40-50	-
		90-100	1.9
		0-10	0.0

Sample ID	SLA	Depth interval (cm)	Modulus of Rupture (kPa)[1]
BUL-10	Undulating plains	10-20	-
		20-35	8.8
		35-43	-
BUL-12	Low slopes	0-10	2.6
		10-25	0.7
BUL-14	Low slopes	0-10	0.3
		10-25	-
		25-40	0.5
BUL-08	Clayey plains	0-10	0.0
		10-20	-
		40-50	0.7
		90-100	26.2
BUL-09	Clayey plains	0-10	0.0
		10-15	-
		15-30	-
		30-45	0.7
BUL-11	Clayey plains	0-10	0.3
		10-20	-
		20-35	0.0
BUL-03	Clayey plains	0-10	0.0
		10-20	-
		40-50	0.5
		90-100	4.0
BUL-04	Clayey plains	0-10	11.6
		10-20	-
		40-50	9.5
		80-90	3.8
BUL-05	Clayey plains	0-10	2.8
		10-20	-
		40-50	70.5
		90-100	66.6
BUL-16	Clayey plains	0-10	38.8
		10-25	-
		25-45	29.7
BUL-17	Clayey plains	0-10	1.0
		10-20	3.1
		40-50	-

Sample ID	SLA	Depth interval (cm)	Modulus of Rupture (kPa)[1]
		90-100	0.2
BUL-18	Clayey plains	0-10	0.6
		10-20	-
		20-35	0.4
Range	-	0.0 – 70.5	
Average	-	5.1	

[1]Values above the threshold of 60kPa are identified as potentially hard-setting (Cochrane & Alymore, 1997)

4.4 Soil chemical characteristics

4.4.1 Soil pH and Electrical Conductivity

Soil pH (H_2O) measures the acidity or alkalinity of the soil in relation to suitability for plant growth. Ratings for soil pH are based on the Land Evaluation Standards for Land Resource Mapping categories (van Gool, 2005).

Soil pH (H_2O) was variable across the study area and SLAs, with individual soil pH (H_2O) values ranging from pH 4.0 (classified as 'very strongly acidic') to pH 9.3 ('very strongly alkaline'), with an overall average pH of 7.4 (classified as 'neutral'). There was some variability found in soil pH between SLAs, with the 'Low slopes SLA generally found to have more acidic soil which increases with depth, and the other SLAs having variable pH values from approximately 6.0 to 8.5. The 'Undulating plains' SLA showed increase in alkalinity with depth on average, however there was little consistent change noted in soil pH with sample depth overall (Figure 13).

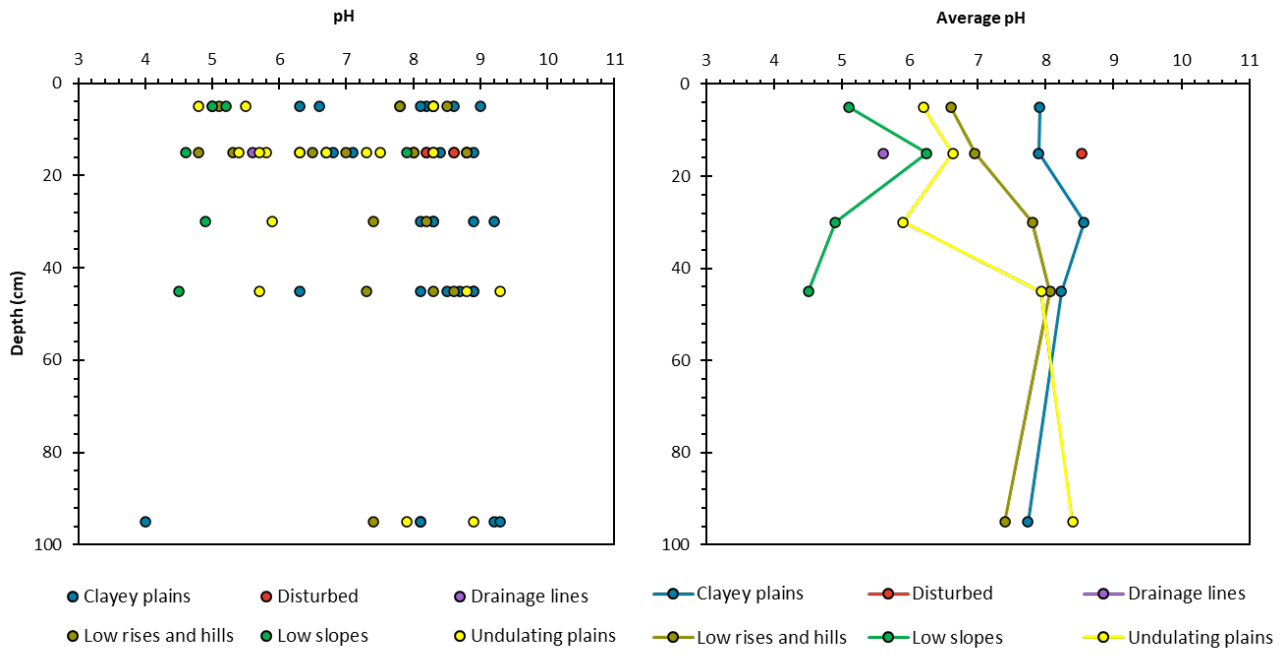


Figure 13: Individual and average soil pH values for each SLA with depth

Electrical conductivity (EC) is a measurement of the soluble salts in soils or water. Soil salinity results from natural processes of landscape evolution, hydrological processes, and rainfall (Hunt, N and Gilkes, R, 1992).

The individual soil EC values from the study area ranged from 0.014 dS/m to 5.9 dS/m, with an average of 1.1 dS/m. Thirty-five out of seventy-nine samples tested were classified as 'non-saline', ten as 'slightly saline', ten as 'moderately saline', seven as 'very saline' and seventeen as 'extremely-saline' (based on the standard USDA and CSIRO electrical conductivity categories - Appendix B).

On average, the soils from the 'Low rises and hills' and 'Clayey plains' SLAs recorded considerably higher salinity than those from all other SLAs. EC measured through the soil profile was variable with depth, except for the Clayey plains SLA which indicated an increase in salinity with increasing depth (Figure 14).

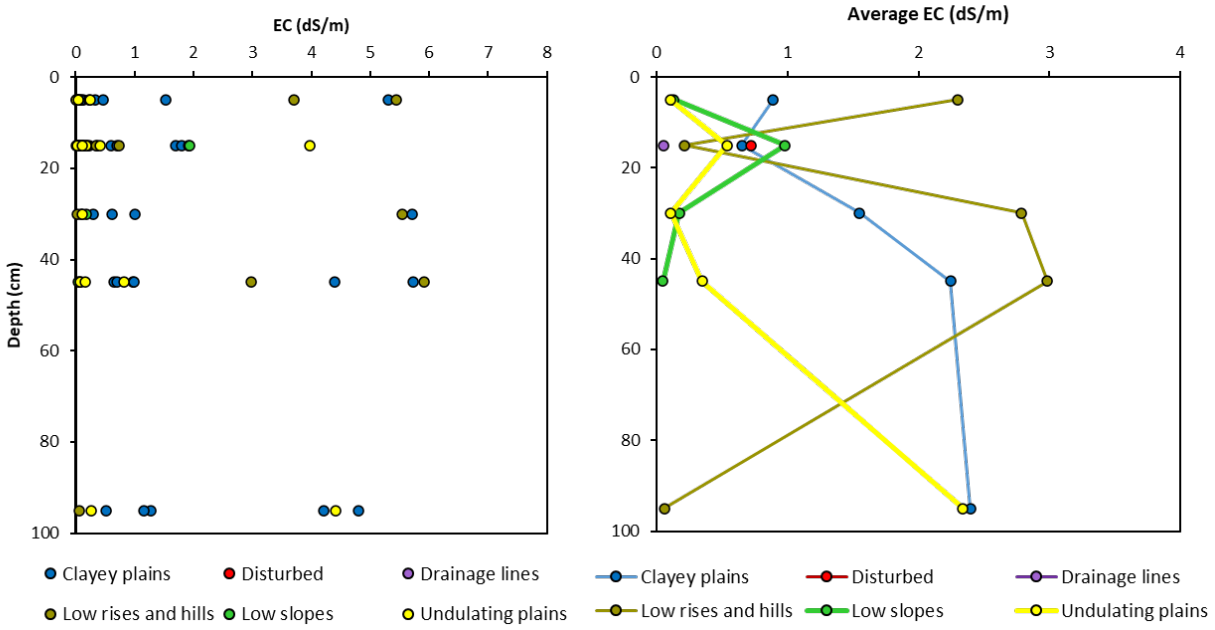


Figure 14: Individual and average EC (dS/m) values for each SLA with depth

4.4.2 Soil Organic Matter

The organic matter content of soil is an important factor influencing many physical, chemical, and biological soil characteristics. Directly derived from plants and animals, its functions in soil include supporting the micro and macro fauna and flora populations, increasing the water retention capacity, buffering pH and improving soil structure.

The organic matter content of the soils within the study area was determined as a measure of the soil organic carbon percentage (SOC%). The SOC% was consistently low across the study area and all SLAs. SOC% of all soils sampled was classified as 'low', 'very low', or 'extremely low' as is typical of most highly weathered soils in the region, ranging from below detection limit (<0.05%) to 1.23% with an average of 0.5%. As would be expected, the SOC% value of the soils generally decreased with depth (Figure 15).

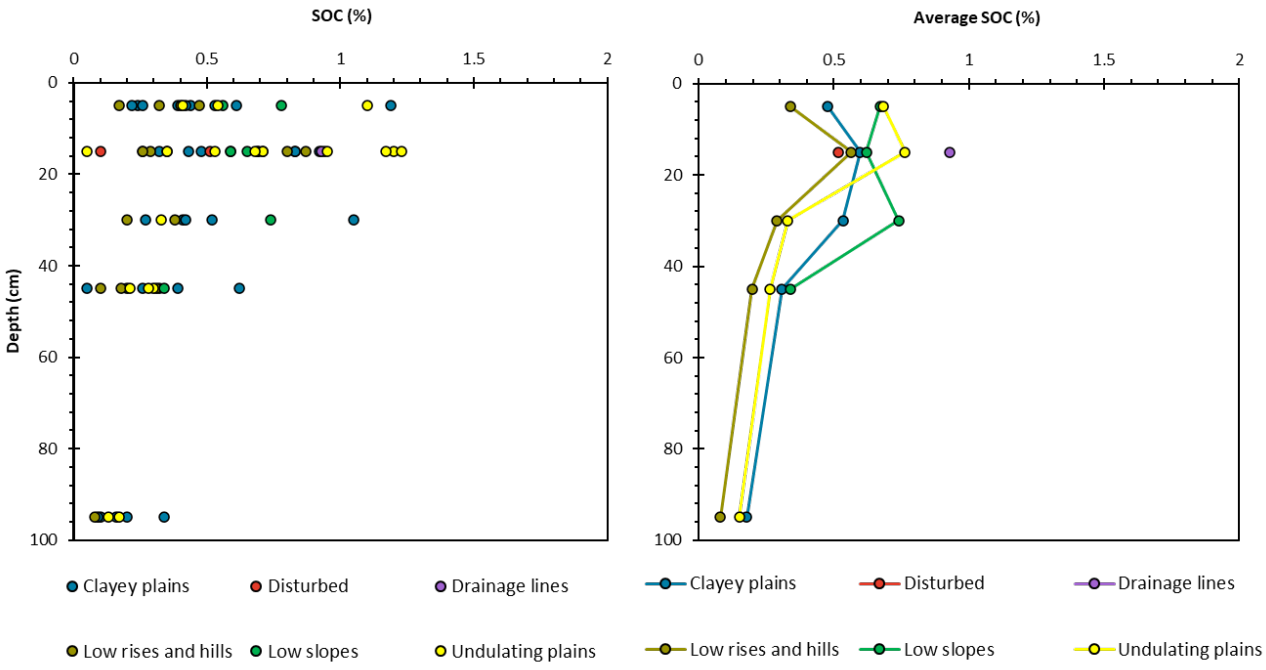


Figure 15: Individual and average SOC (%) values for each SLA with depth

4.4.3 Exchangeable Cations and Exchangeable Sodium Percentage

Exchangeable cations, held on clay surfaces and within organic matter, are an important source of soil fertility and can influence the physical properties of soil. Generally, if cations such as Ca^{2+}, Mg^{2+} and K^{+} are dominant on the clay exchange surfaces, the soil will typically display increased physical structure and stability, leading to increased aeration, drainage and root growth (Moore, 1998). If Na cations (Na^{+}) are dominant on exchange surfaces and the exchangeable sodium percentage (ESP) exceeds more than 6% of the total exchangeable cations, then the soil is considered to be 'sodic', which can lead to poor physical properties (i.e. dispersion, hard setting and erosion in clay-rich soils). ESP values over 15% are classified as 'highly sodic'.

Exchangeable cation concentration, effective cation exchange capacity (eCEC) and ESP results were variable across the study area. Twenty-five out of the forty-seven samples tested were identified as 'non-sodic', fourteen as 'sodic' and eight as 'highly sodic'. Samples from the 'Low rises and hills'. 'Low slopes' and 'Clayey plains' SLAs had on average ESP values sitting within the 'sodic' and 'highly sodic' classifications (Hazelton & Murphy, 2007) (Table 7), indicating these soils may be more prone to dispersion. This was not reflected however, in the Emerson Test results for these samples, which recorded a similar propensity for dispersion to the other non-sodic samples tested (Section 4.3.3). It should be noted however, that the high salinity of the 'Low rises and hills' and 'Clayey plains' SLAs soils may be reducing the potential dispersion of these sodic soils. If the salt is leached from these soils the propensity for dispersion may increase.

Table 7 Exchangeable cations and ESP of selected samples. Shading of ESP values denotes non-sodic, sodic and highly sodic classifications

Sample ID[1]	Depth (cm)	Exchangeable cations (meq/100g)				eCEC (meq/100g)	ESP (%)
		Ca	K	Mg	Na		
Low rises and hills							
BUL-01	0-10	1.2	0.2	0.9	< 0.1	2.3	2.2
	10-20	1.3	0.2	0.95	< 0.1	2.4	2.1

Sample ID[1]	Depth (cm)	Exchangeable cations (meq/100g)				eCEC (meq/100g)	ESP (%)
		Ca	K	Mg	Na		
BUL-06	0-10	2.3	0.1	1.0	< 0.1	3.5	1.4
	10-20	3.7	0.1	3.2	0.12	7.1	1.7
	40-50	12.9	0.1	12.59	1.13	26.7	4.2
	85-90	12.5	0.1	11.84	1.27	25.7	4.9
BUL-13	0-15	7.2	1.1	5.6	3.2	17.1	18.9
	15-30	12.2	0.8	5.83	1.19	20.0	6.0
	30-50	12.5	0.7	5.04	1.04	19.3	5.4
BUL-15	0-10	12.5	0.6	8.83	1.93	23.9	8.1
	10-20	5.1	0.5	8.0	2.5	16.2	15.6
	20-40	2.8	0.3	2.4	< 0.1	5.6	2.0
	40-45	11.3	0.7	8.97	2.28	23.2	9.8
BB30A	0-30	19.2	0.2	4.2	0.3	23.8	1.1
BBH25A	0-30	7.9	0.3	1.2	< 0.1	9.5	1.1
BBH27A	0-30	10.5	0.6	2.3	0.3	13.7	2.2
BBH33A	0-30	11.6	0.4	4.41	2.07	18.4	11.3
Undulating plains							
BUL-02	0-10	2.7	0.2	0.8	< 0.1	3.7	1.4
	10-20	4.5	0.1	1.4	< 0.1	6.1	0.8
	40-50	13.4	0.1	3.9	0.55	17.9	3.1
	90-100	13.0	0.1	4.9	0.65	18.7	3.5
BUL-07	0-10	4.2	0.4	3.3	0.7	8.5	8.1
	10-20	16.8	0.4	7.6	2.6	27.3	9.4
	40-50	10.7	0.4	7.65	3.53	22.3	15.8
	90-100	12.7	0.4	8.54	4.17	25.8	16.2
BUL-10	0-10	2.0	0.2	0.63	< 0.10	2.9	1.7
	10-20	3.9	0.1	1.6	0.2	5.8	3.3
	20-35	2.7	0.1	1.5	0.2	4.5	4.9
	35-43	2.8	0.1	1.4	0.2	4.5	5.3
BB10A	0-30	14.7	0.5	3.4	0.6	19.2	3.2
BB11A	0-30	8.9	0.5	2.6	< 0.1	12.2	1.0
BBH28A	0-30	5.1	0.5	2.3	< 0.1	8.0	0.9
BBH31A	0-30	1.5	0.1	1.6	0.8	3.9	19.1
BB19A	0-30	10.9	0.3	2.73	0.56	14.5	3.9

Sample ID[1]	Depth (cm)	Exchangeable cations (meq/100g)				eCEC (meq/100g)	ESP (%)
		Ca	K	Mg	Na		
BBH12A	0-30	7.3	0.6	3.11	0.22	11.2	2.0
Clayey plains							
BUL-03	0-10	10.9	0.7	6.4	1.8	19.9	9.1
	10-20	19.3	0.7	8.48	3.47	31.9	10.9
	40-50	18.9	0.5	6.74	2.04	28.2	7.2
	90-100	17.1	0.6	10.1	3.6	31.4	11.3
BUL-04	0-10	11.0	0.4	1.61	< 0.10	13.1	0.4
	10-20	17.2	0.3	2.2	< 0.1	19.8	0.6
	40-50	12.9	0.2	5.81	0.77	19.7	3.9
	80-90	8.8	0.3	6.4	2.1	17.6	12.2
BUL-05	0-10	14.0	0.4	4.9	1.5	20.8	7.1
	10-20	17.5	0.2	5.4	4.8	27.9	17.1
	40-50	16.8	0.2	2.6	1.9	21.5	8.7
	90-100	7.0	0.2	1.12	0.8	9.0	8.8
BUL-08	0-10	1.3	0.2	1.36	< 0.10	3.0	1.7
	10-20	3.2	0.2	4.1	2.0	9.5	21.3
	40-50	4.3	0.2	7.81	5.18	17.5	29.6
	90-100	8.3	0.2	7.4	3.5	19.3	18.3
BUL-09	0-10	23.8	0.5	4.8	0.2	29.3	0.6
	15-30	22.0	0.3	5.54	4	31.9	12.6
	30-45	19.7	0.2	5.09	4	29.1	13.8
BUL-11	0-10	9.9	0.3	12.3	2.8	25.3	11.2
	10-20	15.4	0.5	9.3	1.1	26.3	4.3
	20-35	9.4	0.6	6.31	0.13	16.4	0.8
BUL-16	0-10	19.3	0.2	5.2	4.3	29.0	14.9
	10-25	15.9	0.3	4.5	2.2	23.0	9.5
	25-45	19.9	0.1	4.6	3.8	28.5	13.4
BUL-17	0-10	4.2	0.3	3.67	0.33	8.5	3.9
	10-20	7.7	0.2	6.9	1.4	16.3	8.8
	40-50	9.4	0.2	10.09	3.15	22.9	13.8
	90-100	9.5	0.2	9.4	2.4	21.4	11.1
BUL-18	0-10	5.3	0.2	2.4	< 0.1	8.1	1.4
	10-20	12.5	0.2	4.9	0.4	18.0	2.0

Sample ID[1]	Depth (cm)	Exchangeable cations (meq/100g)				eCEC (meq/100g)	ESP (%)
		Ca	K	Mg	Na		
	20-35	18.3	0.2	5.9	0.6	25.0	2.6
BB21A	0-30	18.3	0.4	3.2	0.4	22.3	1.6
BBH20A	0-30	9.1	0.2	1.8	3.2	14.3	22.2
Low slopes							
BUL-12	0-10	0.4	0.1	0.76	0.29	1.5	18.8
	10-25	0.4	0.1	0.9	0.4	1.8	19.2
BUL-14	0-10	0.6	0.1	0.11	< 0.10	0.8	6.0
	10-25	0.5	0.1	0.1	< 0.1	0.8	6.7
	25-40	0.9	0.1	0.2	< 0.1	1.3	3.9
BBH16A	0-30	16.1	0.6	5.6	7.45	29.7	25.1
Disturbed							
BB13A	0-30	17.8	1.0	5.7	< 0.1	24.6	0.6
BB26A	0-30	17.9	0.5	5.6	0.4	24.4	1.7
BB09A	0-30	4.6	0.9	5.2	10.2	20.9	48.9
Drainage lines							
BBH22A	0-30	6.8	0.4	2.0	0.2	9.4	1.9

[1] Sample IDs beginning with 'BBH' are from the previous study (Integrate Sustainability, 2022)

4.4.4 Soil Nutrients

The most important macro-nutrients for plant growth are nitrogen (N), Phosphorus (P), potassium (K) and sulphur (S). These nutrients are largely derived from the soil mineral component and organic matter. Native plant species have a number of physiological adaptations that enable them to be productive in areas where the supply of macronutrients is limited.

4.4.4.1 Nitrogen

Most (>98%) N in soils is organic (Moore, 1998). Plant-available forms of inorganic N (nitrate, nitrite, and ammonium) are produced via mineralisation of soil organic matter.

The plant-available N concentrations of the soils from the study area were consistent and low for ammonium, ranging from below detection (<1 mg/kg) to 6 mg/kg (Figure 16) with an average of 1.5 mg/kg. Nitrate ranged from below detection (<1 mg/kg) to 402 mg/kg nitrate (classified as a 'high' concentration (Hazelton & Murphy, 2007)), and averaging 28.2 mg/kg (Figure 17). Generally, there were overall low concentrations of plant-available N measured within the study area, which is considered typical of native soils in the region. Ammonium and nitrate concentrations were relatively consistent with depth across the SLAs (Figure 16) (Figure 17).

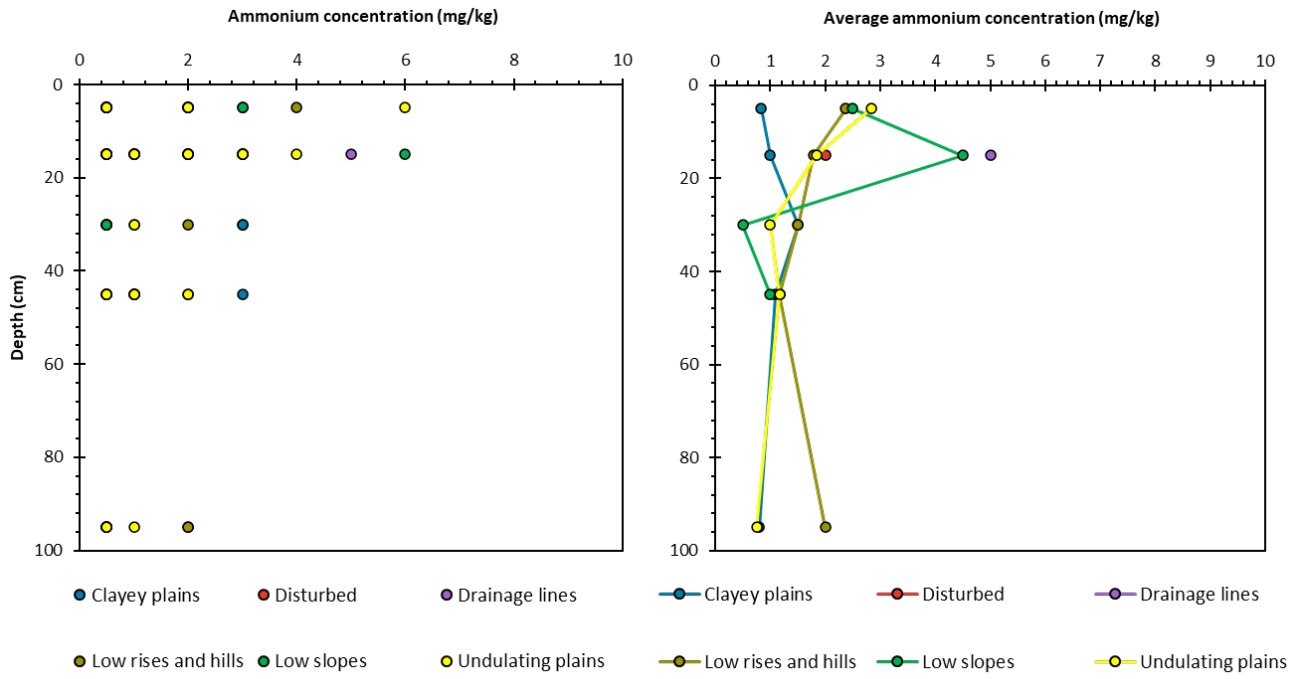


Figure 16: Individual and average ammonium (N) values for each SLA with depth

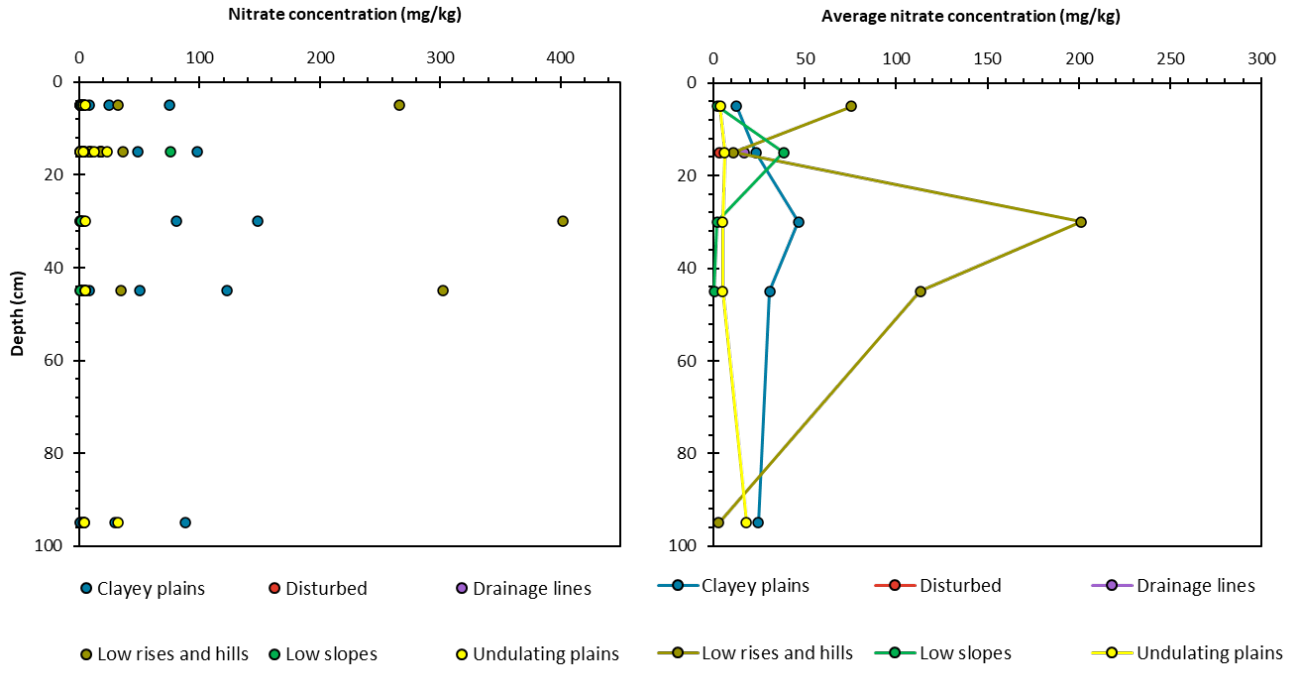


Figure 17: Individual and average nitrate (N) values for each SLA with depth

4.4.4.2 Phosphorus

Phosphorus is essential for the growth of vegetation as it plays a key role in the formulation of energy producing organic compounds. Adequate P nutrition enhances many aspects of plant physiology, including the fundamental processes of photosynthesis, nitrogen fixation, flowering, fruiting (including seed production), and maturation (Brady, N. and Weil, R., 2002).

