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1. Proposed Activities

Mineral Mining Services (MMS) is proposing to develop the Think Big Project (the Project), which involves formation of open pit mining voids, waste rock landforms and support infrastructure to extract gold ore for processing.

MMS will require clearing of native vegetation to allow construction and operation of mine activities including:

- Mining voids;
- Waste rock landforms (WRL);
- Run-of-mine (ROM) pad;
- Topsoil stockpiles; and
- Other ancillary infrastructure.

A Mining Development and Closure Plan (MDCP) for the Project will be submitted to Department of Mines, Petroleum and Exploration (DMPE) in conjunction with other supporting approvals required under applicable legislation prior to commencement of activities.

1.1 Location

The Project is located approximately 25 kilometres (km) south-east of Kalgoorlie, in the Goldfields region of Western Australia and lies within the City of Kalgoorlie-Boulder local government area. The Project is situated on a Woolibar Pastoral Lease and is accessed via Goldfields highway. The Project regional location is shown in **Figure 1.**