The plant-available P concentrations of the soils from the study area ranged from below detection limit <2 mg/kg to 9 mg/kg with an average of 2.6 mg/kg (Figure 18). These values are considered as 'very low' to 'low' levels (Moore, 1998) and are considered typical for native soils in the region. Phosphorus concentrations were relatively consistent between SLAs and typically decreased with depth.

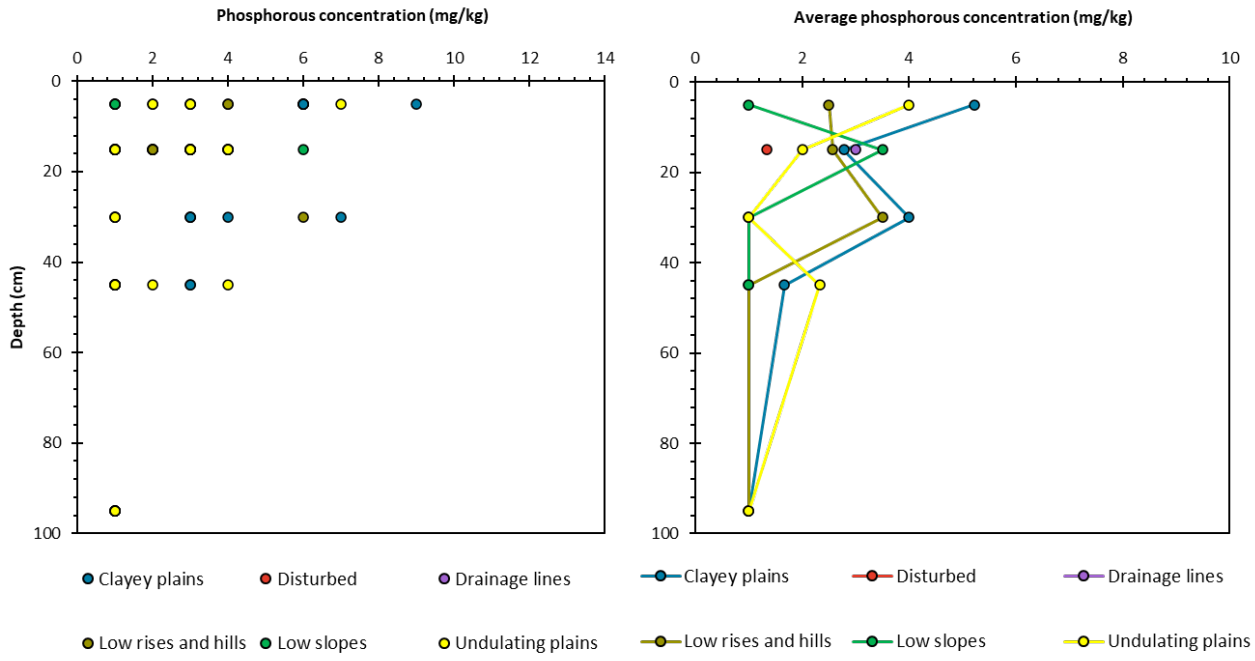


Figure 18: Individual and average plant-available phosphorus (P) values for each SLA with depth

4.4.4.3 Potassium

Potassium (K) plays a critical role in a number of plant physiological processes. Adequate amounts of K have been linked to improved drought tolerance, better resistance to certain fungal diseases and greater tolerance to insect pests (Brady, N. and Weil, R., 2002).

The plant-available K concentrations of the soils from the survey area were variable, ranging from 23 mg/kg to 566 mg/kg with an average of 156.9 mg/kg. These values range between a low and high rating (low rating: <90 mg/kg, high rating: >200 mg/kg (Moore, 1998). Generally, plant-available K was consistent with depth through the surface soil profiles and was relatively consistent across the SLAs but slightly elevated in the 'Low rises and hills' SLA at approximately at 30-45 cm depth (Figure 19).

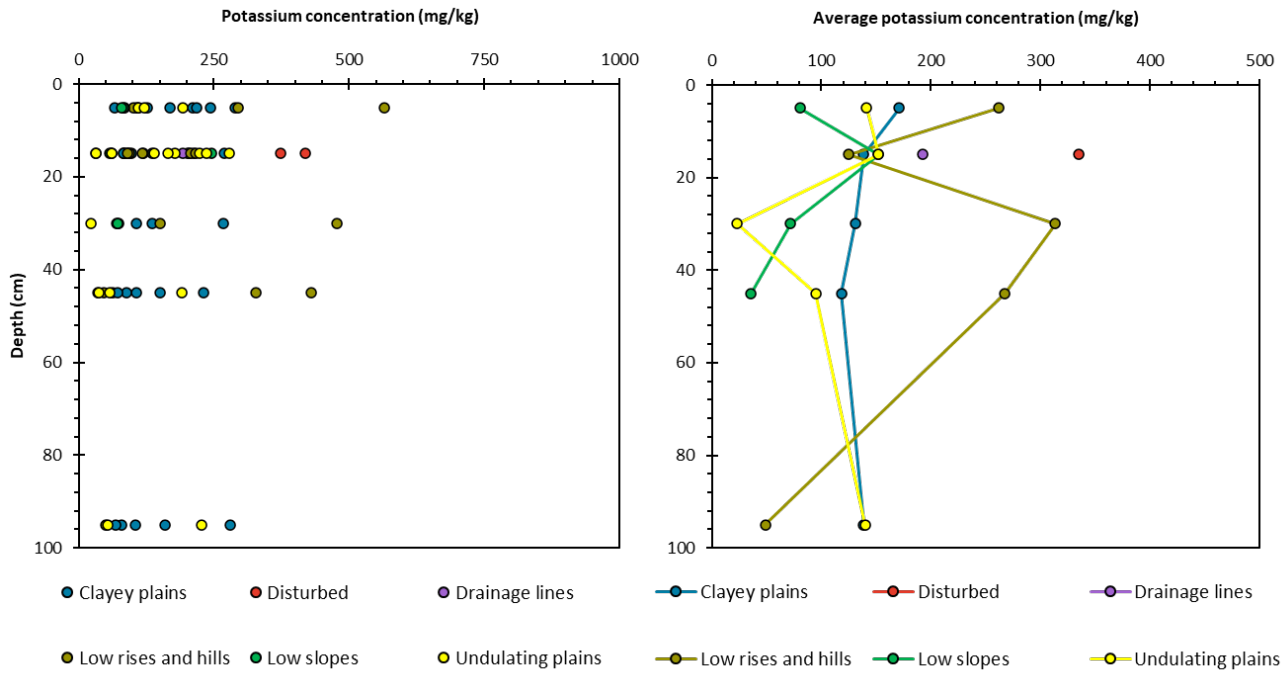


Figure 19: Individual and average plant-available potassium (K) values for each SLA with depth

4.4.4.4 Sulfur

Plant-available sulfur (S) (i.e. sulfate) concentrations measured for soils from the study area were highly variable, ranging from 0.9 mg/kg to 3,734.2 mg/kg with an average of 363.6 mg/kg. There was little apparent correlation of plant-available S with SLA or sample depth (Figure 20).

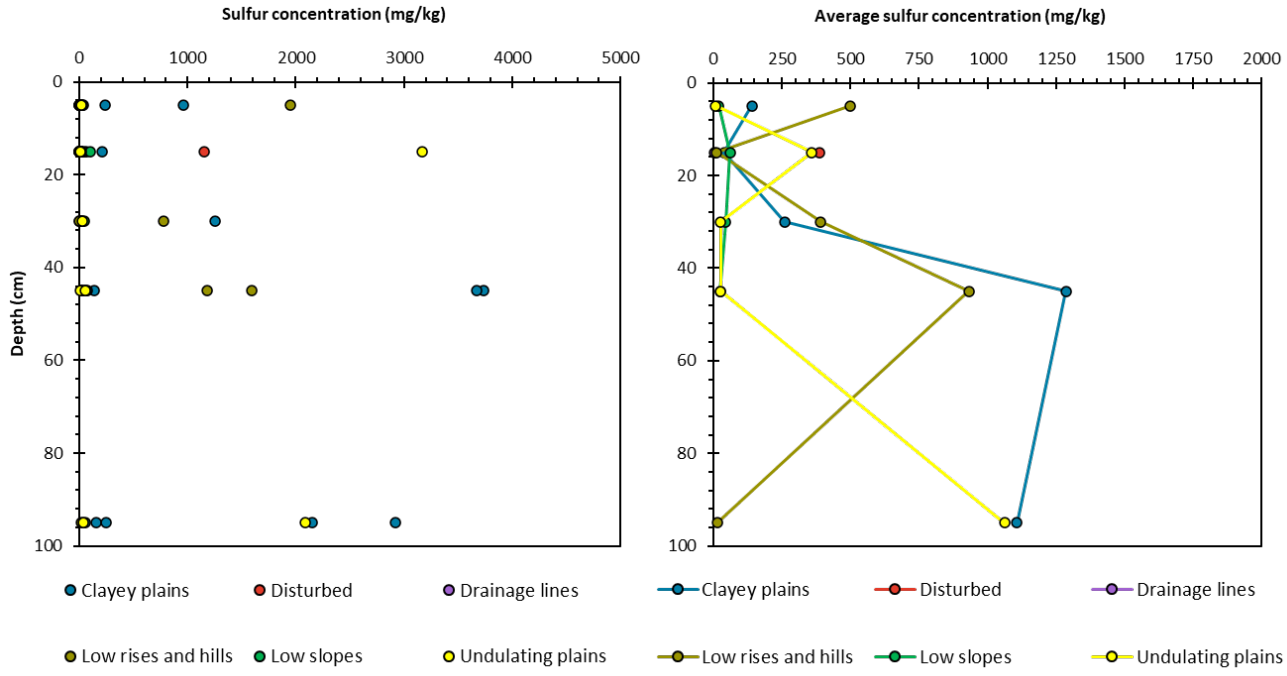


Figure 20: Individual and average sulfur (S) values for each SLA with depth

4.4.5 Total metal concentrations

The total concentration of selected metals was measured for selected soil samples, with the results presented in Table 8. The soils samples were digested using a hydrochloric and nitric acid mixture and read using inductively couple plasma mass spectroscopy (ICP-MS). As a point of comparison, the average crustal abundance (ACA) (Reimann, C. and de Caritat, P, 1998) for each metal is also provided in Table 8.

Of particular note are the high baseline concentrations of arsenic (As), selenium (Se) and chromium (Cr), with the majority of samples recording concentrations higher than the average crustal abundance. These metal concentrations are unlikely to have any implications for soil management or rehabilitation, however, they provide a baseline measure should any comparison against baseline values be required in the future.

Table 8: Total metal concentrations for selected samples. Concentrations above the ACA are denoted in orange

Site ID[1]	Depth (cm)	Total metal concentrations (µg/kg)						
		As	Cd	Cr	Co	Pb	Mo	Se
Low rises and hills SLA								
BUL-01	0-10	**2,768**	4	111,673	3,617	6,501	626	**1,024**
	10-20	**2,056**	14	83,452	2,231	4,787	524	**823**
BUL-06	0-10	**4,024**	7	**203,581**	5,383	12,473	652	**858**
	85-90	**4,506**	10	**220,299**	12,885	9,351	670	**1,466**
BUL-13	0-10	**4,444**	10	**148,846**	8,067	10,289	598	49
BUL-15	0-10	**2,518**	44	**580,881**	22,467	14,753	717	**891**
BB30A	0-30	**5,000**	40	**911,000**	13,800	15,600	-	-
BBH25A	0-30	**4,000**	20	**1,657,000**	10,000	**16,100**	-	-
BBH27A	0-30	1,000	20	**168,000**	5,400	7,700	-	-
BBH33A	0-30	**7,000**	30	**363,000**	7,900	14,800	-	-
Low slopes SLA								
BUL-12	0-10	849	4	34,709	1,317	9,122	118	**400**
BUL-14	0-10	**2,436**	1	82,707	1,652	3,962	701	**317**
	10-25	**3,159**	0	101,475	2,860	6,106	943	**600**
BBH16A	0-30	1,000	10	**196,000**	7,600	5,400	-	-
Undulating plains SLA								
BUL-02	0-10	**5,553**	11	**451,829**	6,801	12,415	**1,401**	**911**
	90-100	**4,950**	33	**343,720**	8,033	10,069	732	**437**
BUL-07	0-10	**2,920**	41	**475,083**	6,863	11,602	776	**647**
BB10A	0-30	**3,000**	30	91,000	6,900	8,900	-	-
BB11A	0-30	**3,000**	20	**143,000**	6,600	8,300	-	-
BB19A	0-30	**2,000**	30	120,000	4,800	7,700	-	-
BBH12A	0-30	**5,000**	30	**245,000**	9,200	14,700	-	-
BBH28A	0-30	**6,000**	10	**164,000**	6,200	14,100	-	-

Site ID[1]	Depth (cm)	Total metal concentrations (µg/kg)						
		As	Cd	Cr	Co	Pb	Mo	Se
BBH31A	0-30	**9,000**	-	**158,000**	3,600	14,100	-	-
Clayey plains SLA								
BUL-03	0-10	**5,027**	41	**813,304**	11,490	**20,061**	895	**429**
	40-50	**4,516**	25	**756,623**	11,465	**15,376**	729	**551**
BUL-04	0-10	**1,805**	42	**184,404**	8,393	9,326	261	110
	80-90	910	20	63,677	6,634	3,295	117	**1,006**
BUL-05	40-50	1,394	7	66,387	4,363	3,759	412	**1,590**
	90-100	1,117	7	50,852	2,515	2,788	421	**1,590**
BUL-08	0-10	**1,854**	16	**211,589**	5,672	8,966	405	**237**
	40-50	**4,090**	14	**453,747**	7,974	**16,068**	604	**494**
	90-100	**3,643**	21	**447,518**	8,973	**17,750**	581	**570**
BUL-09	0-10	**2,737**	34	**300,353**	10,896	12,296	510	**262**
	30-45	**2,643**	24	**273,438**	10,479	12,192	723	**457**
BUL-11	0-10	**2,802**	38	**311,799**	19,389	10,485	766	**757**
	20-35	**1,831**	41	**364,588**	16,648	10,309	386	**314**
BUL-16	25-45	**1,803**	22	73,188	8,582	5,251	276	**991**
BUL-17	0-10	**2,316**	24	**587,742**	16,057	11,873	658	**301**
	90-100	**2,351**	22	**345,509**	17,723	13,149	459	**218**
BUL-18	0-10	1,497	28	66,251	4,991	10,041	397	**294**
BB21A	0-30	**2,000**	20	123,000	6,000	7,200	-	-
BBH20A	0-30	1,000	10	65,000	4,900	4,500	-	-
Disturbed SLA								
BB09A	0-30	**28,000**	10	**2,537,000**	12,400	**17,500**	-	**1,000**
BB13A	0-30	**7,000**	40	**737,000**	20,400	**14,900**	-	-
BB26A	0-30	**9,000**	40	**176,000**	10,500	**18,000**	-	-
Drainage lines SLA								
BBH22A	0-30	**2,000**	10	121,000	7,600	11,200	-	-
Average crustal abundance[2]		**1,700**	**100**	**126,000**	**24,000**	**14,800**	**1,100**	**120**

1. Sample IDs beginning with 'BB' were taken from the previous assessment (Integrate Sustainability, 2022)
2. (Reimann, C. and de Caritat, P, 1998)

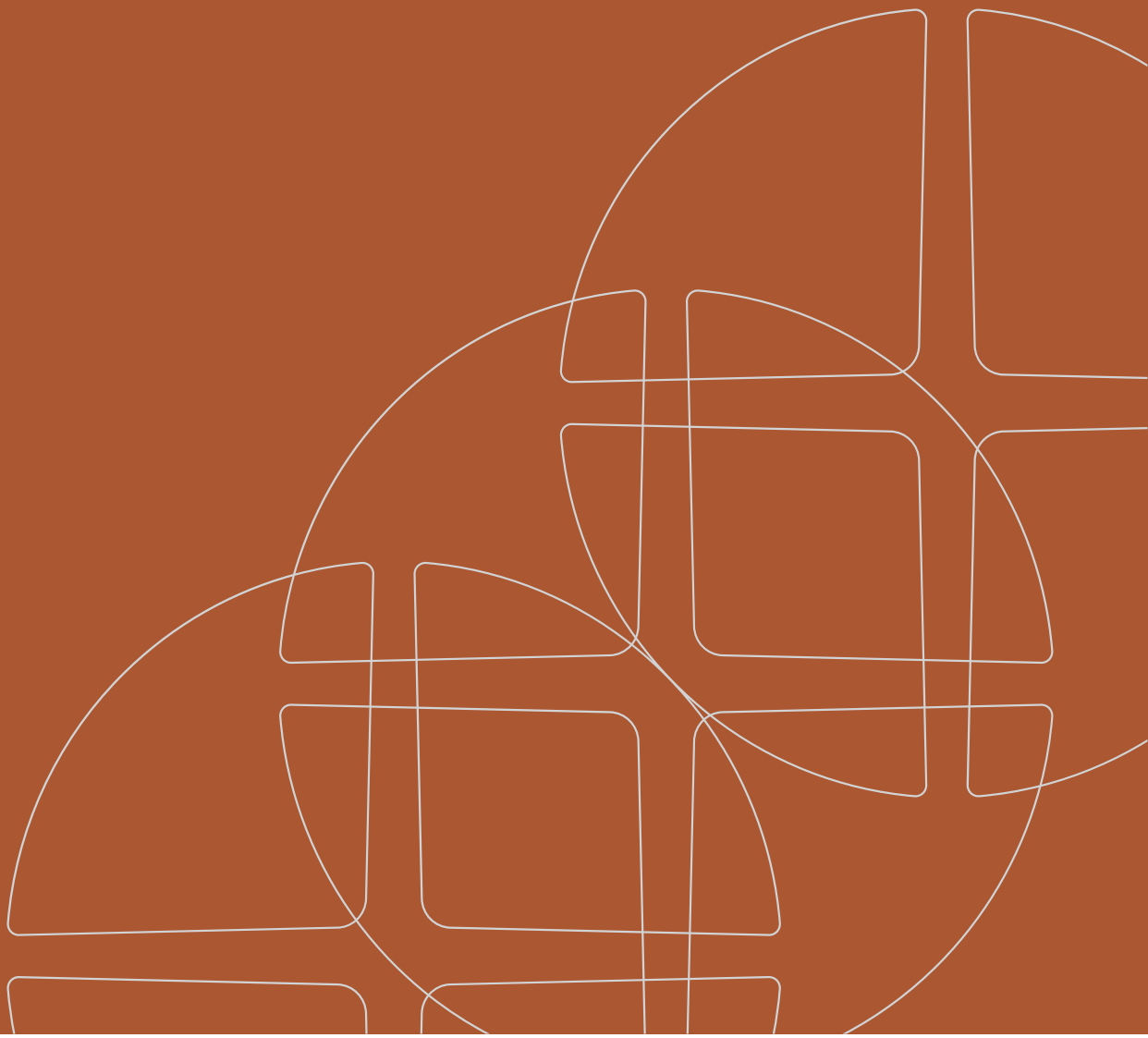
4.5 Likely characteristics of the infrastructure corridor soils

The infrastructure corridor to the south-east of the study area was not assessed as part of this investigation. A review of the regional data sets including land systems, aerial photography, WA Soil Group data and comparable areas that were sampled indicates that the following soil characteristics are likely to be present:

- Level to gently undulating gravelly sandy plains.
- Minor uplands and gravelly plains with quartz and ironstone lag.
- Predominantly 'Calcareous shallow loam' (1602) and 'Red loamy earth' (1673) WA Soil Groups.

It is recommended that the topsoil materials (to approximately 0.2m depth) from disturbance areas within the infrastructure corridor are windrowed / stockpiled adjacent to the disturbance for reapplication and rehabilitation following mining operations.

Soil Management and Handling Recommendations



5. Soil Management and Handling Recommendations

5.1 Suitability for rehabilitation

Soils sampled from within the study area were variable, ranging from loamy sand to clays, with salinity classifications ranging from non-saline to extremely saline. Approximately half of samples tested were classed as sodic or highly sodic and potentially dispersive upon severe disturbance. The soils tested generally recorded a low propensity to hard-set, had a slow to very rapid hydraulic conductivity, low soil organic carbon and plant-available nutrients, and total concentrations of arsenic, chromium and selenium above the average crustal abundance.

The topsoil (0 to 0.2m) from the 'Undulating plains' and 'Drainage lines' SLAs is considered suitable as a surface rehabilitation material for flat and sloped rehabilitation areas. Topsoils from the 'Clayey plains', 'Low slopes' and 'Low rises and hills' SLAs were largely sodic, had some elevated salinity concentrations and are considered less suitable for application to sloped rehabilitation areas. Where used on flat rehabilitation areas, these materials should be further tested prior to application, to further quantify the extent of salinity present and to determine an appropriate salt-tolerant seed mix for rehabilitation. Topsoil resource suitability for rehabilitation is shown in Figure 21.

Any remaining topsoil salvaged from the 'Disturbed' SLA areas which may have been exposed to saline water during operations should be characterised before use, to determine suitability for rehabilitation.

The physical and chemical characteristics of the subsoils (0.2 m to approximately 1 m) were highly variable, both between SLAs and with depth. If there is a topsoil deficit, subsoils from the 'Undulating plains' SLA within the pit and TSF footprints could be salvaged and stockpiled for potential use as a rehabilitation resource. Further testing of the subsoil materials is recommended, prior to application to confirm suitability for use as a rehabilitation material.

Where salvaged soils are utilised as a surface rehabilitation medium on the slopes of waste rock landforms, the soils will require ripping into underlying competent waste rock to armour the surface and minimise erosion as far as practicable. Adequate surface water management on constructed landforms will be required to minimise the potential for surface water concentration and erosion.

6575000 300000 305000 6575000

Legend

- Project layout
- Topsoil possibly exposed to saline water to be characterised before use as rehabilitation medium
- Topsoil suitable for rehabilitation of all areas
- Topsoil suitable for rehabilitation of flat areas only, after further testing

6570000 6570000

6565000 6565000

Earthstar Geographics

MINE EARTH

Topsoil suitability for rehabilitation

Author: S. Parnaby	Figure 21
Reviewed by: S. Perry	Date:24.03.2026

Spatial Reference
Name: GDA 1994 MGA Zone 51
PCS: GDA 1994 MGA Zone 51
GCS: GCS GDA 1994
Datum: GDA 1994

N

0 0.5 1 2

Kilometers

Scale: 1:35,000 at A3

300000 305000

5.2 Soil management and handling

Specific topsoil management and handling recommendations which can optimise soil resource salvaging and the success of future rehabilitation are as follows:

- It is recommended that the upper 0.2m (topsoil) of the soil profiles within all of the proposed disturbance areas is stripped (where possible) and stockpiled for use as a surface rehabilitation medium.
- Topsoils from the 'Undulating plains' and 'Drainage lines' SLAs should be salvaged and stockpiled for use as a rehabilitation medium for use on slopes and flat surfaces.
- Topsoils from the 'Low slopes', 'Clayey plains' and 'Low rises and hills' SLAs should be stockpiled separately from other SLAs and further tested for suitability before utilised as a rehabilitation resource.
- Any available topsoil resources from the 'Disturbed' SLA which may have been exposed to saline water during operations should be characterised before use, to determine suitability for rehabilitation.
- Where deeper excavation is proposed (i.e. within the pit and potentially the TSF footprints) within the 'Undulating plains' SLA, subsoils (0.2 m to approximately 1 m) should be salvaged and stockpiled for use as a surface rehabilitation medium on both slopes and flat surfaces.
- Any rock fragments and surface vegetation litter present within the soil profiles should be collected and stockpiled with the topsoil.
- Machinery operators should minimise the frequency and intensity of topsoil disturbance, to minimise degradation to the structural integrity of the material.
- Soil stripping should occur as close as possible to the time when the proposed disturbance is scheduled to commence.
- It is recommended that up to 0.2m (topsoil) of the soil profiles within the proposed mine area disturbance areas is stripped and paddock-dumped into stockpiles approximately 2 m in height and a practical height achievable by site earthmoving equipment. The piles should have adequate distance between them to create a series of mounds and troughs to capture surface water and organic matter.
- Excessive traffic and disturbance of the stockpiles should be minimised to minimise erosion and degradation of soil structure. Care should be taken to minimise the handling of the soils where possible, particularly when wet.
- Topsoil and subsoil stockpiles should be seeded to maximise vegetation growth and minimise topsoil degradation and potential resource loss.
- As a general rule, topsoil rehabilitation materials should not be placed at depths greater than 0.2m on rehabilitated areas. This is particularly the case for sloped areas of rehabilitation.
- Potential soil resources in any future disturbance areas which are not covered by this investigation should be further quantified as the Project is developed.

5.3 Preliminary soil resource inventory

A preliminary soil resource inventory has been developed to provide an indicative volume of soil resources likely to be available for salvage from the proposed disturbance areas (Table 9). The volumes have been calculated based on the information derived from the soil survey, aerial and landscape photography, site topography and the conceptual project disturbance layout. The approximate areas of previous disturbance within some of the disturbance areas have been taken into consideration, with a nominal stripping depth of 0.2 m utilised for topsoil calculations, and a maximum total depth of 0.7 to 0.9 m for subsoil volume calculations, depending on potential subsoil availability from areas of deeper disturbance (i.e. pit and potentially the TSF footprint). A nominal value of 10% soil loss during stripping and stockpiling operations has also been applied. Proposed disturbance within the 'Disturbed' SLA was not included in the inventory, as it is not clear how much topsoil and subsoil is available as a resource within this area.

It is recommended that the inventory is updated as the Project footprints are finalised and the actual volume of topsoil salvaged from each disturbance area is identified. This should then be updated within the inventory and balanced against the volume of soil required for rehabilitation works, to facilitate optimal application of soil resources to rehabilitation areas.

Table 9 Preliminary soil resource inventory

Conceptual disturbance area	SLA within disturbance	Disturbance footprint area (ha)	Approximate percentage of footprint area with salvageable topsoil (%)[1]	Topsoil volume (m^3) [2]	Subsoil volume (m^3) [3]
Camp	Low rises and hills	10.3	80	14,900	-
Totals		**10.3**		**14,900**	**-**
Grub Stockpile	Drainage lines	0.2	70	191	-
	Undulating plains	6.5	100	11,775	-
Totals		**6.7**		**11,965**	**-**
Infrastructure corridor	Clayey plains	37.4	100	67,380	-
	Drainage lines	5.8	70	7,370	-
	Low rises and hills	16.2	80	23,297	-
	Low slopes	11.1	80	15,990	-
	Undulating plains	43.2	100	77,759	-
Totals		**113.7**		**191,796**	**-**
LGSP	Clayey plains	20.5	100	36,938	-
	Drainage lines	2.6	70	3,322	-
	Low rises and hills	24.3	80	34,973	-
	Undulating plains	0.2	100	349	-

Conceptual disturbance area	SLA within disturbance	Disturbance footprint area (ha)	Approximate percentage of footprint area with salvageable topsoil (%)[1]	Topsoil volume (m^3) [2]	Subsoil volume (m^3) [3]
Totals		**47.6**		**75,583**	**-**
Pit	Drainage lines	20.4	70	25,749	115,872
	Low rises and hills	26.3	80	37,913	71,087
	Low slopes	0.3	80	422	792
	Undulating plains	42.5	100	76,550	229,651
Totals		**89.5**		**140,635**	**417,402**
Other infrastructure	Clayey plains	30.3	100	54,455	-
	Drainage lines	5.7	70	7,163	-
	Low rises and hills	12.9	80	18,510	-
	Low slopes	14.6	80	21,023	-
	Undulating plains	53.2	100	95,837	-
Totals		**116.7**		**196,988**	**-**
Solar Farm	Clayey plains	34.4	100	61,925	-
	Drainage lines	4.7	70	5,914	-
Totals		**39.1**		**67,839**	-
TSF	Clayey plains	183.8	100	330,763	992,290
	Drainage lines	58.9	70	74,241	286,357
	Low rises and hills	218.3	80	314,309	707,195
	Undulating plains	99.1	100	178,413	535,238
Totals		**560.1**		**897,726**	**2,521,080**
Workshop	Clayey plains	4.3	100	7785	-
	Drainage lines	5.2	70	6545	-
	Undulating plains	43.6	100	78397	-
Totals		**53.1**		**92,727**	-
WRD	Clayey plains	194.2	100	349,595	1,422,631
	Drainage lines	27.7	70	34,864	108,132
	Low rises and hills	244.2	80	351,604	667,366

Conceptual disturbance area	SLA within disturbance	Disturbance footprint area (ha)	Approximate percentage of footprint area with salvageable topsoil (%)[1]	Topsoil volume (m^3) [2]	Subsoil volume (m^3) [3]
	Low slopes	73.7	80	106,093	194,134
	Undulating plains	219.8	100	395,724	767,794
Totals		**759.6**		**1,237,880**	**3,160,056**
Grand total				**2,928,039**	**6,098,539**

1. The percentage of topsoil available based on the estimated area of outcropping rock and likely inaccessible or previously disturbed areas within the disturbance footprints. These areas should be confirmed as the Project develops and the inventory updated accordingly.

2. Assumes average topsoil salvage depth of 0.2m and 10% soil loss factor during salvage / stockpiling operations.

3. Assumes a max total average subsoil depth of 0.6 to 0.7 m within WRD, TSF and pit footprints and 10% soil loss factor during salvage / stockpiling operations.

4. 'Infrastructure corridors' and 'roads' were combined for the purposes of this inventory. Topsoil stockpile footprints, all areas within the 'Disturbed' SLA and rehabilitated WRDs are not included in this table.

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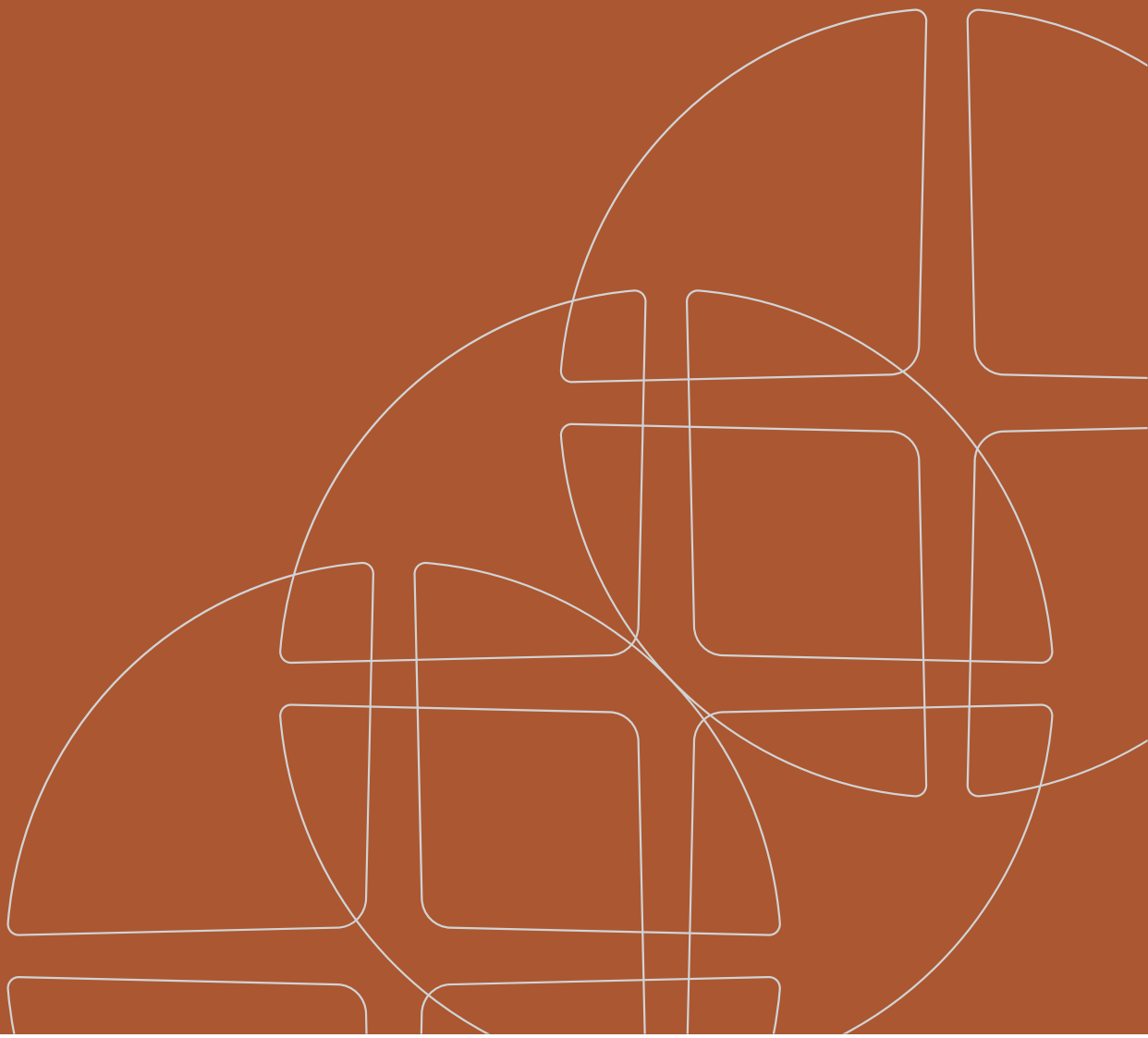
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Appendix A

Soil Profile Descriptions



MINE EARTH

Clayey Plains SLA

MINE EARTH

Site reference: Site BUL-03
Site description: Undulating plain, with sparse wood and shrubland.
Soil landform association: Clayey plains
Soil group: Red loamy earth (WA Soil Group 1673)

Datum: GDA 1994 z50
Easting: 302822
Northing: 6563816



Plate 1 Surface soil profile at Site BUL-03

Soil surface: Thin weak crust with approximately 80% sub-rounded to angular iron stone coarse fragments, approximately 2 to 10 mm in size and approximately 5% vegetation / litter cover.

Vegetation: Shrubs and sparse mulga

Soil profile description:

0 to 10 cm: Dry red/brown friable silty clays with approximately 20% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size. Soil has a moderate consistence and weak structure, with root growth classed as ‘abundant’.

10 to 20 cm: Cohesive red/brown clays with approximately 50% sub-rounded to sub-angular coarse fragments, approximately 2 to 100 mm in size. Soil has a moderate consistence with root growth classed as 'none'.

40 to 50 cm: Red/brown compact clays, with few ironstones, moderately structured, sub-rounded to sub-angular coarse fragments 2 to 120 mm, strong consistence and root growth classed as ‘none’.

90 to 100 cm: Red hard clays and some sands, strongly structured, sub-rounded to sub-angular coarse fragments 2 to 3 mm in size, strong consistence and root growth classed as ‘none’.



Plate 2 Soil surface / vegetation at Site BUL-03

Site reference: Site BUL-04
Site description: Slightly undulating clayey plain, near drainage tracts
Soil landform association: Clayey plains
Soil group: Red loamy earth (WA Soil Group 1673)

Datum: GDA 1994 z50
Easting: 301834
Northing: 6563812

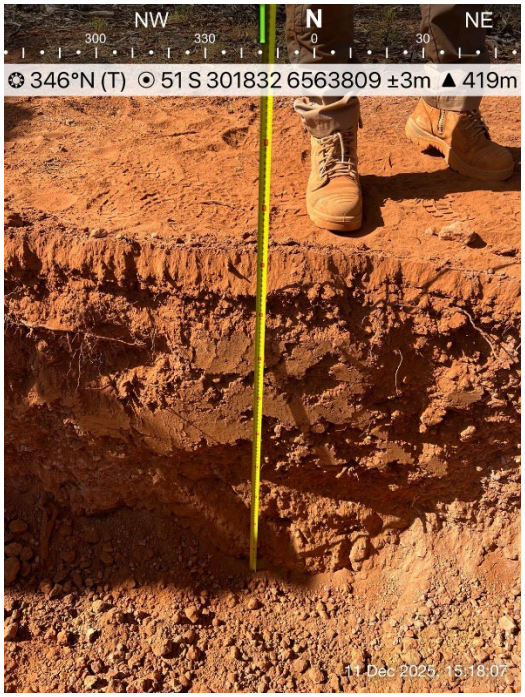


Plate 3 Surface soil profile at Site BUL-04

Soil profile description:

0 to 10 cm: Red/orange sandy clay weakly structured, with approximately 25% sub-rounded to sub-angular coarse fragments 2 to 60 mm in size, weak surface crust, loose consistence with root growth classed as 'none'.

10 to 20 cm: Brown/orange strongly structured sandy clay, with approximately 60% sub-rounded to angular coarse fragments, approximately 2 to 200 mm in size. Soil has a moderate consistence with root growth classed as ‘few’. Soil and calcrete cobbles, weathered rock and quartz fragments visible.

40 to 50 cm: Brown/orange strongly structured sandy clay/clay, with approximately 70% sub-rounded to sub-angular coarse fragments, approximately 2 to 200 mm in size. Soil has a moderate consistence with root growth classed as ‘few’ but found up to 2cm thick, duricrust to calcareous horizon present.

80 to 90 cm: Brown/orange strongly structured sandy clay/clay, with approximately 85% sub-rounded to sub-angular coarse fragments, approximately 2 to 200 mm in size. Soil has a moderate to strong consistence with root growth classed as ‘few’, duricrust oxidised after 50 cm depth.

Soil surface: No surface crust with approximately 20% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size and approximately 50% vegetation / litter cover.

Vegetation: Sparse mulga woodland, interspersed mature trees and smaller shrubs



Plate 4 Soil surface / vegetation at Site BUL-04

Site reference: Site BUL-05
Site description: Slightly sloping plains, amongst mature woodland and minor shrub
Soil landform association: Clayey plains
Soil group: Red loamy earth (WA Soil Group 1673)

Datum: GDA 1994 z50
Easting: 303532
Northing: 6563497



Plate 5 Surface soil profile at Site BUL-05

Soil profile description:

0 to 10 cm: Brown/orange sandy clay weakly structured, with approximately 25% sub-rounded to sub-angular coarse fragments 2 to 80 mm in size, no surface crust, strong consistence with root growth classed as ‘few’.

10 to 20 cm: Brown/orange sandy clay moderately structured, with approximately 25% sub-rounded to sub-angular coarse fragments 2 to 60 mm in size, moderate consistence with root growth classed as ‘abundant’.

40 to 50 cm: Brown/yellow/white strongly structured sandy clay matrix, with approximately 50% sub-rounded to angular coarse fragments 2 to 200 mm in size, strong consistence with root growth classed as ‘none’.

90 to 100 cm: Brown/yellow/white strongly structured clay matrix, with approximately 50% sub-rounded to angular coarse fragments 2 to 200 mm in size, strong consistence with root growth classed as ‘none’.

Soil surface: No crust with approximately 50% sub-rounded to angular coarse fragments, approximately 2 to 200 mm in size and approximately 65% vegetation / litter cover.

Vegetation: Sparse woodland and shrubs near on slightly sloping plain



Plate 6 Soil surface / vegetation at Site BUL-05

Site reference: Site BUL-09
Site description: Sloped plain with sparse shrubs, trees and grasses.
Soil landform association: Clayey plains
Soil group: Red loamy earth (WA Soil Group 1673)

Datum: GDA 1994 z50
Easting: 302989
Northing: 6567019

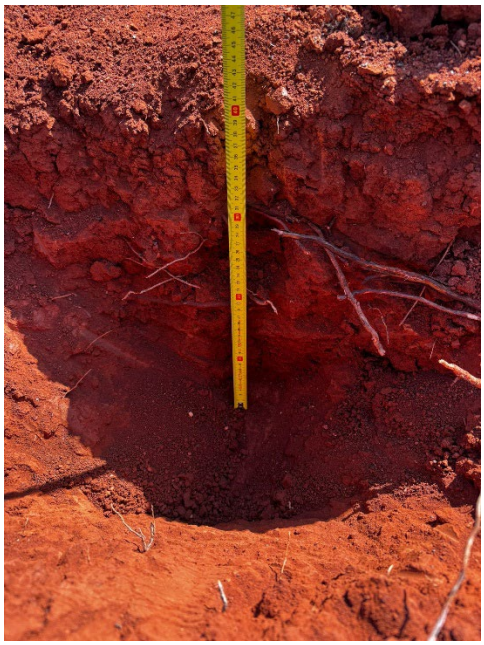


Plate 7 Surface soil profile at Site BUL-09

Soil profile description:

0 to 10 cm: Brown/red sandy clay weakly structured, with approximately 25% sub-rounded to sub-angular coarse fragments 2 to 60 mm in size, weak thin surface crust, loose consistence with root growth classed as ‘few’.

10 to 15 cm: Brown/red sandy clay strongly structured, with approximately 50% sub-rounded to sub-angular coarse fragments 2 to 60 mm in size, loose consistence with root growth classed as ‘few’.

15 to 30 cm: Brown sandy clay strongly structured, with approximately 30% sub-rounded to angular coarse fragments 2 to 60 mm in size, moderate consistence with root growth classed as ‘abundant’.

30 to 45 cm: Brown sandy clay strongly structured and cohesive, with approximately 30% sub-rounded to angular coarse fragments 2 to 60 mm in size, moderate consistence with root growth classed as ‘few’.

Soil surface: Small 1 mm crust with approximately 20% sub-rounded to angular coarse fragments, approximately 2 to 50 mm in size and approximately 30% vegetation / litter cover.

Vegetation: Sparse shrubs



Plate 8 Soil surface / vegetation at Site BUL-09

Site reference: Site BUL-11
Site description: Sparse shrublands

Datum: GDA 1994 z50
Easting: 303152
Northing: 6568005

Soil landform association: Undulating clay plain near access track
Soil group: Red loamy earth (WA Soil Group 1673)



Plate 9 Surface soil profile at Site BUL-11

Soil profile description:

0 to 10 cm: Single grained/weakly structured, red/brown loamy sand/sandy loam soil with approximately 20% sub-rounded to sub-angular coarse fragments, approximately 2 to 40 mm in size. Soil has loose consistence with root growth classed as ‘abundant’.

10 to 20 cm: Weakly structured, red/brown loamy sand/sandy loam soil with approximately 20% sub-rounded to sub-angular coarse fragments, approximately 2 to 30 mm in size. Soil has moderate consistence with root growth classed as 'few'.

20 to 35 cm: Weakly structured / moderately structured, red/brown loamy sand/sandy loam soil with approximately 20% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size. Soil has moderate to strong consistence with root growth classed as 'none'.

Soil surface: Thin crust with approximately 20% sub-rounded to sub-angular coarse fragments, approximately 2 to 40 mm in size and approximately 35% vegetation / litter cover.

Vegetation: Sparse shrubs and woodland



Plate 10 Soil surface / vegetation at Site BUL-11

Site reference: Site BUL-08
Site description: Flat sandy plain amongst sparse woodland

Datum: GDA 1994 z50
Easting: 302780

Soil landform association: Clayey plains
Soil group: Red loamy earth (WA Soil Group 1673)

Northing: 6565678

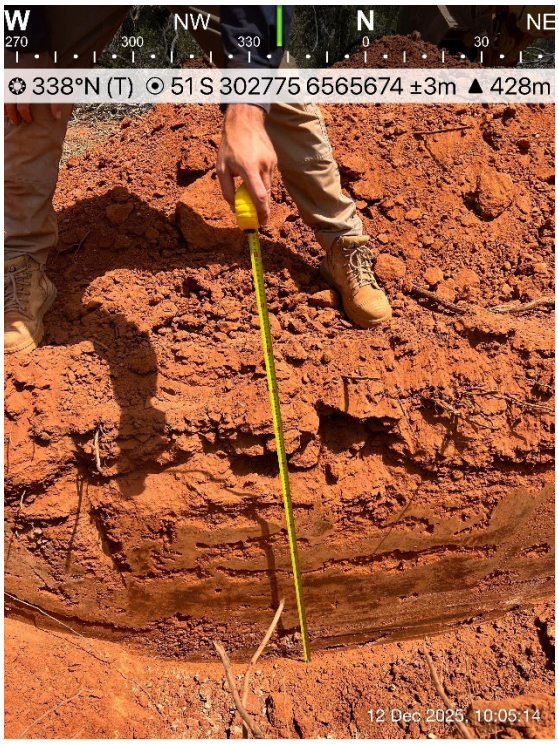


Plate 11 Surface soil profile at Site BUL-08

Soil surface: No crust with approximately 10% sub-rounded coarse fragments, approximately 2 to 60 mm in size and approximately 5% vegetation / litter cover.

Vegetation: Sparse mulga shrubs

Soil profile description:

0 to 10 cm: Weakly structured red/brown sandy clays with approximately 20% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size. Soil has loose consistence with root growth classed as ‘abundant’.

10 to 20 cm: Weakly structured / moderately structured, red/brown sandy clays with approximately 20% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size. Soil has moderate consistence with root growth classed as ‘few’.

40 to 50 cm: Moderately structured, red/brown sandy clays with approximately 40% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size. Soil has moderate consistence with root growth classed as ‘none’.

90 to 100 cm: Strongly structured, red/brown/white sandy clays with approximately 50% sub-rounded to angular coarse quartz fragments, approximately 2 to 200 mm in size. Soil has strong consistence with root growth classed as ‘few’.



Plate 12 Soil surface / vegetation at Site BUL-08

Site reference: Site BUL-16
Site description: Stony lag plain, near thick woodland
Soil landform association: Clayey plains
Soil group: Red loamy earth (WA Soil Group 1673)

Datum: GDA 1994 z50
Easting: 301867
Northing: 6567342



Soil profile description:

0 to 10 cm: Weakly structured red/brown clays with approximately 20% sub-rounded to sub-angular coarse fragments, approximately 2 to 200 mm in size. Soil has loose consistence with root growth classed as 'few'.

10 to 25 cm: Weakly / moderately structured red/brown clays with approximately 20% sub-rounded to sub-angular coarse fragments with some quartz, approximately 2 to 200 mm in size. Soil has loose consistence with root growth classed as 'few'

25 to 45 cm: Weakly / moderately structured red/brown clays with approximately 35% sub-rounded to sub-angular coarse fragments, approximately 2 to 200 mm in size with some quartz. Soil has moderate consistence with root growth classed as 'none'.

Plate 13 Surface soil profile at Site BUL-16

Soil surface: Small, weak crust with approximately 50% sub-rounded to angular coarse fragments, approximately 2 to 60 mm in size and approximately 15% vegetation / litter cover.

Vegetation: Sparse shrubs and mature trees



Plate 14 Soil surface / vegetation at Site BUL-16

Site reference: Site BUL-17

Site description: Slightly undulating stony plain, with sparse grasses and mature trees.

Soil landform association: Clayey plains

Soil group: Red-brown hardpan shallow loam (WA Soil Group 1605)

Datum: GDA 1994 z50

Easting: 302467

Northing: 6564464



Plate 17 Surface soil profile at Site BUL-17

Soil profile description:

0 to 10 cm: Weakly structured red/brown sandy clays with approximately 5% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size. Soil has strong consistence with root growth classed as ‘few’.

10 to 20 cm: Weakly structured more compacted red/brown clays with approximately 10% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size. Soil has strong consistence with root growth classed as ‘few’.

40 to 50 cm: Massively structured red/brown silty clays with approximately 10% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size. Soil has moderate consistence with root growth classed as ‘few’.

Soil surface: No crust with approximately 10% sub-rounded to angular coarse fragments, approximately 2 to 60 mm in size and approximately 10% vegetation / litter cover.

Vegetation: Sparse scrubland with mature woodland nearby



Plate 18 Soil surface / vegetation at Site BUL-17

Site reference: Site BUL-18
Site description: Sandy plain adjacent to woodland
Soil landform association: Clayey plain
Soil group: Red-brown hardpan shallow loam (WA Soil Group 1605)

Datum: GDA 1994 z50
Easting: 304363
Northing: 6568185



Plate 19 Surface soil profile at Site BUL-18

Soil profile description:

0 to 10 cm: Single grain structured red/brown sands with approximately 10% sub-angular coarse fragments, approximately 2 to 60 mm in size. Soil has loose consistence with root growth classed as ‘few’.

10 to 20 cm: Weakly structured red/brown sand/sandy clay soil with approximately 20% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size. Soil has a loose consistence with root growth classed as ‘few’.

20 to 30 cm: Strongly structured, red/brown sandy clay with approximately 50% sub-angular coarse fragments, approximately 2 to 200 mm in size. Root growth classed as 'none'. Indurated clay encountered at 30 cm.

Soil surface: No crust with approximately 10% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size and approximately 30% vegetation / litter cover.

Vegetation: Sparse scrub near tree line



Plate 20 Soil surface / vegetation at Site BUL-18

Undulating plains SLA

MINE EARTH

Site reference: Site BUL-02
Site description: Undulating plain, sparse shrubs with pockets of open woodland.
Soil landform association: Undulating plains
Soil group: Red-brown hardpan shallow loam (WA Soil Group 1605)

Datum: GDA 1994 z50
Easting: 303206
Northing: 6565199



Plate 15 Surface soil profile at Site BUL-02

Soil profile description:

0 to 10 cm: Weakly structured red/brown sandy clay with approximately 20% sub-rounded to sub-angular ironstone coarse fragments, approximately 2 to 60 mm in size. Soil has moderate consistence with root growth classed as ‘abundant’.

10 to 20 cm: Weakly structured red/brown sandy clay with approximately 30% sub-rounded to sub-angular ironstone coarse fragments, approximately 2 to 60 mm in size. Soil has moderate consistence with root growth classed as ‘few’.

40 to 50 cm: Strongly structured / moderately structured, red / brown sandy clay with approximately 40% sub-rounded to sub-angular ironstone coarse fragments, approximately 2 to 60 mm in size. Soil has moderate consistence with root growth classed as 'none'.

90 to 100 cm: Strongly structured / moderately structured, white / brown sandy clay with approximately 40% rounded to sub-rounded ironstone coarse fragments, approximately 2 to 60 mm in size. Soil has strong consistence with root growth classed as 'none'.

Soil surface: Thin weak crust with approximately 60% sub-rounded to angular coarse fragments, approximately 2 to 60 mm in size and approximately 25% vegetation / litter cover.

Vegetation: Sparse shrubland



Plate 16 Soil surface / vegetation at Site BUL-02

Site reference: Site BUL-07
Site description: Flat scrubland plain
Soil landform association: Undulating plains
Soil group: Red-brown hardpan shallow loam (WA Soil Group 1605)

Datum: GDA 1994 z50
Easting: 303028
Northing: 6566286



Plate 21 Surface soil profile at Site BUL-07

Soil surface: No crust with approximately 80% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size and approximately 25% vegetation / litter cover.

Vegetation: Sparse shrubs, nearby tree line.

Soil profile description:

0 to 10 cm: Weakly structured red/brown sandy clay with approximately 20% sub-rounded to sub-angular ironstone coarse fragments, approximately 2 to 60 mm in size. Soil has moderate consistence with root growth classed as 'few'.

10 to 20 cm: Weakly structured red/brown sandy clay with approximately 40% sub-rounded to angular ironstone coarse fragments, approximately 2 to 60 mm in size. Soil has strong consistence with root growth classed as 'few'.

40 to 50 cm: Weakly to moderately structured red/brown sandy clay with approximately 10% sub-rounded to angular ironstone and quartz coarse fragments, approximately 2 to 60 mm in size. Soil has strong consistence with root growth classed as 'few'.

90 to 100 cm: Massively structured red/brown sandy clay with approximately 5% sub-rounded to angular ironstone and quartz coarse fragments, approximately 2 to 60 mm in size. Soil has strong consistence with root growth classed as 'none'.



Plate 22 Soil surface / vegetation at Site BUL-07

Site reference: Site BUL-10
Site description: Sandy plain, sparse vegetation.

Datum: GDA 1994 z50
Easting: 305212

Northing: 6567456

Soil landform association: Undulating plains
Soil group: Red loamy earth (WA Soil Group 1673)



Plate 23 Surface soil profile at Site BUL-10

Soil profile description:

0 to 10 cm: Single grained red/brown sandy clay with approximately 5% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size. Soil has loose consistence with root growth classed as 'few'.

10 to 20 cm: Weakly structured red/brown sandy clay with approximately 10% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size. Soil has loose consistence with root growth classed as 'abundant'.

20 to 35 cm: Moderately structured red/brown sandy clay with approximately 10% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size. Soil has moderate consistence with root growth classed as 'few'.

35 to 43 cm: Moderately structured red/brown sandy clay with approximately 15% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size. Soil has moderate consistence with root growth classed as 'few'.

Soil surface: Weak crust with approximately 10% sub-rounded to angular coarse fragments, approximately 2 to 60 mm in size and approximately 50% vegetation / litter cover.

Vegetation: Abundant shrubs and trees



Plate 24 Soil surface / vegetation at Site BUL-10

Low rises and hills SLA

MINE EARTH

Site reference: Site BUL-01
Site description: Sloping rise, open shrubland with scattered trees

Datum: GDA 1994 z50
Easting: 301524
Northing: 6564750

Soil landform association: Low rises and hills
Soil group: Red-brown hardpan shallow loam (WA Soil Group 1605)



Plate 25 Surface soil profile at Site BUL-01

Soil profile description:

0 to 10 cm: Red/brown sandy duricrust with approximately 70% sub-angular to angular coarse fragments, approximately 2 to 200 mm in size. Soil has strong consistence with root growth classed as ‘few’.

10 to 20 cm: Red/brown sandy duricrust with approximately 70% sub-angular coarse fragments, approximately 2 to 200 mm in size. Soil has strong consistence with root growth classed as ‘none’.

>20 cm: Hardpan

Soil surface: Strong crust with approximately 70% sub-angular to angular coarse fragments, approximately 2 to 200 mm in size and approximately 20% vegetation / litter cover.

Vegetation: Open shrubland



Plate 26 Soil surface / vegetation at Site BUL-01

Site reference: Site BUL-06
Site description: Stony plain, with nearby woodland
Soil landform association: Low rises and hills
Soil group: Red loamy earth (WA Soil Group 1673)

Datum: GDA 1994 z50
Easting: 302095
Northing: 6563223



Plate 27 Surface soil profile at Site BUL-06

Soil profile description:

0 to 10 cm: Weakly structured red/brown sandy clay with approximately 5% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size. Soil has strong consistence with root growth classed as ‘abundant’.

10 to 20 cm: Moderately structured red/brown sandy clay with approximately 5% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size. Soil has strong consistence with root growth classed as ‘few’.

40 to 50 cm: Strongly structured red/brown sandy clay with approximately 30% sub-angular to angular coarse fragments, approximately 2 to 60 mm in size. Soil has strong consistence with root growth classed as ‘none’.

80 to 100 cm: Strongly structured red/brown sandy clay with approximately 30% sub-angular to angular coarse fragments, approximately 2 to 60 mm in size. Soil has strong consistence with root growth classed as ‘none’.

Soil surface: No crust with approximately 80% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size and approximately 20% vegetation / litter cover.

Vegetation: Sparse shrubs with woodland pockets.



Plate 28 Soil surface / vegetation at Site BUL-06

Site reference: Site BUL-13
Site description: Sandy plain
Soil landform association: Low rises and hills
Soil group: Red loamy earth (WA Soil Group 1673)

Datum: GDA 1994 z50
Easting: 303922
Northing: 6569244



Plate 29 Surface soil profile at Site BUL-13

Soil profile description:

0 to 10 cm: Single grained red/brown sand with approximately 5% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size. Soil has loose consistence with root growth classed as ‘none’.

15 to 30 cm: Weakly structured red/brown sand with approximately 5% sub-rounded coarse fragments, approximately 2 to 20 mm in size. Soil has loose consistence with root growth classed as 'none'.

30 to 50 cm: Weakly structured red/brown sand with approximately 10% sub-rounded coarse fragments, approximately 2 to 50 mm in size. Soil has loose to moderate consistence with root growth classed as 'none'.

Soil surface: Hard crust with approximately 5% sub-rounded to sub-angular coarse fragments, approximately 20 to 60 mm in size and approximately 15% vegetation / litter cover.

Vegetation: Sparse shrubs and grasses, occasional woodland pockets



Plate 30 Soil surface / vegetation at Site BUL-13

Site reference: Site BUL-15
Site description: Sandy plain, with open woodland, shrubs and brushes
Soil landform association: Low rises and hills
Soil group: Red loamy earth (WA Soil Group 1673)

Datum: GDA 1994 z50
Easting: 303916
Northing: 6567231



Plate 31 Surface soil profile at Site BUL-15

Soil profile description:

0 to 10 cm: Single grained, orange/brown sand with approximately 5% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size. Soil has loose consistence with root growth classed as ‘abundant’.

10 to 20 cm: Massively structured brown / orange sandy clay with approximately 5% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size. Soil has moderate consistence with root growth classed as ‘abundant’.

20 to 40 cm: Massively structured brown / orange sandy clay with approximately 5% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size. Soil has moderate consistence with root growth classed as ‘few’.

40 to 45 cm: Massively structured brown / orange sandy clay with approximately 5% sub-rounded to sub-angular coarse fragments, approximately 2 to 60 mm in size. Soil has moderate consistence with root growth classed as ‘none’.

Soil surface: Thin weak crust with approximately 5% sub-rounded to angular coarse fragments, approximately 2 to 60 mm in size and approximately 25% vegetation / litter cover.

Vegetation: Open mulga woodland, shrub, brushes, sparse



Plate 32 Soil surface / vegetation at Site BUL-15

Low slopes SLA

MINE EARTH

Site reference: Site BUL-12
Site description: Sandy rise with sparse shrubs and trees
Soil landform association: Low slopes
Soil group: Pale shallow sand (WA Soil Group 1405)

Datum: GDA 1994 z50
Easting: 302781
Northing: 6569026



Plate 35 Surface soil profile at Site BUL-12

Soil profile description:

0 to 10 cm: Single grained, grey sand with approximately 10% sub-rounded to sub-angular quartz and gravel coarse fragments, approximately 2 to 200 mm in size. Soil has loose consistence with root growth classed as 'few'.

10 to 25 cm: Massively structured, grey/white sandy clay with zero coarse fragments, cemented. Soil has strong consistence with root growth classed as 'none'.

Soil surface: Sandy surface with approximately 30% sub-rounded to sub-angular coarse fragments, approximately 2 to 80 mm in size and approximately 5% vegetation / litter cover.

Vegetation: Sparse shrubs and trees



Plate 36 Soil surface / vegetation at Site BUL-12

Site reference: Site BUL-14
Site description: Slightly sloping area with abundant woodland
Soil landform association: Low slopes
Soil group: Yellow sandy earth (1467)

Datum: GDA 1994 z50
Easting: 304010
Northing: 6568818



Plate 39 Surface soil profile at Site BUL-14

Soil profile description:

0 to 10 cm: Weakly structured red/brown sandy soil with approximately 5% sub-rounded coarse fragments, approximately 2 to 60 mm in size. Soil has loose consistence with root growth classed as 'abundant'.

10 to 25 cm: Moderately structured red/brown sandy soil with approximately 5% sub-rounded coarse fragments, approximately 2 to 60 mm in size. Soil has loose consistence with root growth classed as 'few'.

25 to 40 cm: Weakly structured orangey/brown sandy soil with approximately 10% sub-rounded coarse fragments, approximately 2 to 60 mm in size. Soil has loose to moderate consistence with root growth classed as 'few'.

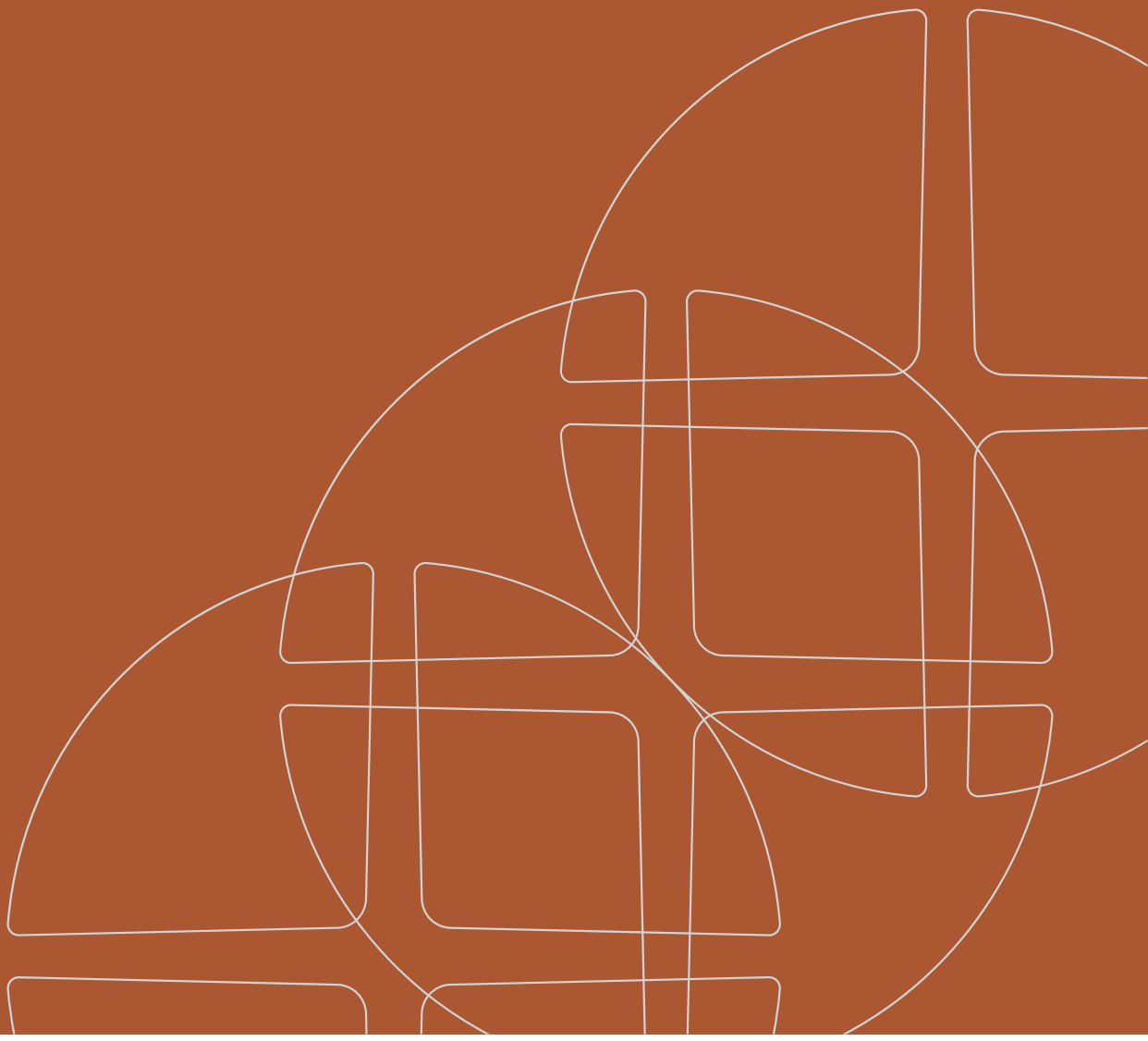
Soil surface: No weak crust with approximately 5% sub-rounded coarse fragments, approximately 2 to 60 mm in size and approximately 80% vegetation / litter cover.

Vegetation: Abundant woodland



Plate 40 Soil surface / vegetation at Site BUL-14

Appendix B
Soil Classifications



MINE EARTH

Emerson Dispersion Test Classes (Moore 1998)

Class	Description
Class 1	Dry aggregate slakes and completely disperses
Class 2	Dry aggregate slakes and partly disperses
Class 3a	Dry aggregate slakes but does not disperse; remoulded soil disperses completely
Class 3b	Dry aggregate slakes but does not disperse; remoulded soil partly disperses
Class 4	Dry aggregate slakes but does not disperse; remoulded soil does not disperse; carbonates and gypsum are present
Class 5	Dry aggregate slakes but does not disperse; remoulded soil does not disperse; carbonates and gypsum are absent; 1: suspension remains dispersed
Class 6	Dry aggregate slakes but does not disperse; remoulded soil does not disperse; carbonates and gypsum are absent; 1:5 suspension remains flocculated
Class 7	Dry aggregate does not slake; aggregate swells
Class 8	Dry aggregate does not slake; aggregate does not swell

Soil Electrical conductivity classes (based on standard USDA and CSIRO categories)

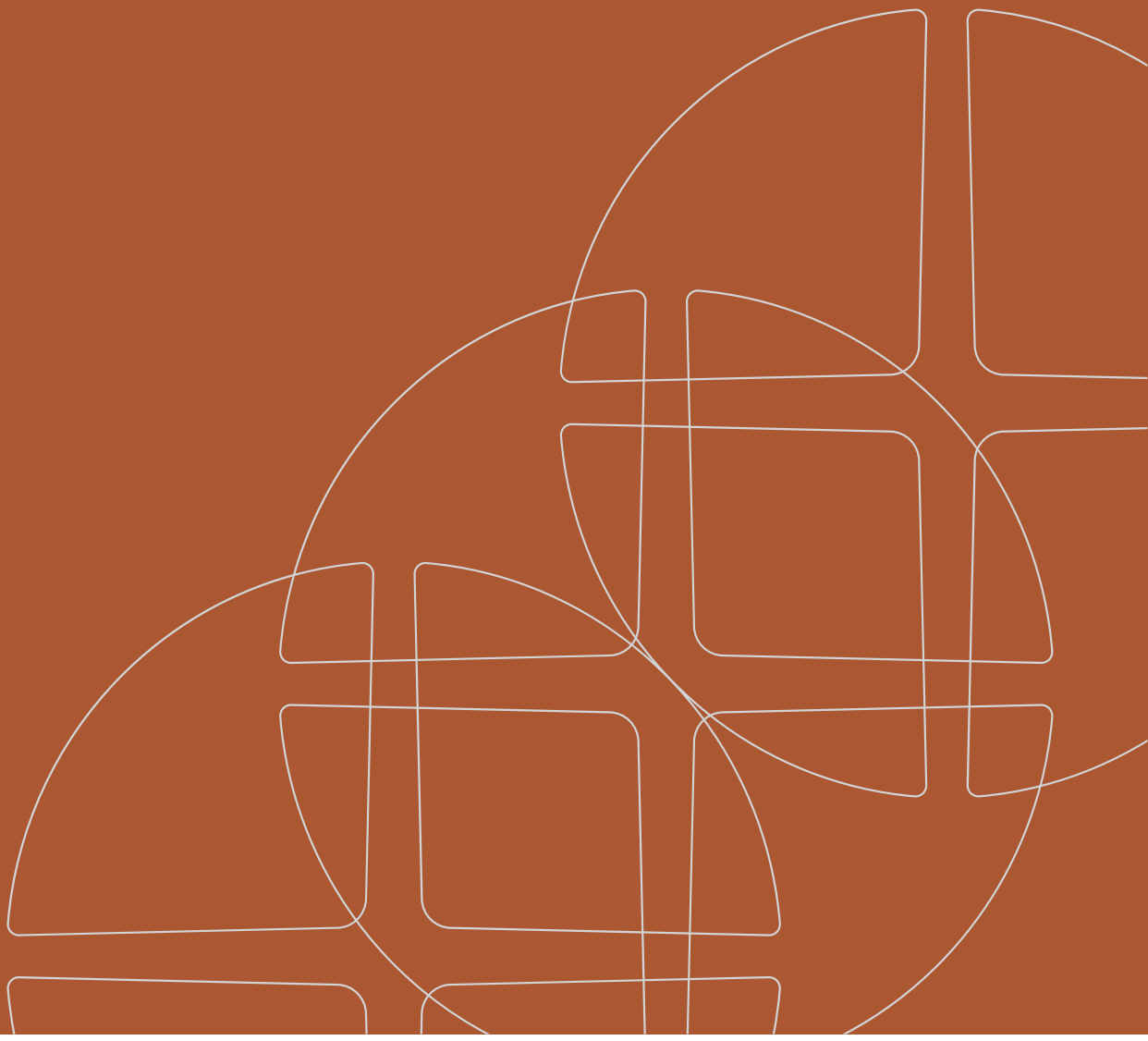
EC (1:5) (dS/m)						
Salinity class	**Sand**	**Sandy loam**	**Loam**	**Clay loam**	**Light / medium clay**	**Heavy clay**
Non-saline	<0.13	<0.17	<0.20	<0.22	<0.25	<0.33
Slightly saline	0.13 – 0.26	0.17 – 0.33	0.20 – 0.40	0.22 – 0.44	0.25 – 0.50	0.33 – 0.67
Moderately saline	0.26 – 0.52	0.33 – 0.67	0.40 – 0.80	0.44 – 0.89	0.50 – 1.00	0.67 – 1.33
Very saline	0.52 – 1.06	0.67 – 1.33	0.80 – 1.60	0.89 – 1.78	1.00 – 2.00	1.33 – 2.67
Extremely saline	>1.06	>1.33	>1.60	>1.78	>2.00	>2.67

Soil pH classes

	Soil pH rating						
	Very strongly acid (Vsac)	**Strongly acid (Sac)**	**Moderately acid (Mac)**	**Slightly acid (Slac)**	**Neutral (N)**	**Moderately alkaline (Malk)**	**Strongly alkaline (Salk)**
pH_w	<5.3	5.3 – 5.6	5.6 – 6.0	6.0 – 6.5	6.5 – 8.0	8.0 – 9.0	>9.0
pH_{Ca}	<4.2	4.2 – 4.5	4.5 – 5.0	5.0 – 5.5	5.5 – 7.0	7.0 – 8.0	>8.0

Appendix C

CSBP Laboratory Results



MINE EARTH

Analysis Results

CSBP Soil and Plant Analysis Laboratory

Customer: Mine Earth Pty Ltd (90423)
PO/Job Name: Mine Earth Pty Ltd
Dates Rec'd: 15/01/2026

	Lab Number	1DYS26035	1DYS26037	1DYS26038	1DYS26039	1DYS26040	1DYS26041	1DYS26042	1DYS26043
	Date Received	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026
	Sample Name 1	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026
	Sample Name 2	BUL-01	BUL-01	BUL-02	BUL-02	BUL-03	BUL-03	BUL-04	BUL-04
	Sample Name 3	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd
	Depth	0-10	10-20	0-10	90-100	0-10	40-50	0-10	80-90
Colour		LTBR	LTBR	DKBR	LTBR	DKBR	DKBR	BROR	LTBR
Gravel	%	5	5	5	5	5	5-10	5-10	5
Texture		2.5	3.0	2.5	2.0	2.5	3.0	2.0	2.0
Ammonium Nitrogen	mg/kg	2	2	2	1	< 1	< 1	2	< 1
Nitrate Nitrogen	mg/kg	3	1	3	32	8	50	1	88
Phosphorus Colwell	mg/kg	4	4	3	< 2	4	< 2	9	< 2
Potassium Colwell	mg/kg	101	93	111	53	290	230	244	160
Sulfur	mg/kg	5.3	12.3	2.5	41.2	10.0	3734.2	3.6	155.7
Organic Carbon	%	0.32	0.29	0.54	0.17	0.24	0.26	0.61	0.34
Conductivity	dS/m	0.020	0.029	0.015	0.270	0.338	4.400	0.131	1.276
pH Level (CaCl2)		4.2	4.1	4.6	7.9	7.2	7.7	7.5	8.2
pH Level (H2O)		5.0	4.8	5.5	8.9	8.2	8.1	8.1	9.2
% Clay	%	16.27	26.12	11.29	10.60	34.78	6.11	16.18	14.84
% Coarse Sand	%	40.93	39.73	59.36	67.04	26.97	21.85	35.76	54.20
% Fine Sand	%	34.63	25.09	26.26	14.62	25.33	26.47	36.90	24.01
% Sand	%	75.56	64.82	85.62	81.66	52.30	48.32	72.66	78.21
% Silt	%	8.16	9.06	3.09	7.74	12.94	45.57	11.16	6.95
Prewash exch. Ca	meq/100g	1.16	1.28	2.65	13.02	10.92	18.94	11.02	8.80
Prewash exch. K	meq/100g	0.17	0.15	0.20	0.12	0.71	0.48	0.42	0.32
Prewash exch. Mg	meq/100g	0.91	0.95	0.76	4.90	6.44	6.74	1.61	6.35

CSBP Lab. Extract Value.

Analysis Results

CSBP Soil and Plant Analysis Laboratory

Customer: Mine Earth Pty Ltd (90423)
PO/Job Name: Mine Earth Pty Ltd
Dates Rec'd: 15/01/2026

	Lab Number	1DYS26044	1DYS26045	1DYS26046	1DYS26047	1DYS26048	1DYS26049	1DYS26050	1DYS26051
	Date Received	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026
	Sample Name 1	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026
	Sample Name 2	BUL-05	BUL-05	BUL-06	BUL-06	BUL-07	BUL-08	BUL-08	BUL-08
	Sample Name 3	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd
	Depth	40-50	90-100	0-10	85-90	0-10	0-10	40-50	90-100
Colour		BRGR	BRGR	BROR	BROR	BR	BROR	BR	BR
Gravel	%	5	5	5	5-10	5	5	5	5-10
Texture		3.0	3.0	2.5	2.0	2.5	2.0	3.0	3.0
Ammonium Nitrogen	mg/kg	1	< 1	3	2	< 1	< 1	< 1	< 1
Nitrate Nitrogen	mg/kg	< 1	< 1	1	3	3	< 1	2	1
Phosphorus Colwell	mg/kg	3	< 2	3	< 2	7	6	< 2	< 2
Potassium Colwell	mg/kg	150	105	85	49	192	126	62	79
Sulfur	mg/kg	3670.7	2153.3	12.8	14.9	7.2	1.7	134.9	243.5
Organic Carbon	%	0.39	0.20	0.47	0.08	0.41	0.39	0.05	0.10
Conductivity	dS/m	5.730	4.216	0.044	0.058	0.242	0.016	0.650	1.161
pH Level (CaCl2)		6.1	3.8	4.3	6.5	7.4	4.8	8.0	8.1
pH Level (H2O)		6.3	4.0	5.1	7.4	8.3	6.3	8.9	9.3
% Clay	%	23.26	31.30	19.43	8.00	14.78	10.48	13.38	37.16
% Coarse Sand	%	24.81	35.07	32.50	67.06	43.16	58.51	56.15	44.43
% Fine Sand	%	19.49	26.98	41.92	20.91	33.15	25.74	17.03	11.37
% Sand	%	44.30	62.05	74.42	87.97	76.31	84.25	73.18	55.80
% Silt	%	32.44	6.65	6.15	4.03	8.90	5.27	13.43	7.04
Prewash exch. Ca	meq/100g	16.78	6.96	2.31	12.49	4.15	1.34	4.32	8.28
Prewash exch. K	meq/100g	0.24	0.16	0.14	0.10	0.35	0.21	0.19	0.16
Prewash exch. Mg	meq/100g	2.59	1.12	1.01	11.84	3.33	1.36	7.81	7.35

CSBP Lab. Extract Value.

Analysis Results

CSBP Soil and Plant Analysis Laboratory

Customer: Mine Earth Pty Ltd (90423)
PO/Job Name: Mine Earth Pty Ltd
Dates Rec'd: 15/01/2026

	Lab Number	1DYS26052	1DYS26053	1DYS26054	1DYS26055	1DYS26056	1DYS26057	1DYS26058	1DYS26059
	Date Received	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026
	Sample Name 1	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026
	Sample Name 2	BUL-09	BUL-09	BUL-10	BUL-11	BUL-11	BUL-12	BUL-13	BUL-13
	Sample Name 3	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd
	Depth	0-10	30-45	35-43	0-10	20-35	0-10	0-15	30-50
Colour		DKBR	DKBR	BRGR	BRGR	BR	LTGR	BROR	LTBR
Gravel	%	5	5-10	5-10	5-10	5	5-10	5	5-10
Texture		3.0	3.0	3.0	2.5	3.0	2.0	2.5	2.0
Ammonium Nitrogen	mg/kg	< 1	< 1	2	< 1	< 1	3	4	2
Nitrate Nitrogen	mg/kg	< 1	2	5	25	< 1	3	266	302
Phosphorus Colwell	mg/kg	6	3	2	< 2	7	< 2	2	< 2
Potassium Colwell	mg/kg	211	107	37	107	268	82	566	430
Sulfur	mg/kg	0.9	41.8	15.8	239.5	1.2	30.2	37.2	1593.6
Organic Carbon	%	0.26	0.32	0.30	0.44	0.52	0.78	0.17	0.18
Conductivity	dS/m	0.081	0.975	0.073	1.530	0.102	0.226	5.435	5.911
pH Level (CaCl2)		7.7	8.0	5.0	8.2	7.6	4.1	7.5	8.1
pH Level (H2O)		8.6	8.9	5.7	9.0	8.3	5.0	7.8	8.3
% Clay	%	36.69	43.51	16.41	39.68	14.59	23.63	12.61	25.77
% Coarse Sand	%	21.95	24.60	61.64	28.86	45.39	62.01	39.94	29.11
% Fine Sand	%	27.46	22.97	16.82	19.54	29.29	11.39	24.09	30.05
% Sand	%	49.41	47.57	78.46	48.40	74.68	73.40	64.03	59.16
% Silt	%	13.90	8.91	5.14	11.92	10.73	2.96	23.36	15.07
Prewash exch. Ca	meq/100g	23.80	19.74	2.79	9.92	9.39	0.36	7.15	12.46
Prewash exch. K	meq/100g	0.50	0.24	0.07	0.27	0.61	0.13	1.10	0.74
Prewash exch. Mg	meq/100g	4.79	5.09	1.39	12.29	6.31	0.76	5.58	5.04

CSBP Lab. Extract Value.

Analysis Results

CSBP Soil and Plant Analysis Laboratory

Customer: Mine Earth Pty Ltd (90423)
PO/Job Name: Mine Earth Pty Ltd
Dates Rec'd: 15/01/2026

	Lab Number	1DYS26060	1DYS26061	1DYS26062	1DYS26063	1DYS26064	1DYS26065	1DYS26066	1DYS26068
	Date Received	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026
	Sample Name 1	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026
	Sample Name 2	BUL-14	BUL-14	BUL-15	BUL-15	BUL-16	BUL-16	BUL-17	BUL-17
	Sample Name 3	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd
	Depth	0-10	10-25	0-10	40-45	0-10	25-45	0-10	90-100
Colour		GRYW	YWBR	DKBR	DKBR	DKBR	BR	DKBR	BR
Gravel	%	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10
Texture		2.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0
Ammonium Nitrogen	mg/kg	2	3	< 1	< 1	< 1	3	< 1	2
Nitrate Nitrogen	mg/kg	2	1	32	35	75	81	< 1	4
Phosphorus Colwell	mg/kg	< 2	< 2	< 2	< 2	3	3	6	< 2
Potassium Colwell	mg/kg	79	58	295	327	66	74	168	69
Sulfur	mg/kg	10.4	15.4	1947.1	1184.2	963.5	1251.7	5.8	56.8
Organic Carbon	%	0.56	0.59	0.40	0.31	0.42	0.41	0.22	0.09
Conductivity	dS/m	0.034	0.026	3.705	2.970	5.308	5.711	0.095	0.519
pH Level (CaCl2)		4.7	4.1	8.1	8.1	7.9	8.0	6.9	7.3
pH Level (H2O)		5.2	4.6	8.5	8.6	8.3	8.3	7.8	8.1
% Clay	%	9.80	11.83	37.22	43.96	47.94	32.51	16.04	19.71
% Coarse Sand	%	68.11	61.08	22.41	21.59	10.30	14.18	45.74	28.35
% Fine Sand	%	19.13	24.11	24.25	23.69	23.77	28.10	30.18	41.53
% Sand	%	87.24	85.19	46.66	45.28	34.07	42.28	75.92	69.88
% Silt	%	2.95	2.97	16.12	10.76	18.00	25.21	8.05	10.40
Prewash exch. Ca	meq/100g	0.58	0.50	12.47	11.28	19.34	19.89	4.17	9.46
Prewash exch. K	meq/100g	0.10	0.09	0.63	0.71	0.15	0.13	0.33	0.18
Prewash exch. Mg	meq/100g	0.11	0.11	8.83	8.97	5.17	4.64	3.67	9.38

CSBP Lab. Extract Value.

Analysis Results

CSBP Soil and Plant Analysis Laboratory

Customer: Mine Earth Pty Ltd (90423)
PO/Job Name: Mine Earth Pty Ltd
Dates Rec'd: 15/01/2026

	Lab Number	1DYS26069	1DYS26084	1DYS26085	1DYS26086	1DYS26087	1DYS26088	1DYS26089	1DYS26090
	Date Received	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026
	Sample Name 1	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026
	Sample Name 2	BUL-18	BUL-02	BUL-02	BUL-03	BUL-03	BUL-04	BUL-04	BUL-05
	Sample Name 3	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd
	Depth	0-10	10-20	40-50	10-20	90-100	10-20	40-50	0-10
Colour		LTBR	BR	BROR	DKBR	BRRD	LTBR	LTBR	BRGR
Gravel	%	5-10	5	5-10	5	5-10	5	5-10	5-10
Texture		3.0	2.5	2.0	2.5	2.5	2.0	2.0	2.5
Ammonium Nitrogen	mg/kg	< 1	2	1	< 1	< 1	< 1	1	2
Nitrate Nitrogen	mg/kg	3	1	5	49	30	18	123	1
Phosphorus Colwell	mg/kg	6	< 2	< 2	2	< 2	4	< 2	6
Potassium Colwell	mg/kg	110	60	58	269	280	135	89	218
Sulfur	mg/kg	3.2	1.9	10.0	209.0	2924.4	3.8	73.8	31.0
Organic Carbon	%	0.53	0.35	0.21	0.32	0.16	0.71	0.62	1.19
Conductivity	dS/m	0.036	0.014	0.155	1.693	4.802	0.173	0.994	0.473
pH Level (CaCl2)		5.6	4.9	7.9	7.8	7.8	7.7	8.0	7.4
pH Level (H2O)		6.6	5.8	8.8	8.4	8.1	8.6	8.7	8.3
% Clay	%	26.94							
% Coarse Sand	%	36.37							
% Fine Sand	%	25.69							
% Sand	%	62.06							
% Silt	%	11.00							
Prewash exch. Ca	meq/100g	5.29	4.53	13.35	19.33	17.12	17.19	12.92	13.99
Prewash exch. K	meq/100g	0.23	0.13	0.12	0.66	0.57	0.30	0.21	0.44
Prewash exch. Mg	meq/100g	2.43	1.42	3.90	8.48	10.14	2.18	5.81	4.91

CSBP Lab. Extract Value.

Analysis Results

CSBP Soil and Plant Analysis Laboratory

Customer: Mine Earth Pty Ltd (90423)
PO/Job Name: Mine Earth Pty Ltd
Dates Rec'd: 15/01/2026

	Lab Number	1DYS26091	1DYS26092	1DYS26093	1DYS26094	1DYS26095	1DYS26096	1DYS26103	1DYS26104
	Date Received	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026
	Sample Name 1	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026
	Sample Name 2	BUL-05	BUL-06	BUL-06	BUL-07	BUL-07	BUL-07	BUL-08	BUL-09
	Sample Name 3	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd
	Depth	10-20	10-20	40-50	10-20	40-50	90-100	10-20	15-30
Colour		DKBR	BR	BROR	BROR	DKBR	DKBR	BRRD	DKBR
Gravel	%	5	5-10	5	5-10	5-10	5-10	5	5
Texture		3.0	2.0	2.0	3.0	3.0	3.0	2.5	3.0
Ammonium Nitrogen	mg/kg	< 1	1	1	< 1	< 1	< 1	< 1	< 1
Nitrate Nitrogen	mg/kg	3	1	3	8	5	4	< 1	< 1
Phosphorus Colwell	mg/kg	< 2	< 2	< 2	< 2	4	< 2	2	4
Potassium Colwell	mg/kg	83	32	46	178	190	227	84	107
Sulfur	mg/kg	68.7	5.4	19.3	3171.0	54.7	2083.0	21.6	16.0
Organic Carbon	%	0.83	0.26	0.10	0.05	0.28	0.13	0.48	0.27
Conductivity	dS/m	1.797	0.030	0.071	3.980	0.815	4.403	0.235	0.620
pH Level (CaCl2)		7.9	4.5	6.5	8.1	8.1	7.6	5.9	7.8
pH Level (H2O)		8.8	5.3	7.3	8.3	9.3	7.9	7.1	8.9
% Clay	%								
% Coarse Sand	%								
% Fine Sand	%								
% Sand	%								
% Silt	%								
Prewash exch. Ca	meq/100g	17.47	3.67	12.87	16.75	10.69	12.66	3.18	22.03
Prewash exch. K	meq/100g	0.20	0.06	0.10	0.38	0.43	0.44	0.20	0.29
Prewash exch. Mg	meq/100g	5.44	3.20	12.59	7.60	7.65	8.54	4.13	5.54

CSBP Lab. Extract Value.

Analysis Results

CSBP Soil and Plant Analysis Laboratory

Customer: Mine Earth Pty Ltd (90423)
PO/Job Name: Mine Earth Pty Ltd
Dates Rec'd: 15/01/2026

	Lab Number	1DYS26105	1DYS26106	1DYS26107	1DYS26108	1DYS26109	1DYS26110	1DYS26111	1DYS26112
	Date Received	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026
	Sample Name 1	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026
	Sample Name 2	BUL-10	BUL-10	BUL-10	BUL-11	BUL-12	BUL-13	BUL-14	BUL-15
	Sample Name 3	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd
	Depth	0-10	10-20	20-35	10-20	10-25	15-30	25-40	10-20
Colour		BR	BR	BR	BR	GRWH	BROR	YWBR	DKBR
Gravel	%	5	5	5	5	5	5	5	5
Texture		2.0	2.5	2.5	2.0	2.5	2.5	2.0	2.5
Ammonium Nitrogen	mg/kg	6	3	1	< 1	< 1	2	1	< 1
Nitrate Nitrogen	mg/kg	5	2	5	3	2	402	< 1	9
Phosphorus Colwell	mg/kg	2	< 2	< 2	4	< 2	< 2	< 2	3
Potassium Colwell	mg/kg	121	31	23	203	72	477	36	207
Sulfur	mg/kg	14.2	19.9	26.5	4.9	44.1	781.0	24.8	41.6
Organic Carbon	%	1.10	0.71	0.33	0.59	0.74	0.20	0.34	0.69
Conductivity	dS/m	0.049	0.067	0.108	0.367	0.173	5.549	0.045	0.732
pH Level (CaCl2)		4.2	4.7	5.0	8.0	4.1	7.9	4.1	7.1
pH Level (H2O)		4.8	5.7	5.9	8.9	4.9	8.2	4.5	8.0
% Clay	%								
% Coarse Sand	%								
% Fine Sand	%								
% Sand	%								
% Silt	%								
Prewash exch. Ca	meq/100g	2.04	3.94	2.70	15.41	0.39	12.15	0.91	5.14
Prewash exch. K	meq/100g	0.22	0.08	0.06	0.53	0.14	0.81	0.07	0.54
Prewash exch. Mg	meq/100g	0.63	1.59	1.47	9.25	0.94	5.83	0.24	7.98

CSBP Lab. Extract Value.

Analysis Results

CSBP Soil and Plant Analysis Laboratory

Customer: Mine Earth Pty Ltd (90423)
PO/Job Name: Mine Earth Pty Ltd
Dates Rec'd: 15/01/2026

Lab Number		1DYS26113	1DYS26114	1DYS26115	1DYS26116	1DYS26117	1DYS26118
Date Received		15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026	15/01/2026
Sample Name 1		12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026	12/01/2026
Sample Name 2		BUL-15	BUL-16	BUL-17	BUL-17	BUL-18	BUL-18
Sample Name 3		Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd	Mine Earth Pty Ltd
Depth		20-40	10-25	10-20	40-50	10-20	20-35
Colour		LTBR	DKBR	DKBR	BROR	BRGR	BRGR
Gravel	%	5	5	5-10	5	5-10	5-10
Texture		2.0	3.0	3.0	2.5	2.5	2.5
Ammonium Nitrogen	mg/kg	1	3	1	3	< 1	< 1
Nitrate Nitrogen	mg/kg	< 1	3	17	8	98	148
Phosphorus Colwell	mg/kg	6	3	3	< 2	4	3
Potassium Colwell	mg/kg	150	136	91	71	82	70
Sulfur	mg/kg	1.5	5.6	7.4	64.4	17.3	28.9
Organic Carbon	%	0.38	0.42	0.26	0.20	0.83	1.05
Conductivity	dS/m	0.023	0.295	0.094	0.706	0.605	1.012
pH Level (CaCl2)		6.3	8.1	6.7	7.6	6.3	7.6
pH Level (H2O)		7.4	9.2	8.0	8.5	6.8	8.1
% Clay	%						
% Coarse Sand	%						
% Fine Sand	%						
% Sand	%						
% Silt	%						
Prewash exch. Ca	meq/100g	2.82	15.94	7.69	9.44	12.49	18.27
Prewash exch. K	meq/100g	0.31	0.30	0.24	0.22	0.23	0.19
Prewash exch. Mg	meq/100g	2.36	4.54	6.91	10.09	4.92	5.91

CSBP Lab. Extract Value.

Analysis Results

CSBP Soil and Plant Analysis Laboratory

Customer: Mine Earth Pty Ltd (90423)
PO/Job Name: Mine Earth Pty Ltd
Dates Rec'd: 15/01/2026

	Lab Number	1DYS26035	1DYS26037	1DYS26038	1DYS26039	1DYS26040	1DYS26041	1DYS26042	1DYS26043
Prewash exch. Na	meq/100g	< 0.10	< 0.10	< 0.10	0.65	1.80	2.04	< 0.10	2.14
Arsenic	ug/kg	2768.46	2055.55	5553.45	4949.93	5027.38	4515.60	1804.98	910.31
Cadmium	ug/kg	4.43	14.05	10.62	32.91	40.62	25.30	41.64	20.45
Chromium	ug/kg	111673.26	83452.35	451829.45	343720.22	813304.12	756623.34	184403.57	63677.32
Cobalt	ug/kg	3616.62	2230.62	6801.07	8033.11	11490.37	11465.28	8393.41	6633.55
Lead	ug/kg	6501.13	4787.10	12414.84	10069.09	20061.03	15376.16	9326.22	3294.82
Molybdenum	ug/kg	625.7	523.8	1400.6	732.2	895.2	728.6	261.1	116.7
Selenium	ug/kg	1023.80	823.10	911.25	436.61	428.98	550.80	110.49	1006.15

CSBP Lab. Extract Value.

Analysis Results

CSBP Soil and Plant Analysis Laboratory

Customer: Mine Earth Pty Ltd (90423)
PO/Job Name: Mine Earth Pty Ltd
Dates Rec'd: 15/01/2026

	Lab Number	1DYS26044	1DYS26045	1DYS26046	1DYS26047	1DYS26048	1DYS26049	1DYS26050	1DYS26051
Prewash exch. Na	meq/100g	1.86	0.80	< 0.10	1.27	0.69	< 0.10	5.18	3.53
Arsenic	ug/kg	1393.58	1116.99	4024.20	4505.72	2919.70	1853.85	4090.45	3643.20
Cadmium	ug/kg	6.90	7.00	6.92	9.96	41.26	16.48	13.85	21.14
Chromium	ug/kg	66387.00	50852.04	203580.83	220299.36	475082.84	211589.26	453746.63	447517.84
Cobalt	ug/kg	4363.10	2515.39	5382.61	12884.85	6862.82	5671.60	7973.84	8973.09
Lead	ug/kg	3759.19	2788.12	12472.83	9351.27	11602.20	8965.67	16068.27	17750.40
Molybdenum	ug/kg	412.0	421.2	652.4	670.0	775.7	405.0	604.3	581.0
Selenium	ug/kg	1590.12	1590.07	858.16	1465.78	646.51	236.77	493.60	570.44

CSBP Lab. Extract Value.

Analysis Results

CSBP Soil and Plant Analysis Laboratory

Customer: Mine Earth Pty Ltd (90423)
PO/Job Name: Mine Earth Pty Ltd
Dates Rec'd: 15/01/2026

	Lab Number	1DYS26052	1DYS26053	1DYS26054	1DYS26055	1DYS26056	1DYS26057	1DYS26058	1DYS26059
Prewash exch. Na	meq/100g	0.18	4.00	0.24	2.84	0.13	0.29	3.22	1.04
Arsenic	ug/kg	2736.62	2642.58	1576.54	2802.20	1830.78	848.80	4443.96	
Cadmium	ug/kg	34.07	24.03	2.48	38.09	40.58	4.42	9.82	
Chromium	ug/kg	300352.82	273438.47	61352.46	311799.13	364588.35	34708.58	148845.66	
Cobalt	ug/kg	10896.43	10478.68	3134.46	19389.32	16648.06	1316.68	8066.86	
Lead	ug/kg	12295.54	12192.00	9991.13	10484.83	10309.01	9122.21	10289.23	
Molybdenum	ug/kg	509.7	722.5	517.0	765.8	386.3	117.5	598.2	
Selenium	ug/kg	262.00	456.85	446.47	756.97	314.29	399.87	49.48	

CSBP Lab. Extract Value.

Analysis Results

CSBP Soil and Plant Analysis Laboratory

Customer: Mine Earth Pty Ltd (90423)
PO/Job Name: Mine Earth Pty Ltd
Dates Rec'd: 15/01/2026

	Lab Number	1DYS26060	1DYS26061	1DYS26062	1DYS26063	1DYS26064	1DYS26065	1DYS26066	1DYS26068
Prewash exch. Na	meq/100g	< 0.10	< 0.10	1.93	2.28	4.32	3.80	0.33	2.38
Arsenic	ug/kg	2435.67	3158.72	2517.82			1803.47	2315.68	2351.02
Cadmium	ug/kg	1.19	0.34	43.61			21.50	24.12	21.79
Chromium	ug/kg	82706.80	101475.31	580881.03			73187.96	587741.92	345509.32
Cobalt	ug/kg	1652.25	2859.52	22466.64			8581.90	16057.17	17723.10
Lead	ug/kg	3962.39	6105.79	14753.44			5251.46	11873.35	13148.96
Molybdenum	ug/kg	701.2	943.3	717.2			276.4	657.6	458.5
Selenium	ug/kg	317.06	600.30	890.79			990.55	301.12	218.30

CSBP Lab. Extract Value.

Analysis Results

CSBP Soil and Plant Analysis Laboratory

Customer: Mine Earth Pty Ltd (90423)
PO/Job Name: Mine Earth Pty Ltd
Dates Rec'd: 15/01/2026

	Lab Number	1DYS26069	1DYS26084	1DYS26085	1DYS26086	1DYS26087	1DYS26088	1DYS26089	1DYS26090
Prewash exch. Na	meq/100g	0.11	< 0.10	0.55	3.47	3.56	0.11	0.77	1.47
Arsenic	ug/kg	1497.34							
Cadmium	ug/kg	27.70							
Chromium	ug/kg	66250.86							
Cobalt	ug/kg	4990.72							
Lead	ug/kg	10041.25							
Molybdenum	ug/kg	397.2							
Selenium	ug/kg	293.96							

CSBP Lab. Extract Value.

Analysis Results

CSBP Soil and Plant Analysis Laboratory

Customer: Mine Earth Pty Ltd (90423)
PO/Job Name: Mine Earth Pty Ltd
Dates Rec'd: 15/01/2026

	Lab Number	1DYS26091	1DYS26092	1DYS26093	1DYS26094	1DYS26095	1DYS26096	1DYS26103	1DYS26104
Prewash exch. Na	meq/100g	4.78	0.12	1.13	2.57	3.53	4.17	2.03	4.00
Arsenic	ug/kg								
Cadmium	ug/kg								
Chromium	ug/kg								
Cobalt	ug/kg								
Lead	ug/kg								
Molybdenum	ug/kg								
Selenium	ug/kg								

CSBP Lab. Extract Value.

Analysis Results

CSBP Soil and Plant Analysis Laboratory

Customer: Mine Earth Pty Ltd (90423)
PO/Job Name: Mine Earth Pty Ltd
Dates Rec'd: 15/01/2026

	Lab Number	1DYS26105	1DYS26106	1DYS26107	1DYS26108	1DYS26109	1DYS26110	1DYS26111	1DYS26112
Prewash exch. Na	meq/100g	< 0.10	0.19	0.22	1.14	0.35	1.19	< 0.10	2.53
Arsenic	ug/kg								
Cadmium	ug/kg								
Chromium	ug/kg								
Cobalt	ug/kg								
Lead	ug/kg								
Molybdenum	ug/kg								
Selenium	ug/kg								

CSBP Lab. Extract Value.

Analysis Results

CSBP Soil and Plant Analysis Laboratory

Customer: Mine Earth Pty Ltd (90423)
PO/Job Name: Mine Earth Pty Ltd
Dates Rec'd: 15/01/2026

	Lab Number	1DYS26113	1DYS26114	1DYS26115	1DYS26116	1DYS26117	1DYS26118
Prewash exch. Na	meq/100g	0.11	2.19	1.43	3.15	0.36	0.64
Arsenic	ug/kg						
Cadmium	ug/kg						
Chromium	ug/kg						
Cobalt	ug/kg						
Lead	ug/kg						
Molybdenum	ug/kg						
Selenium	ug/kg						

CSBP Lab. Extract Value.

APPENDIX 4. SURVEY FOR SHORT RANGE ENDEMIC FAUNA FOR THE BULLABULLING GOLD PROJECT (INVERTEBRATE SOLUTIONS, 2022)

Survey for Short Range Endemic Fauna for the Bullabulling Gold Project, Bullabulling, Western Australia.



NORTON GOLD FIELDS PTY LTD

Report by *Invertebrate Solutions Pty Ltd*
for Norton Gold Fields Pty Ltd

March 2022

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Report Number 2021ISJ09_F01_20220303

Prepared for: Norton Gold Fields Pty Ltd

Frontispiece: Bullabulling vegetation

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Executive Summary

Norton Goldfields Pty Ltd (Norton) is proposing to recommence mining and processing activities at the Bullabulling Gold Project (the Project) located 25km west of Coolgardie in the Goldfields region of Western Australia. Associated infrastructure proposed includes waste rock landforms, a heap leach facilities, processing plant, run-of-mine, ore stockpiles, power generation, workshops, administration buildings and roads (haul and LV) are proposed. The proposed activities encompass a Project area of approximately 3,587 ha.

Invertebrate Solutions has been requested by Norton to undertake a baseline field survey for Short Range Endemic (SRE) invertebrates for the Project. The survey is to support environmental approvals required under Commonwealth and State legislation.

The Desktop Study Area contains no Confirmed or Likely SRE species, and one Possible SRE species, an undescribed Bothriembryon land snail. The remaining species identified from desktop resources were found to be widespread. An additional five conservation significant invertebrates (widespread, non-SRE species) were identified in the desktop assessment; however, none have potential habitat within the survey area.

The SRE field survey recorded 58 individual specimens representing 10 taxa of invertebrates from four classes, six orders and nine families that have the potential to contain SRE taxa (Appendix 4). Species that are considered to be SRE are summarised in Table 7. No Confirmed, or Likely SRE species were recorded during the field survey.

Four Possible SRE species were recorded, primarily due to the groups being considered data deficient:

- the mygalomorph spiders *Aname sp.'bullabulling-DNA'* and *Idiosoma sp.'bullabulling - DNA'*
- the pseudoscorpions *Protochelifer cf. cavernerum* and all Olpiidae sp.

The majority of the species are classified Possible SRE taxa is due to incomplete taxonomy and unknown species distributions. The two Possible SRE mygalomorph species were recorded at multiple locations during the survey indicating that their distributions are wider than the current survey could determine.

The majority of species recorded are widespread across the Goldfields and/or arid Western Australia.

No further survey work for SRE invertebrate is necessary in order to meet the Technical Guidance – Sampling of short range endemic invertebrate fauna (EPA 2016).

1. Introduction

Norton Goldfields Pty Ltd (Norton) is proposing to recommence mining and processing at the Bullabulling Gold Project (the Project) located 25km west of Coolgardie in the Goldfields region of Western Australia. Associated infrastructure proposed includes waste rock landforms, a heap leach facilities, processing plant, run-of-mine, ore stockpiles, power generation, workshops, administration buildings and roads (haul and LV) are proposed. The proposed activities encompass a Project area of approximately 3,587 ha.

Invertebrate Solutions has been requested by Norton to undertake a baseline field survey for Short Range Endemic (SRE) invertebrates for the Project. The survey is to support environmental approvals required under Commonwealth and State legislation.

Short range endemic (SRE) invertebrates occur within terrestrial habitats and possess naturally restricted ranges and poor dispersal capabilities. The high degrees of local endemism and lack of habitat connectivity makes SRE fauna susceptible to high levels impacts from sometimes localised projects, with species' extinction a real possibility if they are not adequately considered during project planning phases. The Project is located within the Great Western Woodland that is known to contain numerous SRE species.

1.1 Purpose of this report

Invertebrate Solutions has been requested by Norton to undertake the following scope of works within the Bullabulling project area, Goldfields, Western Australia:

- Undertake a desktop assessment for SRE invertebrates to determine known SRE fauna in the area, as well as habitats in which they likely occur.
- Summarise previous SRE surveys for the Norton tenements and other relevant studies from the region.
- Undertake a level 2 field survey for SRE invertebrates within the entire Project area (SRE Level 2 survey area as shown in Figure 1) to enable a thorough understanding of the local distribution of all previously identified and any newly recorded potential SRE taxa.
- Identify to the lowest practical taxonomic unit all relevant specimens recorded during the level 2 survey for SREs, including the use of molecular techniques as required.
- Where data are sufficient (more than three different locality records), map the occurrence and potential extent of SREs and their associated habitats.
- Provide SRE habitat mapping for the Level 2 survey area based upon supplied vegetation/and or vertebrate fauna habitat mapping.
- Provide recommendations and any suggested requirements for further work to comply with relevant legislation.
- Provide a written report containing the above items.

- Provide all spatial data in electronic format and data packages in accordance with the Index of Biodiversity Surveys for Assessments (IBSA) (EPA 2018).

The desktop assessment and field survey program will be undertaken with regard to Technical Guidance Sampling of short range endemic invertebrate fauna (EPA 2016).

1.2 Desktop Study area and Project area

The Bullabulling Gold Project is located at the locality of Bullabulling, approximately 25 km west of Coolgardie townsite in the Goldfields region of Western Australia and is shown in Figure 1.

The Desktop Study area includes an approximately 50 km sided rectangle (~260,000 Ha) bounded by the north west corner (30.803708°S, 120.645245°E) and the south east corner (31.255477°S, 121.184684°E) centred on the Bullabulling Gold project and was used for the purposes of database searches and relevant literature.

The Project area includes the vegetated area and previous mining disturbance area as defined in Figure 1. The SRE field survey was undertaken within the Project area (Figure 1).

1.3 Survey Effort and Timing

Invertebrate Solutions completed a single season SRE survey at the Bullabulling Gold Project area between the 20th – 23rd September 2021. This comprised of 30 sites throughout the Project area which were actively sampled for SRE invertebrates including litter sifting and hand searching of appropriate microhabitats (Table 1, Appendix 3). All coordinates in UTM are using datum GDA and located in Zone 51J. A map showing the locations of the SRE sampling sites in relation to existing features is shown in Figure 2.

Rainfall during 2021 was above average compared with the long-term average for the local region in the first half of the year (Location 012038) (Plate 1), and especially in winter months and the survey period of September was suitable for sampling SRE invertebrates in the context of EPA Technical guidance, sampling of short range endemic invertebrate fauna (EPA 2016).

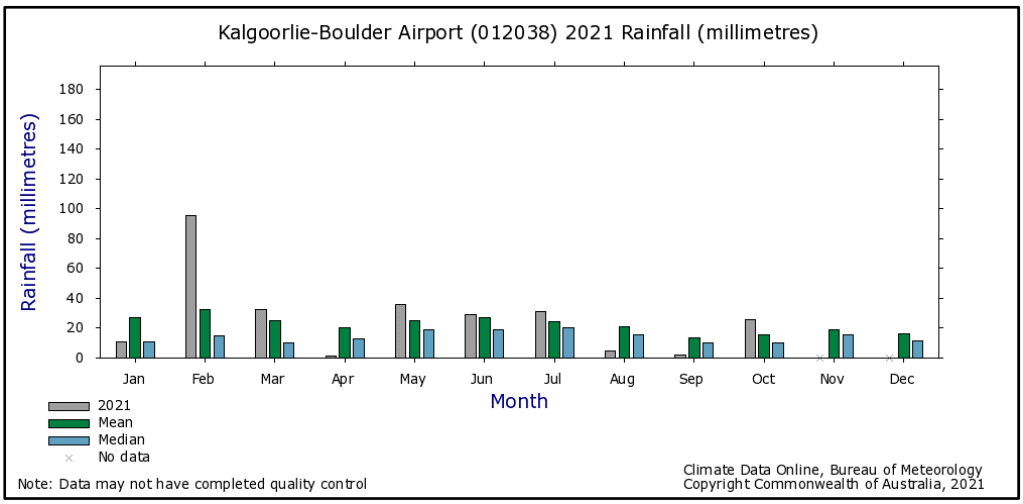
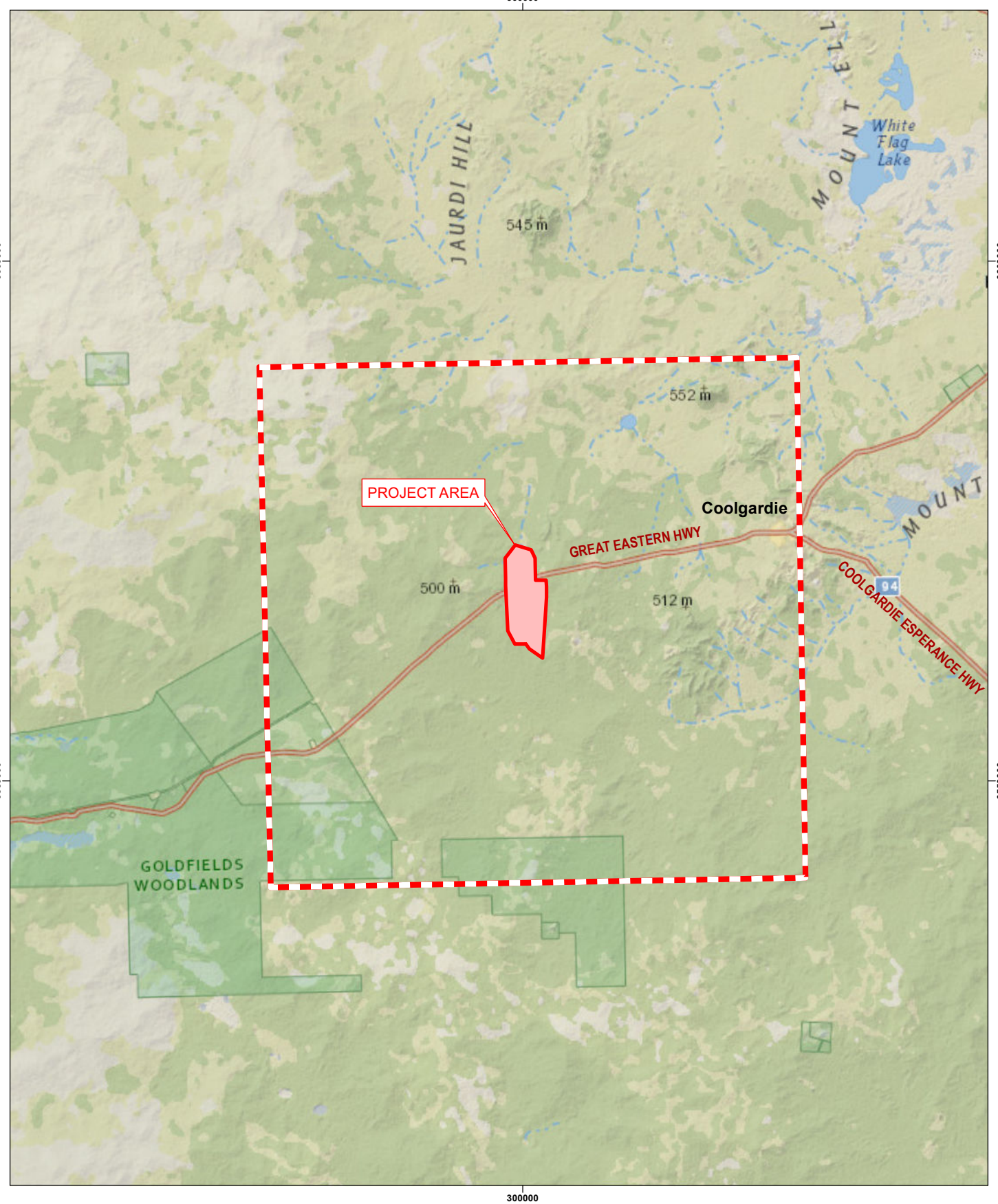


Plate 1 Mean rainfall and rainfall recorded in 2021 for Kalgoorlie-Boulder Airport (Source www.bom.gov.au)

Table 1 Locations actively searched for SRE invertebrates

Sample Site	Easting	Northing	Habitat	Active search date
BULSRE01	302227	6273985	Low Eucalyptus woodlands with mixed shrubs	21/09/2021
BULSRE02	302075	6273322	Eucalyptus woodlands over Eremophila or chenopod low open heaths and shrublands	21/09/2021
BULSRE03	301548	6275134	Melaleuca and Acacia tall scrub	21/09/2021
BULSRE04	301954	6271327	Eucalyptus woodlands over Eremophila or chenopod low open heaths and shrublands	21/09/2021
BULSRE05	302065	6271377	Eucalyptus woodlands over Eremophila or chenopod low open heaths and shrublands	20/09/2021
BULSRE06	301806	6271312	Acacia thickets on flow lines and ephemeral creeks	20/09/2021
BULSRE07	301784	6272368	Melaleuca and Acacia tall scrub	20/09/2021
BULSRE08	301569	6272946	Open Eucalyptus woodlands on sheet flows and ephemeral flow line	21/09/2021
BULSRE09	301406	6273712	Eucalyptus woodlands with mixed shrubs	21/09/2021
BULSRE10	301633	6273712	Allocasuarina dominate tall shrubland	21/09/2021
BULSRE11	301354	6273491	Eucalyptus woodlands over Eremophila or chenopod low open heaths and shrublands	21/09/2021
BULSRE12	301089	6274107	Eucalyptus woodlands with mixed shrubs	21/09/2021
BULSRE13	302174	6275027	Eucalyptus woodlands over Eremophila or chenopod low open heaths and shrublands	20/09/2021
BULSRE14	302508	6274324	Acacia thickets on flow lines and ephemeral creeks	20/09/2021
BULSRE15	302370	6273380	Eucalyptus woodlands over Eremophila or chenopod low open heaths and shrublands	20/09/2021
BULSRE16	302407	6272735	Melaleuca and Acacia tall scrub	21/09/2021
BULSRE17	304932	6274963	Allocasuarina dominate tall shrubland	21/09/2021
BULSRE18	304934	6274644	Low Eucalyptus woodlands with mixed shrubs	21/09/2021
BULSRE19	304797	6274205	Low Eucalyptus woodlands with mixed shrubs	22/09/2021
BULSRE20	304527	6273919	Melaleuca and Acacia tall scrub	22/09/2021
BULSRE21	303987	6273412	Eucalyptus woodlands with mixed shrubs	21/09/2021
BULSRE22	304621	6273355	Allocasuarina dominate tall shrubland	20/09/2021
BULSRE23	301207	6274822	Tall shrublands over *Triodia tomentosa* on sandy loams	21/09/2021
BULSRE24	300994	6274480	Eucalyptus woodlands with mixed shrubs	21/09/2021
BULSRE25	300947	6272979	Acacia thickets on flow lines and ephemeral creeks	22/09/2021
BULSRE26	301614	6271765	Open Eucalyptus woodlands on sheet flows and ephemeral flow line	22/09/2021
BULSRE27	301998	6271107	Eucalyptus woodlands over Eremophila or chenopod low open heaths and shrublands	22/09/2021
BULSRE28	302763	6271077	Eucalyptus woodlands with mixed shrubs	22/09/2021
BULSRE29	302650	6271491	Open Eucalyptus woodlands on sheet flows and ephemeral flow line	22/09/2021
BULSRE30	302257	6272157	Eucalyptus woodlands with mixed shrubs	22/09/2021



Legend

- Dekstop Study Area
- Project Area

0 3.75 7.5 15 km

Scale: 1:500,000 @ A4

N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP



- LOCALITY MAP SOURCED FROM LANDGATE
- NATGEO WORLD MAP FROM OPEN SOURCE

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PROJECT ID	DATE
Bullabulling Gold SRE Assessment	11/02/2022

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 51

CREATED	CHECKED	APPROVED	REVISION
ENVIRONMAPS	TM	TM	0

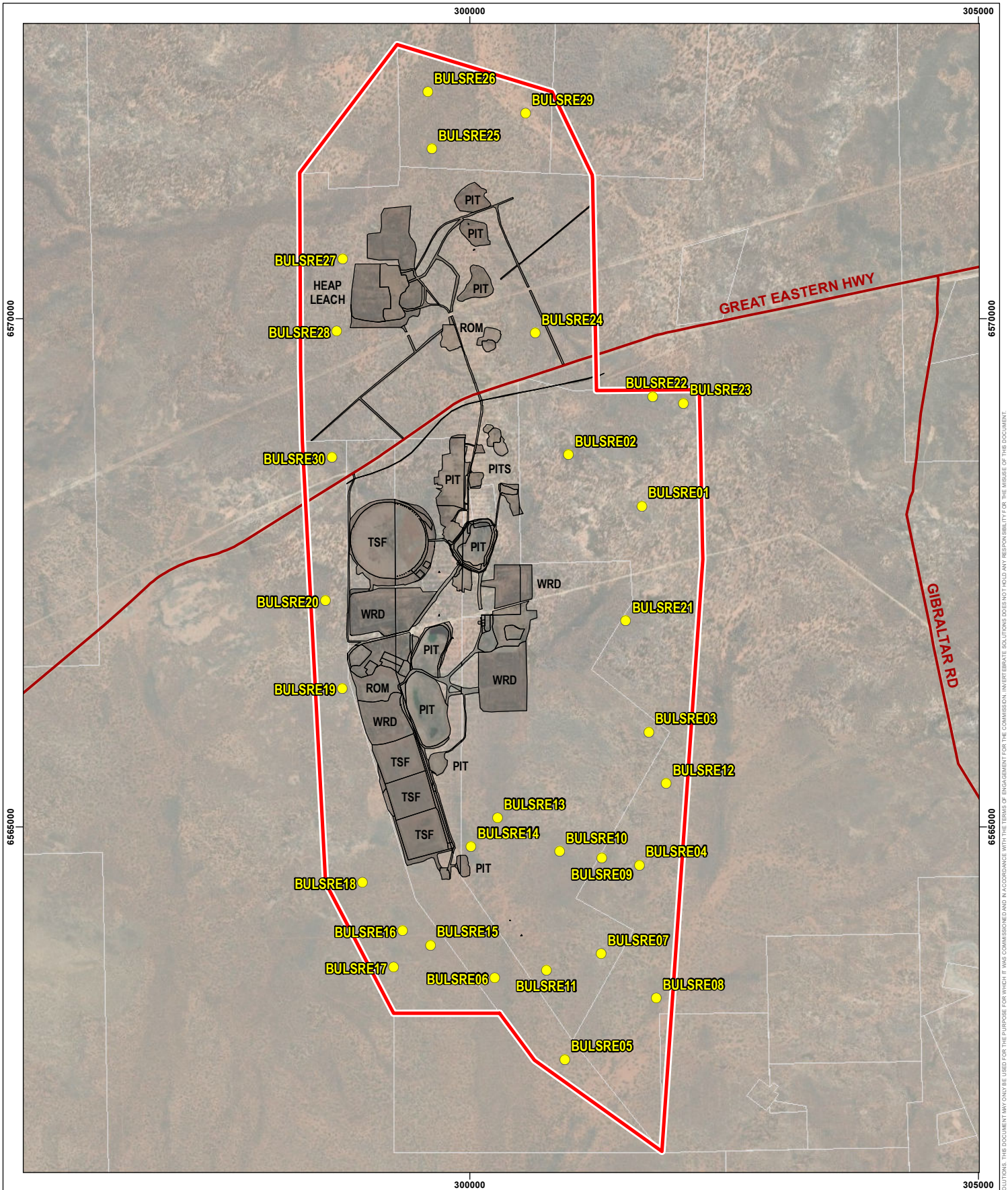
Norton Goldfields Pty Ltd

Figure 1
Desktop Study Area and Project Area

ENVIRONMAPS t: 0406 590 006 Environmental Mapping Solutions www.environmaps.com.au

C:\GIS\Jobs\Invertebrate Solutions\Bullabulling Gold Project SRE Assessment\Figures\BGP-SRE_F01 Desktop Study Area and Project Area_220211.mxd

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Legend

- Project Area
- Tenement
- Site Layout
- SRE Sample Location

0 0.375 0.75 1.5 km

Scale: 1:50,000 @ A4

N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP



- LOCALITY MAP SOURCED FROM LANDGATE
- ORTHOPHOTO FROM OPEN SOURCE

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PROJECT ID	DATE
Bullabulling Gold SRE Assessment	3/03/2022

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 51

CREATED	CHECKED	APPROVED	REVISION
ENVIRONMAPS	TM	TM	0

Norton Goldfields Pty Ltd

Figure 2
SRE Sample Locations Within the Project Area

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1.4 Introduction to SRE fauna

Short range endemic (SRE) invertebrates are species with restricted distributions. The isolation of invertebrates in specific habitats or bioregions leads to endemism at various spatial scales. The vast majority of invertebrates are capable of dispersing substantial distances at some phase of their life cycle. Some groups, however, are susceptible to short-range endemism which describes endemic species with restricted ranges, arbitrarily defined in Western Australia as less than 10,000 km^2 (100 km x 100 km) (Harvey, 2002). Taxa that have been more commonly found to contain SRE representatives include:

- Onychophorans (velvet worms);
- Crustaceans (Isopoda);
- Arachnids (mygalomorph spiders, pseudoscorpions, opiliones, scorpions, schizomids);
- Myriapods (millipedes and centipedes);
- Molluscs (land snails); and
- Insects (hemipterans, grasshoppers, butterflies).

SRE invertebrate fauna taxa are generally found in sheltered, relatively mesic environments such as isolated habitats (e.g. boulder piles, isolated hills, dense patches of vegetation, gullies) and can include microhabitats within these environments such as deep leaf litter accumulation, large logs, under bark, cave areas and springs and permanent water bodies.

Many processes contribute to taxa being susceptible to short range endemism. Generally, these factors are related to the isolation of a species which can include the ability and opportunity to disperse, life history, physiology, habitat requirements, and habitat availability. Taxa that exhibit short range endemism generally exhibit poor dispersal, low growth rates, low fecundity and reliance on habitat types that are discontinuous (Harvey, 2002). Taxa that reside within easily isolated habitats surrounded by physical barriers such as islands, mountains, aquifers, lakes and caves are also more susceptible to becoming SRE species often including additional taxa not otherwise generally forming SREs.

Taxa that exhibit short range endemism are particularly vulnerable to disturbance, either natural or anthropogenic, as they are reliant upon specialised and often restricted habitats (often moist) (Framenau, *et al*., 2008). Short range endemic taxa are unable to disperse to *refugia* when their habitats are threatened or destroyed, thus making them a priority for conservation efforts.

The allocation of short-range endemism status can be difficult due to the often-incomplete taxonomic framework of many invertebrate groups and the often frequent need for substantial revision to enable accurate identification. Short Range Endemic status is assigned using the categories described in Table 2, based upon the available information from the Western Australian Museum (WAM) database and discussion with appropriate taxonomic authorities for various invertebrate groups. Insufficient information exists for many invertebrate species due to specimens being juvenile, the wrong sex to allow identification, damaged, or inadequate taxonomic frameworks, precluding the assignment of SRE status.

Table 2 Short Range Endemic Status of Species

SRE Status	Definition
Confirmed	A confirmed SRE species. A known distribution of < 10,000 km^2 (after Harvey 2002). Taxonomy of the group is well known. The group is well represented in collections, or via comprehensive sampling.
Likely	Likely to be a SRE species based upon knowledge of the family/genus, where other closely related species show evidence of short-range endemism. Where habitats containing the specimens show discontinuity within the landscape.
Possible	Based upon existing knowledge of the genus / family there is a possibility that the species may have a restricted range. Where habitats containing the specimens may show discontinuity within the landscape. Possible SRE species may be assigned one of the sub categories below: A. Data deficient i.e. new species, lack of distribution, taxonomic or collecting knowledge, juvenile specimens, wrong sex for identification B. Habitat indicators C. Morphology indicators D. Molecular evidence E. Research and expertise of WAM staff/taxonomic specialists
Widespread	Not a SRE, a wide ranging distribution of > 10,000 km^2

1.5 Conservation Legislation and Guidance Statements

Terrestrial SRE species are protected under state legislation via the newly enacted *Biodiversity Conservation* (BC) Act (2016) which came into force on 1st January 2019, replacing the outdated *Wildlife Conservation* (WC) Act (1950). The new BC Act is aligned with the federal *Environment Protection and Biodiversity Conservation* (EPBC) Act (1999). The assessment of SRE fauna for environmental impact assessment (EIA) is undertaken in Western Australia with regard to Technical Guidance – Sampling of short-range endemic invertebrate fauna (EPA 2016).

At the State level, the BC Act provides a list of species that have special protection as species listed under Part 2 of BC Act. This notice is updated periodically by the Department of Biodiversity, Conservation and Attractions (DBCA) (formerly the Department of Parks and Wildlife (DPaW)) and the current list (November 2019) includes numerous SRE species from the Wheatbelt, South Coast, Murchison and Pilbara regions. Included in the list are crustaceans, arachnids and myriapods that are considered to be "rare or likely to become extinct, as critically endangered fauna, or are declared to be fauna that is in need of special protection" (DPaW 2015). In addition to the specially protected fauna, DBCA also maintains a list of Priority fauna that are considered to be of conservation

significance but do not meet the criteria for formal listing under the BC Act. The Priority fauna list is irregularly updated by DBCA and is now part of the BC Act.

The BC Act now provides the ability for the state government of Western Australia to formally list Threatened Ecological Communities (TECs), along with threatening processes.

The federal EPBC Act protects both species and ecological communities. The most relevant Western Australian listing for SRE fauna is the mygalomorph spider (*Idiosoma nigrum)* that only occurs in the northern Wheatbelt region and is listed as Vulnerable.

1.6 Survey Staff Qualifications

Field sampling for invertebrates was undertaken by an experienced ecologist and comprised of:

- Dr Timothy Moulds *BSc (Hons) Geol., PhD. Invert. Ecol.* (Invertebrate Solutions)

Sampling for SRE invertebrates was undertaken by Dr Timothy Moulds. Invertebrate extraction, sorting and identification was completed by Dr Timothy Moulds. Survey work was undertaken under the collection licences issued by the Department of Biodiversity, Conservation and Attractions:

- BA27000480; Licensee Timothy Moulds (Invertebrate Solutions); Valid until 15/08/2022.

1.7 Report Limitations and Exclusions

This study was limited to the written scope provided to the client by Invertebrate Solutions (12th April 2021) and in Section 1.1. This study was limited to the extent of information made available to Invertebrate Solutions at the time of undertaking the work. Information not made available to this study, or which subsequently becomes available may alter the conclusions made herein. Assessment of potential impacts to SRE fauna was based on proposed development plans provided by the client.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. Invertebrate Solutions has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by Invertebrate Solutions described in this report (this section and throughout this report). Invertebrate Solutions disclaims liability arising from any of the assumptions being incorrect.

Invertebrate Solutions has prepared this report on the basis of information provided by Norton Goldfields Pty Ltd and others (including Government authorities), which Invertebrate Solutions has not independently verified or checked beyond the agreed scope of work. Invertebrate Solutions does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

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Species were identified to the lowest practical taxonomic level, taking into consideration that the taxonomic framework of many invertebrate groups is incomplete and often in need of substantial

revision to enable accurate identification. Short Range Endemic status was assigned using the available information from the WAM database and discussion with appropriate taxonomic authorities for various invertebrate groups. Insufficient information exists for many invertebrate species due to specimens being juvenile, the wrong sex to allow identification, damaged, or inadequate taxonomic frameworks, precluding the assignment of SRE status.

Field surveys for SRE invertebrates require multiple seasonal surveys to fully record all species that may be present in an area, and in varying weather conditions. The current survey was undertaken in a single season and additional surveys at different times of the year may record additional species, however, the combination of collection techniques and the intensity of the survey provides a high degree of certainty that majority of potential SRE invertebrates present within the survey area were recorded.

1.7.1 Survey Specific Limitations

The following specific comments are made with regard to project specific limitations for the Project:

- **Sampling effort** – The single-phase survey included 30 hours of active searching and 30 leaf litter samples extracted in Tullgren funnels that provide a high degree of certainty that the majority of potential SRE invertebrates present at the time of survey were recorded from the Project area.
- **Timing** – The survey was undertaken from 20th – 23rd September, which is two weeks outside of the suggested timing for the Goldfields region (May – August) according to the EPA Technical Guidance – Sampling of short-range endemic invertebrate fauna (EPA 2016). Rainfall was above average in winter months and the following survey period of September was suitable for sampling SRE invertebrates.
- **Methods** – a wide variety of collecting techniques were used including active searching, leaf litter sieving, leaf litter extracted in Tullgren funnels and bark peeling providing a high degree of certainty that the majority of potential SRE invertebrates present at the time of the survey were recorded from the Project area.
- **Habitats sampled** – All significant potential SRE habitats within the Project Area were sampled using a combination of techniques.
- **Access to areas** – No access issues were encountered for the Project, with all areas of the Project area being successfully accessed during the September 2021 survey.

2. Methods

Invertebrate Solutions undertook the following tasks for the single season SRE survey of the Bullabulling Project area:

- SRE desktop assessment based upon Western Australian Museum Records.
- SRE survey of the Project Area (30 sites – 1 hour active searching and leaf litter samples).

The survey program was undertaken with regard to the Technical Guidance – Sampling of short-range endemic invertebrate fauna (EPA 2016).

2.1 SRE Desktop Methodology

A search of the WAM databases for Arachnids, Crustacea and Molluscs was undertaken for potential SRE taxa occurring in the Bullabulling region. In addition, other published reports for the area were examined including vegetation and vertebrate fauna reports by RPS (2013) and Phoenix (2014). The desktop analysis was used to identify any potential SRE species that may occur in the Bullabulling region and target those taxa during the subsequent field survey of the Survey area.

2.1.1 Likelihood of SRE invertebrate occurrence

The likelihood of SRE invertebrate species occurring in the Project area was assessed using a combination of regional and local botanical and landform information and database searches including:

- Analysis of published and unpublished reports concerning SRE invertebrate from the region.
- Botanical and vegetation mapping (Phoenix 2014) and other information available for the Project area.
- Results of a Protected Matters Search from the Federal Government's Department of Agriculture, Water and the Environment (DAWE) website.
- Records of fauna held by the WAM.

Based on the analysis of all available information, potential SRE invertebrate species were assigned a level of likelihood to be present within habitats contained in the Study area of either 'Very Low', 'Low', 'Moderate', 'High', or 'Definite' (Table 3).

The likelihood of SRE invertebrate species to occur in particular habitats within the Project area was assigned using the categories in Table 4.

Table 3 SRE species likelihood of occurrence definitions

SRE Species Likelihood of occurrence	Definition
Definite	The species is confirmed to occur within the Project area.
High	Habitat for the SRE species known to occur within the Project area and known records of the species are within 20 km.
Moderate	Habitat for the SRE species known to occur within the Project area and known records of the species are within 50 km.
Low	The SRE species has been recorded from within 50 km, however, no habitat is present for the species within the Project area.
Very low	No habitat exists for the species within the Project area and no records of the species are within 50 km or the distribution of the species is known well enough to exclude its presence within the Project area.

Table 4 SRE habitat suitability definitions

SRE habitat Likelihood of occurrence	Definition
High	The habitat has a High likelihood of containing SRE species as it has at least three microhabitat factors that support the presence of SRE species such as: SE facing slopes, moisture, rocky areas, habitat isolates, deep leaf litter, mountainous areas, deep gullies or gorges, riparian vegetation, or habitats known to contain SRE species.
Moderate	The habitat has a Moderate likelihood of containing SRE species as it has at least two microhabitat factors that support the presence of SRE species such as: SE facing slopes, moisture, rocky areas, habitat isolates, deep leaf litter, mountainous areas, deep gullies or gorges, riparian vegetation or habitats known to contain SRE species.
Low	The habitat has a Low likelihood of containing SRE species as it has only a single microhabitat factor that support the presence of SRE species such as: SE facing slopes, moisture, rocky areas, habitat isolates, deep leaf litter, mountainous areas, deep gullies or gorges, riparian vegetation or habitats known to contain SRE species.
Nil	No potential habitat exists for SRE species within the vegetation type / condition area. This includes areas that are totally cleared, completely degraded or urbanised. This also includes areas that are dominated by weeds or exotic vegetation species.

2.2 SRE Survey Methodology

The SRE survey was undertaken using a combination of sampling techniques and employed both systematic (timed active searching) and opportunistic (litter collection and transect) sampling. Sites were chosen to maximise SRE habitat including south-facing slopes, gullies, rocky outcrops, dense patches of trees and permanent water bodies. These were selected from previous vegetation mapping available for the Project area, the results of previous SRE surveys and to provide a spatial spread of survey locations throughout the entire Project area as much as possible whilst focussing on the best quality habitat as observed during the field survey.

2.2.1 Active searching

Active searching was undertaken at 30 sites within the Project area, focusing on areas more likely to contain SRE fauna (Appendix 3). Active searching consisted of sifting of soil and/or leaf litter from suitable habitat areas within each site (millipedes and land snails); the raking of leaf litter (millipedes, land snails, centipedes, mygalomorph burrows); examination of vegetative material below logs and bark (pseudoscorpions, centipedes, millipedes), and an examination of (if present) areas of rock outcrops and associated rock piles.

A minimum of one hour of active searching per site was undertaken.

2.2.2 Leaf Litter collection

Leaf litter was collected from each site surveyed and processed in Tullgren funnels for potential SRE fauna. Approximately 3L of leaf litter was collected from each site and stored in sealed plastic garbage bags.

2.2.3 Opportunistic collection

Various areas that may provide habitat for SRE invertebrates were also opportunistically sampled whilst undertaking other surveys in the survey area. This included searching for burrows of mygalomorph spiders and searching under tree bark and logs for potential SRE species.

2.3 Sorting and curation

Sorting for all SRE samples occurred in the Invertebrate Solutions laboratory using a Leica M125 100x dissecting microscope and was undertaken by Dr Timothy Moulds. In the laboratory, fauna was extracted from SRE leaf litter samples using Tullgren funnels and preserved in 80% ethanol. Each taxon was identified to the lowest practical taxonomic rank using published keys and descriptions, and the numbers of each taxon recorded. Each identified taxon was kept in a separate labelled vial and assigned a specimen tracking code. Specimen and site collection data were recorded in an Excel spreadsheet. At the conclusion of the study, all specimens will be lodged at the Western Australian Museum.

2.4 Taxonomy and Nomenclature

Identification of collected invertebrate material was undertaken by Dr Timothy Moulds. Invertebrate groups collected that have no SRE representatives such as ants and flying insects were not identified or reported. The presence of winged adults in most insect groups suggests that they are more capable dispersers and, therefore, less likely to have a restricted range.

The level of specimen identification achievable is dependent on the level of taxonomic knowledge and expertise available. The majority of the taxonomic expertise relating to SRE taxa resides with the staff of the Western Australian Museum, while some groups are also worked on by researchers within other government departments and academic institutions. Taxonomic treatments are available for some invertebrate groups, but not all. The EPA expects that invertebrates collected for identification will be identified to the lowest taxonomic level possible. Ideally, this is to the species level, but there will be limits due to the nature of specimens and the availability of taxonomic keys.

2.5 Molecular sequencing

Specimens that were unable to otherwise be identified using traditional morphological taxonomic approaches due to specimens being the wrong sex, juvenile or damaged were subject to molecular sequencing techniques. Specimens selected for potential molecular identification had a portion of the individual dissected and stored in 100% reagent grade ethanol in a refrigerator to preserve DNA within the samples.

Molecular identification most commonly uses the mitochondrial gene Cytochrome Oxidase 1 (CO1) as 'barcoding' gene to determine species' limits. DNA sequences obtained are matched with those held within various online databases such as the National Center for Biotechnology Information (NCBI - https://www.ncbi.nlm.nih.gov/). Extensive sequencing (and subsequent taxonomic revision) of mygalomorph spiders in Western Australia has been undertaken over the past eight years enabling credible matches of sequences to be obtained for various mygalomorph spiders (e.g. Castalanelli et al. 2014, Rix et al. 2015, Castalanelli et al. 2017, Harvey et al. 2018, Rix at el. 2017, Rix et al. 2018a,b,c). DNA extraction and sequencing was undertaken by Genotyping Australia Pty Ltd with detailed molecular methods listed in Genotyping Australia (2019), (Appendix 5).

2.6 Short Range Endemic Status

Taxonomic groups known to contain SRE representatives were examined in more detail to determine if the specimens collected in this study, are potentially restricted forms. SRE status was assigned after comparison with the morphology and where available molecular sequencing data of other close relatives in the group and current knowledge on their distribution and ecology, where known.

3. Results

3.1 SRE Invertebrates of the Goldfields region

Whilst there are limited systematic surveys for SRE species close to the Project Area there are several studies from the region for various resources projects. A comprehensive SRE survey near Norseman for Pantoro South investigated multiple tenements in Eucalyptus woodland and recorded 204 individual specimens representing 22 taxa of invertebrates from five classes, 12 orders and 21 families that have the potential to contain SRE taxa (Invertebrate Solutions 2021). No Confirmed SRE species were recorded during the field survey, however one Likely SRE species, the millipede *Atelomastix sp. 'B03'* was recorded and four Possible SRE species were recorded.

In the northern Goldfields, the Mt Keith satellite mine expansion project (MWH 2016) south of Leinster comprised of multiple survey seasons and included the Mt Keith disturbance footprint as well the adjacent Wanjarri Nature Reserve. The surveys recorded over 1,500 specimens representing 49 taxa, however, only two species were considered by experts as Confirmed SRE species, four as Likely SRE species and 23 as Potential SRE species.

A baseline survey for SRE invertebrates in the Northern goldfields was undertaken on Cashmere Downs station for Cashmere Iron in 2010. This survey used a wide variety of different trapping techniques to record several likely SRE species including *Antichiropus* millipedes and mygalomorph trapdoor spiders (GHD 2010). No species were found to be restricted to proposed impact areas.

A comprehensive SRE survey was undertaken for the Tropicana Gold Project (Ecologica 2009) located approximately 330 km to the north east of Kalgoorlie between 2006 and 2008 using pitfall traps and active searching. The surveys recorded 46 potential SRE species from within the Tropicana Project area, with three confirmed SRE mygalomorph spiders being recorded only from within proposed impact areas (Ecologia 2009). The habitat for these species was found to be more widespread than the proposed impacts although a monitoring program was initiated to ensure these species were not significantly impacted (EPA 2010).

More widely within the greater Goldfields and Yilgarn areas comprehensive SRE surveys have been undertaken at the Gruyere Gold Project located approximately 100 km to the north east of Laverton. The survey recorded 20 taxa with the potential to contain SRE species, of which eight were determined to be Potential SRE species and the other 12 were found to be widespread (Harewood 2016, Framenau 2015, Volschenk 2015). The Potential SRE species included two species of scorpion, four species of spider, one species of isopod and one species of centipede (Harewood 2016).

Habitats within the wider Goldfields and Yilgarn area that are considered prospective for SRE invertebrates include creek and drainage lines, Banded Iron Formation (BIF) ridges, mesas, stony hills and breakaways. The majority of reported SRE species in the Goldfields and Yilgarn comprise of Camaenid land snails, Mygalomorph spiders, *Urodacus* scorpions, and Antichiropus and *Atelomastix* millipedes (Bamford 2006; Bamford and Bancroft 2006; Bennelongia 2012, Biota 2009; Biota 2011; Car et al. 2013; GHD 2012; Harewood 2016, Ninox 2009, Volschenck 2015).

3.2 SRE Habitat in Project Area

The vegetation units and condition mapping identified in the biological assessment (Phoenix 2014) were used to assess the Project area for potential SRE habitat (Table 5). The vegetation units within the Project area range from Excellent to Completely Degraded, with disturbance due largely to historical gold mining activities and the installation of linear infrastructure that crosses the Project area (Phoenix 2014). The Eucalyptus woodland habitats within the Project area are largely considered to be of Moderate likelihood of containing SRE species (Table 4) due to the known presence of SRE species including *Antichiropus* millipedes, and the increasing diversity of potential SRE mygalomorph spiders identified largely through molecular methods from within the Great Western Woodlands (GWW) (Car and Harvey 2014) that encompasses the Project area and Desktop Study area. It should be noted that no known SRE millipedes have been identified within the Desktop Study area, however, the survey intensity within this area is likely lower than other parts of the GWW and the degree of historical gold mining disturbance is also likely higher than in other parts of the GWW. The specific habitats within the Project area have been assessed in both the wider context and the local vegetation quality and disturbance levels to determine their SRE habitat suitability (Table 4, Table 5). No habitats within the Project area were identified as being highly likely to contain SRE species.

All assessments for likelihood of occurrence of conservation significant and SRE invertebrate species were undertaken with regard to the Technical Guidance – Sampling of short-range endemic invertebrate fauna (EPA 2016).



Plate 2 Open Eucalyptus woodland habitat within the Project area.

Table 5 Vegetation units (modified after Phoenix 2014), habitat suitability for SRE invertebrates and survey effort

SRE Habitat	Description (modified after Phoenix 2014)	SRE Sites surveyed	Area (Ha) and Percent in Project Area	Survey Methods		SRE habitat suitability
				Active Searching	Tullgren funnels	
Acacia thickets on flow lines and ephemeral creeks	Low Open Forest to Low Open Woodland of *Eucalyptus loxophleba* over Open Scrub to Tall Shrubland of *Acacia acuminata*, *Acacia gibbosa* or *Acacia lineolata* and *Eremophila alternifolia* over Low Open Shrubland *(V01)*	BULSRE06, BULSRE14, BULSRE25	181.06 / 5.05%	+	+	Low
Melaleuca and Acacia tall scrub	Low Open Woodland of *Eucalyptus celastroides* subsp. *celastroides* over Tall Shrubland of *Melaleuca pauperiflora and Acacia acuminata, Melaleuca hamata* and *Alyxia buxifolia* over Low Shrubland to Low Open Shrubland (*V02, V05)*	BULSRE03, BULSRE07, BULSRE16, BULSRE20	50.24 / 1.40%	+	+	Moderate
Eucalyptus woodlands over Eremophila or chenopod low open heaths and shrublands	Low Open Forest to Low Open Woodland of *Eucalyptus salmonophloia* or *E. transcontinentalis or E. salubris* over Open Heath to Low Open Shrubland of *Eremophila caerulea (V03, V09)*	BULSRE02, BULSRE04, BULSRE05, BULSRE11, BULSRE13, BULSRE15, BULSRE27	1,712.68 / 47.74%	+	+	Moderate
Low Eucalyptus woodlands with mixed shrubs	Low Woodland to Low Open Woodland of *Eucalyptus loxophleba*, *E. griffithsii*, *E. capillosa* and *Brachychiton gregorii* over Tall Open Shrubland of *Acacia acuminata (V04, V06, V12)*	BULSRE18, BULSRE19	251.74 / 7.02%	+	+	Low
Open Eucalyptus woodlands on sheet flows and ephemeral flow line	Open Woodland of *Eucalyptus salubris* or *Eucalyptus salmonophloia* over Tall Open Shrubland of *Acacia acuminata* and *Eremophila alternifolia* over Low Shrubland to Low Open Shrubland *(V07, V10)*	BULSRE08, BULSRE26, BULSRE29	106.70 / 2.97%	+	+	Moderate
Allocasuarina dominated tall shrubland	Low Woodland to Low Open Woodland of *Eucalyptus oleosa* subsp. *oleosa* over Tall Shrubland of *Allocasuarina acutivalvis*, *Aluta appressa*, *Alyxia buxifolia*, *Trymalium myrtillus*, *Acacia acuminata* and *Eremophila oppositifolia (V08, V14)*	BULSRE10, BULSRE17, BULSRE22	29.57 / 0.82%	+	+	Low
Eucalyptus woodlands with mixed shrubs	Open Woodland of *Eucalyptus clelandii* or *Eucalyptus griffithsii* over Low Woodland to Low Open Woodland of *Eucalyptus griffithsii*, *Eucalyptus loxophleba* and *Eucalyptus capillosa* over Open Scrub to Tall Open Shrubland of *Acacia acuminata*, *Eremophila oppositifolia* and *Alyxia buxifolia (V11)*	BULSRE01, BULSRE09, BULSRE12, BULSRE21, BULSRE24, BULSRE28, BULSRE30	676.31 / 18.85%	+	+	Moderate
Tall shrublands over *Triodia tomentosa* on sandy loams	Low Open Woodland of *Eucalyptus griffithsii* and *Eucalyptus oleosa* over Tall to Tall Open Shrubland of *Allocasuarina acutivalvis*, *Acacia resinimarginea* over Very Open Tussock Grassland of *Triodia tomentosa (V13)*	BULSRE23	8.58 / 0.24%	+	+	Moderate
Cleared / Degraded	*Cleared or degraded land*	-	570.41 / 15.90%	-	-	Nil

3.3 SRE and Conservation Significant Fauna in the Desktop Study Area

A list of conservation significant fauna for the Desktop Study Area was compiled from the DBCA Specially Protected Fauna Notice 2019 (DBCA 2019) and the DAWE's Protected Matters Search Tool (PMST). SRE species that are listed under the BC Act and/or the EPBC Act and are likely to occur or have known habitat within the Desktop Study Area are shown in Table 6 along with their conservation code. The PMST results listed no known SRE or conservation significant invertebrate fauna within 50 km of the Project area. A full description of the BC and DBCA conservation codes are shown in Appendix 1. The full list of species obtained from the PMST search is shown in Appendix 2.

A search of the WAM databases for potential SRE taxa occurring in the broader Desktop Study Area centred on the Project was undertaken (WAM 2021a, b, c). The results of these were filtered for SRE species as shown in Table 6. Definitions for SRE status are found in Table 1.

The records held by the WAM are not exhaustive and represent only specimens within the WAM collections that have been databased. The Entomology, Mollusc and Crustacean collections remain largely un-databased. Specimens identified to genus level only, have been excluded from the analysis as it is impossible to determine if they represent a SRE taxa.

The Desktop Study Area contains no Confirmed or Likely SRE species, and one Possible SRE species (Table 6). The species is listed below:

- One land snail (*Bothriembryon sp.*) – Possible SRE species

The remaining species identified from desktop resources were found to be widespread.

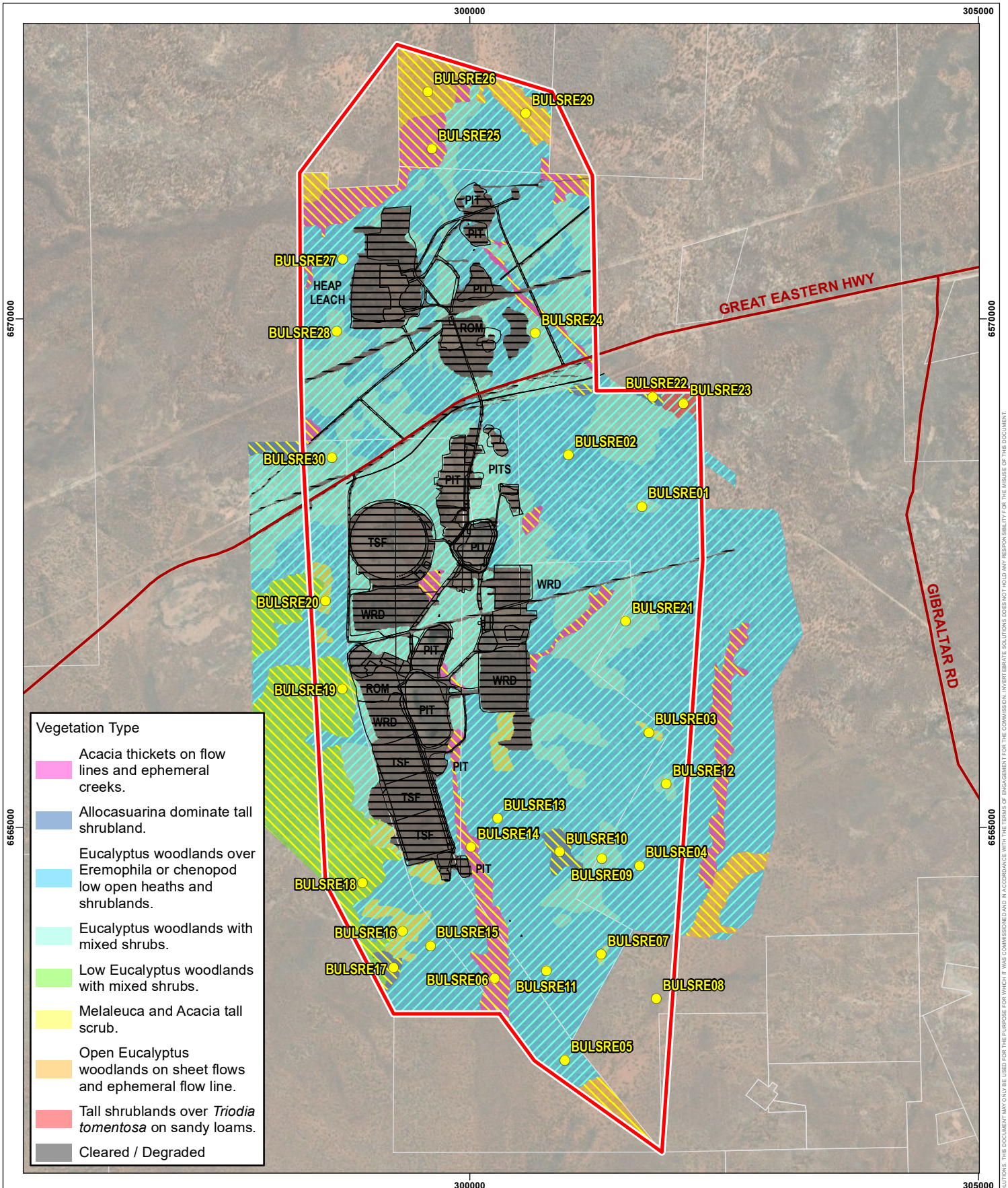
An additional five conservation significant invertebrates (widespread, non-SRE species) were identified in the desktop assessment:

- A fairy shrimp - *Branchinella simplex* – DBCA Priority 1
- A fairy shrimp - *Branchinella denticulata*– DBCA Priority 3
- A mygalomorph spider – *Idiosoma intermedium* - DBCA Priority 3
- A butterfly – The Inland Hairstreak (*Jalmenus aridus*) – DBCA Priority 1
- A butterfly – The Arid Bronze Azure Butterfly (*Ogyris subterrestris petrina*) – BC Act Critically Endangered / EPBC Act Critically Endangered

Of these five conservation significant species none are considered as having potential habitat within the Project area. The Arid Bronze Azure Butterfly (*Ogyris subterrestris petrina*) was not identified as occurring, or having potential habitat within 50 km of the Project area using the PMST.

Table 6 SRE and conservation significant Invertebrates recorded from the Desktop Study Area.

Higher Classification	Genus and Species	SRE status	DBCA / BC Act Conservation Status	EPBC Conservation Status	Likely habitat present in Project area	Desktop likelihood of species within the Project Area
Gastropoda:						
Bothriembryontidae	*Bothriembryon sp.*	Possible	-	-	Present	High
Crustacea:						
Thamnocephalidae	*Branchinella denticulata*	Widespread	Priority 3	-	Not present	Low
	Branchinella simplex	Widespread	Priority 1	-	Not Present	Low
Arachnida:						
Araneae: Mygalomorphae						
Idiopidae	*Idiosoma intermedium*	Widespread	Priority 3	-	Not Present	Low
Insecta						
Lepidoptera	*Jalmenus aridus*	Widespread	Priority 1		Not present	Low
	Ogyris subterrestris petrina	Widespread	Critically Endangered	Critically Endangered	Not Present	Low



Legend

- Project Area
- Tenement
- Site Layout
- SRE Sample Location

SRE Habitat Suitability

- Moderate
- Low
- Nil

0 0.375 0.75 1.5 km

Scale: 1:50,000 @ A4

N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP



- LOCALITY MAP SOURCED FROM LANDGATE
- ORTHOPHOTO FROM OPEN SOURCE

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PROJECT ID	DATE
Bullabulling Gold SRE Assessment	18/02/2022

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 51

CREATED	CHECKED	APPROVED	REVISION
ENVIRONMAPS	TM	TM	0

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Figure 3
SRE Habitat Mapping

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3.4 SRE Field Survey

The SRE field survey recorded 58 individual specimens representing 10 taxa of invertebrates from four classes, six orders and nine families that have the potential to contain SRE taxa (Appendix 4). Species that are considered to be SRE are summarised in Table 7. No Confirmed, or Likely SRE species were recorded during the field survey.

Four Possible SRE species were recorded primarily due to the groups being considered data deficient:

- the mygalomorph spiders *Aname sp.'bullabulling-DNA'* and *Idiosoma sp.'bullabulling - DNA'*
- the pseudoscorpions *Protochelifer cf. cavernerum* and all Olpiidae sp.

The taxonomy of the Pseudoscorpion family Olpiidae is poorly known and, until further taxonomic resolution has been obtained, all species are considered to be Possible SRE species in Western Australia due to a deficiency in data. Molecular sequencing of Pilbara and other Western Australian specimens is currently being undertaken by the Western Australian Museum and this data will be used in the future to determine if species are widespread or restricted in distribution. It must be stated, however, there is considerable difference between molecular and morphological data, with generic and species boundaries highly uncertain making meaningful results unlikely, except in the medium to long term. Due to the unreliable existing taxonomic framework olpiid specimens are not identified beyond family level.

Six mygalomorph spider specimens were identified using molecular sequencing of the CO1 gene (Appendix 5). Results were obtained for all of the six specimens and sequences were compared with sequences previously uploaded to the NCBI database. Four specimens matched most closely with taxa from the Anamidae genus *Aname* that is currently under taxonomic revision, with numerous cryptic species identified during initial molecular and morphological analysis, some of which are likely to be SRE (Dr Mark Harvey, pers. comm. November 2021). These four specimens did not match closely (~8% divergence) to any previously sequenced specimens and are hence regarded as an undescribed *Aname* species and are considered to be a Possible SRE species

The other two specimens sequenced were found to be part of the mygalomorph family Idiopidae and most closely matched with the non-sigillate group of *Idiosoma* taxa. These two specimens did not match closely (~8% divergence) to any previously sequenced specimens and are hence regarded as an undescribed *Idiosoma* species and are considered to be a Possible SRE species.

The Possible SRE taxa identified in Table 7 are discussed further in Sections 4.1 – 4.2. The majority of species recorded are widespread throughout Western Australia and beyond.

The details of all specimens recorded during the survey including abundance data and individual specimen tracking numbers is shown in Appendix 4.



Plate 3 The burrow of the mygalomorph spider *Idiosoma* sp.'bullabulling–DNA' at site BULSRE09



Plate 4 The mygalomorph spider *Idiosoma* sp.'bullabulling–DNA' excavated from her burrow at site BULSRE30



Plate 5 The mygalomorph spider *Aname* sp.'bullabulling–DNA' excavated from her burrow at site BULSRE13

Table 7 SRE invertebrates recorded during the field survey.

Higher Order	Genus and species	Sites recorded	SRE Status
Mollusca			
Gastropoda			
Pupillidae	*Pupoides adelaide*	BULSRE07	Widespread
Arachnida			
Mygalomorphae			
Anamidae	*Aname sp.'bullabulling-DNA'*	BULSRE03, BULSRE07, BULSRE13, BULSRE24.	Possible (A)
Idiopidae	*Idiosoma* sp.*'bullabulling-DNA'*	BULSRE09, BULSRE30	Possible (A)
Pseudoscorpiones			
Cheliferidae	*Protochelifer cf. cavernerum*	BULSRE29	Possible (A)
Garypidae	*Synsphyronus sp.*	BULSRE13	Widespread
Olpiidae	Olpiidae *sp.*	BULSRE04, BULSRE08, BULSRE09, BULSRE19, BULSRE20, BULSRE21, BULSRE24.	Possible (A)
Scorpionida			
Urodacidae	*Lychas* sp.'austroccidentalis'	BULSRE08, BULSRE09	Widespread
Chilopoda			
Scolopendromorpha			
Scolopendridae	*Arthrohabdus mjobergi*	BULSRE03.	Widespread
Diplopoda			
Polyxenida			
Polyxenidae	*Unixenus attemsi*	BULSRE06, BULSRE09, BULSRE11, BULSRE29.	Widespread
	Unixenus mjobergi	BULSRE04, BULSRE09, BULSRE13.	Widespread

4. Discussion

4.1 SRE Invertebrate Assessment

The SRE field survey recorded four potential SRE invertebrate species from within the Project area. These four taxa are all considered to be Possible SRE species, and no Confirmed or Likely SRE species were recorded (Figure 4, Table 7, Table 8, Appendix 4). The majority of the species determined to be Possible SRE taxa is due to incomplete taxonomy and unknown species distributions. The two Possible SRE mygalomorph species were recorded at multiple locations during the survey (Figure 4) indicating that their distributions are wider than the current survey could determine. The three Possible SRE species (excluding the Olpiid pseudoscorpions as discussed in Section 3.4) are discussed in further detail in Section 4.2.

The desktop assessment of the Desktop Study Area recorded a single Possible SRE land snail species (*Bothriembryon* sp.) that have a High Likelihood of occurrence within the Project area due to numerous records from Coolgardie townsite. This species was not recorded during the SRE survey and due to the large and conspicuous nature of these land snails it is likely that it is not present within the Project area (Table 8).

4.2 Possible SRE species recorded within the Project Area

4.2.1 Arachnida: Mygalomorphae

Anamidae: *Aname* sp.'bullabulling – DNA'

The speciose genus *Aname* occurs throughout Western Australia and with recent taxonomic investigations, it is likely to contain numerous undescribed species, many with reduced geographic ranges (Dr M. Harvey, pers. comm. WAM, Nov 2021). The molecular identification of the four specimens dug from open holed burrows within the Project area (Plate 6) show an approximate 8 – 10% divergence from *Aname* 'MYG212' that is a widespread species occurring from Mt Henry south of Norseman to Yeelirrie indicating that *Aname* sp.'bullabulling – DNA' is a distinct species but still within the genus *Aname*. It is considered to be a Possible SRE species due to an absence of distributional data, however, the presence of *Aname* sp.'bullabulling – DNA' at four locations (Figure 4) indicates that the species is at least locally relatively abundant.



Plate 6 Two of the open holed burrows that contained *Aname* sp.'bullabulling – DNA'

Idiopidae: *Idiosoma* sp.'bullabulling – DNA'

The Idiopidae family and the genus *Idiosoma* were revised using both molecular and morphology in recent years (Rix et al. 2017, 2018d) with the genus divided into sigillate and non-sigillate clades, with many of sigillate species considered of conservation concern (Rix et. al. 2018d, DBCA 2019). The molecular identification of the two specimens dug from burrows with twig moustaches within the Project area show an approximate 6 – 8% divergence from *Idiosoma* 'MYG22' / Idiosoma 'cupulifex group complex' that has various taxa throughout the Wheatbelt region indicating that *Idiosoma* sp.'bullabulling – DNA' is a distinct species but still within the non-sigillate clade of the *Idiosoma*. It is considered to be a Possible SRE species due to an absence of distributional data, The two records of *Idiosoma* sp.'bullabulling – DNA' occurred in the same widespread habitat type of Eucalyptus Woodlands over mixed shrubs (V11) (Figure 4) indicating that the species is at least locally widespread.



Plate 7 The excavated burrow of *Idiosoma* sp.'bullabulling – DNA' at BULSRE30 showing the moustache twig arrangement and the excavated depth of approximately 30 cm.

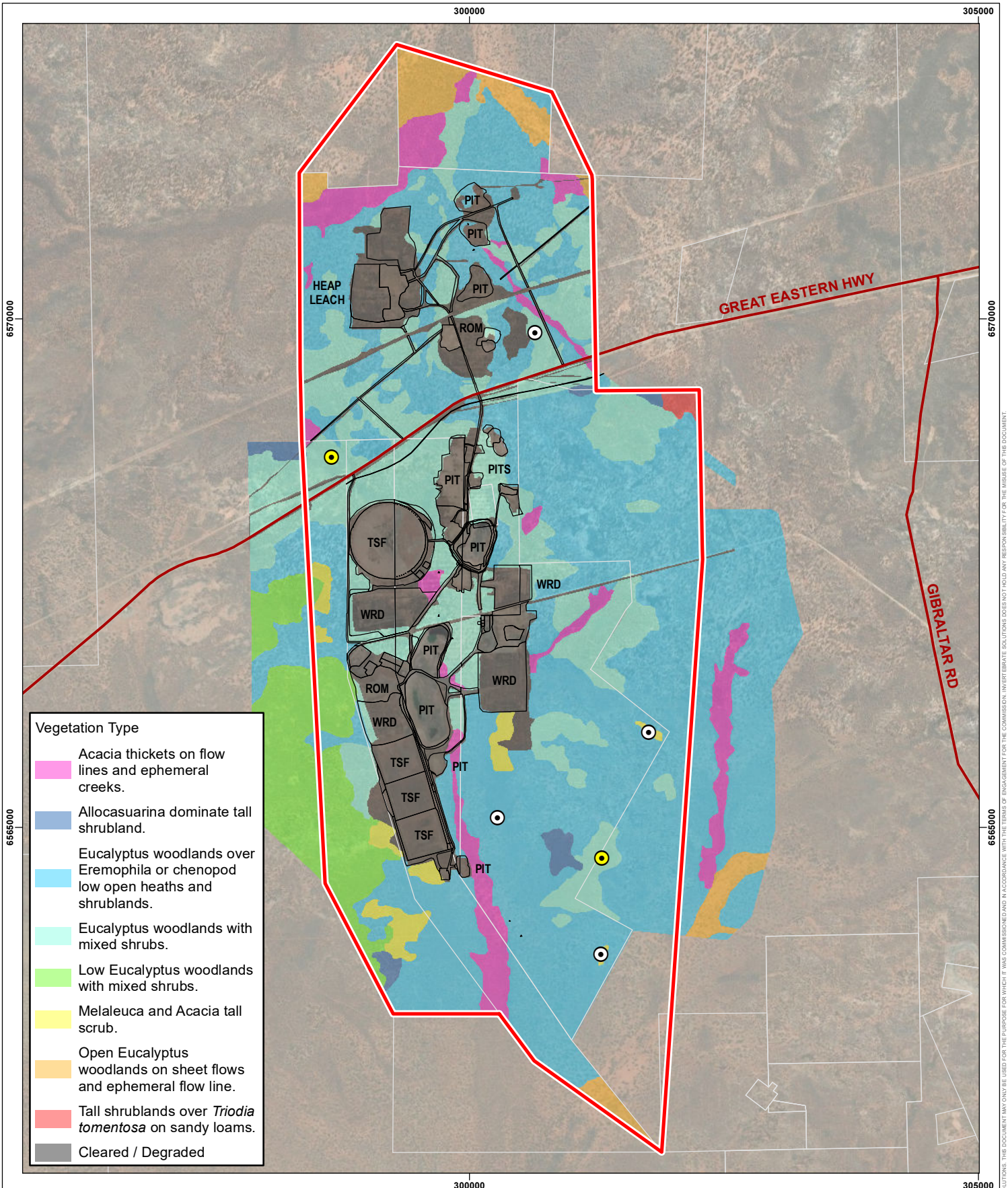
4.2.2 Arachnida: Pseudoscorpionida: Cheliferidae

Protochelifer cf. cavernerum

A single specimen of Cheliferid pseudoscorpion was identified morphologically as being close to the *Protochelifer cavernerum* species complex (Moulds et. al. 2007) that occurs throughout southern Australia. Although primarily associated with caves, the species complex is often found in cave entrance zones sheltering under rocks and it is not uncommon to find species in rocky terrestrial areas. The species is considered a Possible SRE due to an incomplete knowledge of its distribution and the apparent endemism present in other species of the genus (Moulds et. al. 2007).

Table 8 Potential SRE invertebrates Likelihood of occurrence in the Bullabulling SRE Project Area

Higher Order	Genus and species	Known Distribution (WAM or Published records)	Recorded in Project area	SRE Status	Likelihood of species within the Survey area
Mollusca					
Gastropoda					
Bothriembryontidae	*Bothriembryon*	Coolgardie to south of Norseman	No	Possible (A)	Low
Arachnida					
Mygalomorphae					
Anamidae	*Aname sp.'Bullabulling-DNA'*	Survey area	Yes	Possible (A)	Present
Idiopidae	*Idiosoma sp. 'Bullabulling-DNA'*	Survey area	Yes	Possible (A)	Present
Pseudoscorpiones:					
Cheliferidae	Protochelifer cf. cavernerum	Survey area (Moulds et al. 2007)	Yes	Possible (A)	Present
Olpiidae	*Olpiidae sp.*	Insufficient taxonomy	Yes	Possible (A)	Present



Legend

- Project Area
- Tenement
- Site Layout
- Anamidae: *Aname sp.'bullabulling-DNA'*
- Idiopidae: *Idiosoma sp.'bullabulling-DNA'*

0 0.375 0.75 1.5 km

Scale: 1:50,000 @ A4

N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP



- LOCALITY MAP SOURCED FROM LANDGATE
- ORTHOPHOTO FROM OPEN SOURCE

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PROJECT ID	DATE
Bullabulling Gold SRE Assessment	18/02/2022

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 51

CREATED	CHECKED	APPROVED	REVISION
ENVIRONMAPS	TM	TM	0

Norton Goldfields Pty Ltd

Figure 4
Distribution of Possible SRE Mygalomorph spiders

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5. Conclusions and Recommendations

The Desktop Study Area contains no Confirmed or Likely SRE species, and one Possible SRE species, an undescribed Bothriembryon land snail. The remaining species identified from desktop resources were found to be widespread. An additional five conservation significant invertebrates (widespread, non-SRE species) were identified in the desktop assessment; however, none have potential habitat within the Desktop Study area.

The SRE field survey recorded 58 individual specimens representing 10 taxa of invertebrates from four classes, six orders and nine families that have the potential to contain SRE taxa (Appendix 4). Species that are considered to be SRE are summarised in Table 8. No Confirmed, or Likely SRE species were recorded during the field survey.

Four Possible SRE species were recorded primarily due to the groups being considered data deficient:

- the mygalomorph spiders *Aname sp.'bullabulling-DNA'* and *Idiosoma sp.'bullabulling - DNA'*
- the pseudoscorpions *Protochelifer cf. cavernerum* and all Olpiidae sp.

The majority of the species determined to be Possible SRE taxa is due to incomplete taxonomy and unknown species distributions. The two Possible SRE mygalomorph species were recorded at multiple locations during the survey indicating that their distributions are wider than the current survey could determine.

The majority of species recorded are widespread across the Goldfields and/or arid Western Australia.

No further survey work for SRE invertebrate is necessary in order to meet the Technical Guidance – Sampling of short-range endemic invertebrate fauna (EPA 2016).

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Appendix 1

Conservation Codes from Department of Biodiversity, Conservation and Attractions

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

CONSERVATION CODES

For Western Australian Flora and Fauna

Threatened, Extinct and Specially Protected fauna or flora[1] are species[2] which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

The *Wildlife Conservation (Specially Protected Fauna) Notice 2018* and the *Wildlife Conservation (Rare Flora) Notice 2018* have been transitioned under regulations 170, 171 and 172 of the *Biodiversity Conservation Regulations 2018* to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the *Biodiversity Conservation Act 2016.*

Categories of Threatened, Extinct and Specially Protected fauna and flora are:

T **Threatened species**

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for Threatened Fauna.

Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the *Wildlife Conservation (Rare Flora) Notice 2018* for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR **Critically endangered species**

Threatened species considered to be "*facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for critically endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for critically endangered flora.

EN **Endangered species**

Threatened species considered to be "*facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for endangered flora.

VU **Vulnerable species**

Threatened species considered to be "*facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for vulnerable fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for vulnerable flora.

Extinct species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

EX Extinct species

Species where "*there is no reasonable doubt that the last member of the species has died*", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.

EW Extinct in the wild species

Species that *"is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form*", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially protected species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

MI Migratory species

Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

CD Species of special conservation interest (conservation dependent fauna)

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

OS Other specially protected species

Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Published as other specially protected fauna under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

P Priority species

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

1 Priority 1: Poorly-known species

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

2 Priority 2: Poorly-known species

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

3 Priority 3: Poorly-known species

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

4 Priority 4: Rare, Near Threatened and other species in need of monitoring

(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.
(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.
(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

[1] The definition of flora includes algae, fungi and lichens
[2]Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

Appendix 2

Protected Matters Search Tool Results

Australian Government

Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

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.

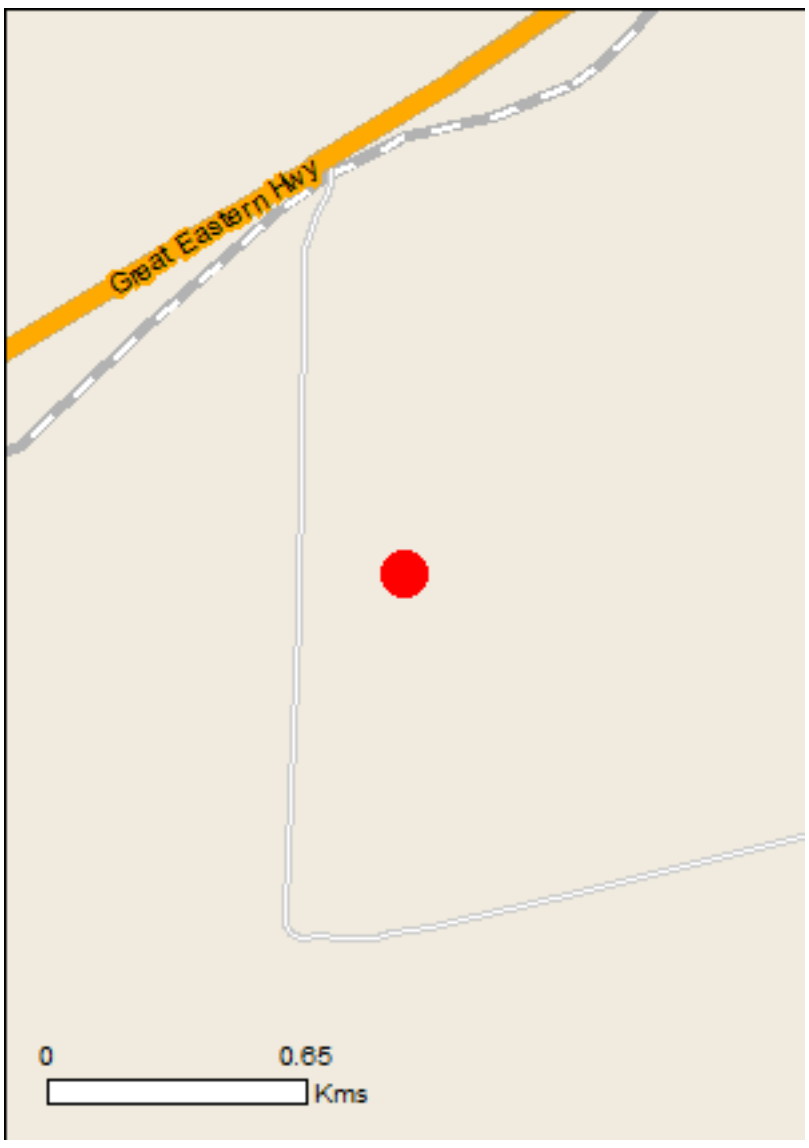
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 09/07/21 12:17:08

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

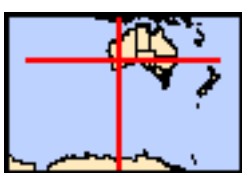
Caveat
Acknowledgements



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2015

Coordinates

Buffer: 0.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	5
Listed Migratory Species:	6

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	9
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	8
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area
Plants		
Gastrolobium graniticum Granite Poison [14872]	Endangered	Species or species habitat likely to occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans		
Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area

Extra Information

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Carrichtera annua Ward's Weed [9511]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-31.00816 120.89497

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Appendix 3

SRE Site locations and habitats

BULSRE01 Eucalyptus woodlands with mixed shrubs	
BULSRE02 Eucalyptus woodlands over dominant Eremophila and or chenopod species	

BULSRE03 Melaleuca and Acacia tall scrub.	
BULSRE04 Eucalyptus woodlands over dominant Eremophila and or chenopod species	

BULSRE05 Eucalyptus woodlands over dominant Eremophila and or chenopod species	
BULSRE06 Acacia thickets on flow lines and ephemeral creeks.	

BULSRE07 Melaleuca and Acacia tall scrub.	
BULSRE08 Open Eucalyptus woodlands on sheet flows and ephemeral flow line.	

BULSRE09 Eucalyptus woodlands with mixed shrubs	
BULSRE10 Allocasuarina dominate tall shrubland.	

BULSRE11 Eucalyptus woodlands over dominant Eremophila and or chenopod species	
BULSRE12 Eucalyptus woodlands with mixed shrubs	

BULSRE13 Eucalyptus woodlands over dominant Eremophila and or chenopod species	
BULSRE14 Acacia thickets on flow lines and ephemeral creeks.	

BULSRE15 Eucalyptus woodlands over dominant Eremophila and or chenopod species	
BULSRE16 Melaleuca and Acacia tall scrub.	

BULSRE17 Allocasuarina dominate tall shrubland.	
BULSRE18 Low Eucalyptus woodlands with mixed shrubs.	

BULSRE19 Low Eucalyptus woodlands with mixed shrubs.	
BULSRE20 Melaleuca and Acacia tall scrub	

BULSRE21 Eucalyptus woodlands with mixed shrubs	
BULSRE22 Allocasuarina dominate tall shrubland.	

BULSRE23 Tall shrublands over *Triodia tomentosa* on sandy loams.	
BULSRE24 Eucalyptus woodlands with mixed shrubs	

BULSRE25 Acacia thickets on flow lines and ephemeral creeks.	
BULSRE26 Open Eucalyptus woodlands on sheet flows and ephemeral flow line.	

BULSRE27 Eucalyptus woodlands over dominant Eremophila and or chenopod species	
BULSRE28 Eucalyptus woodlands with mixed shrubs	

BULSRE29 Open Eucalyptus woodlands on sheet flows and ephemeral flow line.	
BULSRE30 Eucalyptus woodlands with mixed shrubs	

Appendix 4

Specimen abundance and tracking codes

Phylum/ Subphylum	Class	Order	Family	Genus and sp	SRE Status	Abundance	Site	Date	Collection Method	Tracking number	Identified by
Mollusca	Gastropoda	Systellomatomorpha	Pupillidae	*Pupoides adelaidae*	Widespread	1	BULSRE07	20/09/2021	Active searching and leaf litter sifting	ISTN2836	TMoulds
Chelicerata	Arachnida	Mygalomorphae	Idiopidae	*Idiosoma sp. 'Bullabulling DNA'*	Possible A	1	BULSRE09	21/09/2021	Dug from burrow	ISTN2841	TMoulds
Chelicerata	Arachnida	Mygalomorphae	Idiopidae	*Idiosoma sp. 'Bullabulling DNA'*	Possible A	1	BULSRE09	21/09/2021	Leg cut from ISTN2841	ISTN2979	TMoulds
Chelicerata	Arachnida	Mygalomorphae	Idiopidae	*Idiosoma sp. 'Bullabulling DNA'*	Possible A	1	BULSRE30	22/09/2021	Dug from burrow	ISTN2845	TMoulds
Chelicerata	Arachnida	Mygalomorphae	Idiopidae	*Idiosoma sp. 'Bullabulling DNA'*	Possible A	1	BULSRE30	22/09/2021	Leg cut from ISTN2845	ISTN2978	TMoulds
Chelicerata	Arachnida	Mygalomorphae	Anamidae	*Anome sp. 'Bullabulling DNA'*	Possible A	1	BULSRE07	20/09/2021	Dug from burrow	ISTN2837	TMoulds
Chelicerata	Arachnida	Mygalomorphae	Anamidae	*Anome sp. 'Bullabulling DNA'*	Possible A	1	BULSRE07	20/09/2021	Leg cut from ISTN2837	ISTN2938	TMoulds
Chelicerata	Arachnida	Mygalomorphae	Anamidae	*Anome sp. 'Bullabulling DNA'*	Possible A	1	BULSRE24	21/09/2021	Dug from burrow	ISTN2838	TMoulds
Chelicerata	Arachnida	Mygalomorphae	Anamidae	*Anome sp. 'Bullabulling DNA'*	Possible A	1	BULSRE24	21/09/2021	Leg cut from ISTN2838	ISTN2939	TMoulds
Chelicerata	Arachnida	Mygalomorphae	Anamidae	*Anome sp. 'Bullabulling DNA'*	Possible A	1	BULSRE13	20/09/2021	Dug from burrow	ISTN2835	TMoulds
Chelicerata	Arachnida	Mygalomorphae	Anamidae	*Anome sp. 'Bullabulling DNA'*	Possible A	1	BULSRE13	20/09/2021	Leg cut from ISTN2835	ISTN2940	TMoulds
Chelicerata	Arachnida	Mygalomorphae	Anamidae	*Anome sp. 'Bullabulling DNA'*	Possible A	1	BULSRE03	21/09/2021	Dug from burrow	ISTN2843	TMoulds
Chelicerata	Arachnida	Mygalomorphae	Anamidae	*Anome sp. 'Bullabulling DNA'*	Possible A	1	BULSRE03	21/09/2021	Leg cut from ISTN2843	ISTN2937	TMoulds
Chelicerata	Arachnida	Pseudoscorpionida	Cheliferidae	*Protochelifer cf. covernerum*	Possible A	6	BULSRE29	22/09/2021	Leaf litter extracted from tullgren funnel	ISTN2928	TMoulds
Chelicerata	Arachnida	Pseudoscorpionida	Garypidae	*Synsphyronus sp.*	Widespread	16	BULSRE13	20/09/2021	Leaf litter extracted from tullgren funnel	ISTN2757	TMoulds
Chelicerata	Arachnida	Pseudoscorpionida	Olpiidae	Olpiidae sp.	Possible A	2	BULSRE24	21/09/2021	Leaf litter extracted from tullgren funnel	ISTN2761	TMoulds
Chelicerata	Arachnida	Pseudoscorpionida	Olpiidae	Olpiidae sp.	Possible A	1	BULSRE04	21/09/2021	Leaf litter extracted from tullgren funnel	ISTN2742	TMoulds
Chelicerata	Arachnida	Pseudoscorpionida	Olpiidae	Olpiidae sp.	Possible A	1	BULSRE20	22/09/2021	Leaf litter extracted from tullgren funnel	ISTN2764	TMoulds
Chelicerata	Arachnida	Pseudoscorpionida	Olpiidae	Olpiidae sp.	Possible A	4	BULSRE09	21/09/2021	Leaf litter extracted from tullgren funnel	ISTN2929	TMoulds
Chelicerata	Arachnida	Pseudoscorpionida	Olpiidae	Olpiidae sp.	Possible A	6	BULSRE19	22/09/2021	Leaf litter extracted from tullgren funnel	ISTN2760	TMoulds
Chelicerata	Arachnida	Pseudoscorpionida	Olpiidae	Olpiidae sp.	Possible A	1	BULSRE08	21/09/2021	Leaf litter extracted from tullgren funnel	ISTN2931	TMoulds
Chelicerata	Arachnida	Pseudoscorpionida	Olpiidae	Olpiidae sp.	Possible A	1	BULSRE21	21/09/2021	Leaf litter extracted from tullgren funnel	ISTN2736	TMoulds
Chelicerata	Arachnida	Scorpionida	Urodacidae	*Lychas sp. 'australoccidentalis'*	Widespread	1	BULSRE09	21/09/2021	Leaf litter extracted from tullgren funnel	ISTN2737	TMoulds
Chelicerata	Arachnida	Scorpionida	Urodacidae	*Lychas sp. 'australoccidentalis'*	Widespread	1	BULSRE08	21/09/2021	Leaf litter extracted from tullgren funnel	ISTN2741	TMoulds
Myriapoda	Chilopoda	Scolopendromorpha	Scolopendridae	*Arthrorhabdus mjobergi*	Widespread	1	BULSRE03	21/09/2021	Active searching and leaf litter sifting	ISTN2844	TMoulds
Myriapoda	Diplopoda	Polyxenida	Polyxenidae	*Unixenus mjoebergi*	Widespread	1	BULSRE13	20/09/2021	Active searching and leaf litter sifting	ISTN2834	TMoulds
Myriapoda	Diplopoda	Polyxenida	Polyxenidae	*Unixenus mjoebergi*	Widespread	1	BULSRE09	21/09/2021	Active searching and leaf litter sifting	ISTN2842	TMoulds
Myriapoda	Diplopoda	Polyxenida	Polyxenidae	*Unixenus mjoebergi*	Widespread	1	BULSRE04	21/09/2021	Leaf litter extracted from tullgren funnel	ISTN2927	TMoulds
Myriapoda	Diplopoda	Polyxenida	Polyxenidae	*Unixenus ottemsi*	Widespread	1	BULSRE29	22/09/2021	Leaf litter extracted from tullgren funnel	ISTN2735	TMoulds
Myriapoda	Diplopoda	Polyxenida	Polyxenidae	*Unixenus ottemsi*	Widespread	1	BULSRE06	20/09/2021	Active searching and leaf litter sifting	ISTN2756	TMoulds
Myriapoda	Diplopoda	Polyxenida	Polyxenidae	*Unixenus ottemsi*	Widespread	1	BULSRE11	21/09/2021	Active searching and leaf litter sifting	ISTN2754	TMoulds
Myriapoda	Diplopoda	Polyxenida	Polyxenidae	*Unixenus ottemsi*	Widespread	4	BULSRE09	21/09/2021	Leaf litter extracted from tullgren funnel	ISTN2930	TMoulds

Appendix 5

Genotyping Australia Molecular Sequencing report

Unit 3/9 Brodie-Hall Drive
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Genotyping Australia

Final Report

Report No. XYR0012379.0
Supersedes None
Report Date: 27/01/2022

Certificate of Analysis

Client:

Invertebrate Solutions
9 Wing Court
Maylands WA 6051

Tim Moulds
tim@invetrtebratesolutions.com

Sample Log in Detail:

Your Reference	Bullabulling Gold
No of samples:	2
Date samples received:	18/01/2022
Date samples analysed:	27/01/2022

Service	Report detail	Comment
Numbers of DNA Extraction	6	
Numbers of successful PCR (1 to 3)	6/0/0	
Numbers of sequences generated	6	Data to be reviewed and analysed by client

Authorised by:



Dr Daniel Kollehn
Reporting Officer
on 27/01/2022

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Genotyping Australia

Final Report

Report No. XYR0012379.0
Supersedes None
Report Date: 27/01/2022

Table 1.

XY SAMPLE NUMBER	Your Sample ID / Description / Number	Collection Information (Date)	Method Type	Identification	Percentage Match	Accession Number
165718	ISTN2937	21/09/2021 00:00	XYP-300 DNA Barcoding	NA	NA	NA
165719	ISTN2937a	20/09/2021 00:00	XYP-300 DNA Barcoding	NA	NA	NA
165720	ISTN2939	21/09/2021 00:00	XYP-300 DNA Barcoding	NA	NA	NA
165721	ISTN2940	20/09/2021 00:00	XYP-300 DNA Barcoding	NA	NA	NA
165722	ISTN2978	22/09/2021 00:00	XYP-300 DNA Barcoding	NA	NA	NA
165723	ISTN2979	21/09/2021 00:00	XYP-300 DNA Barcoding	NA	NA	NA

www.invertebratesolutions.com



Minerals 260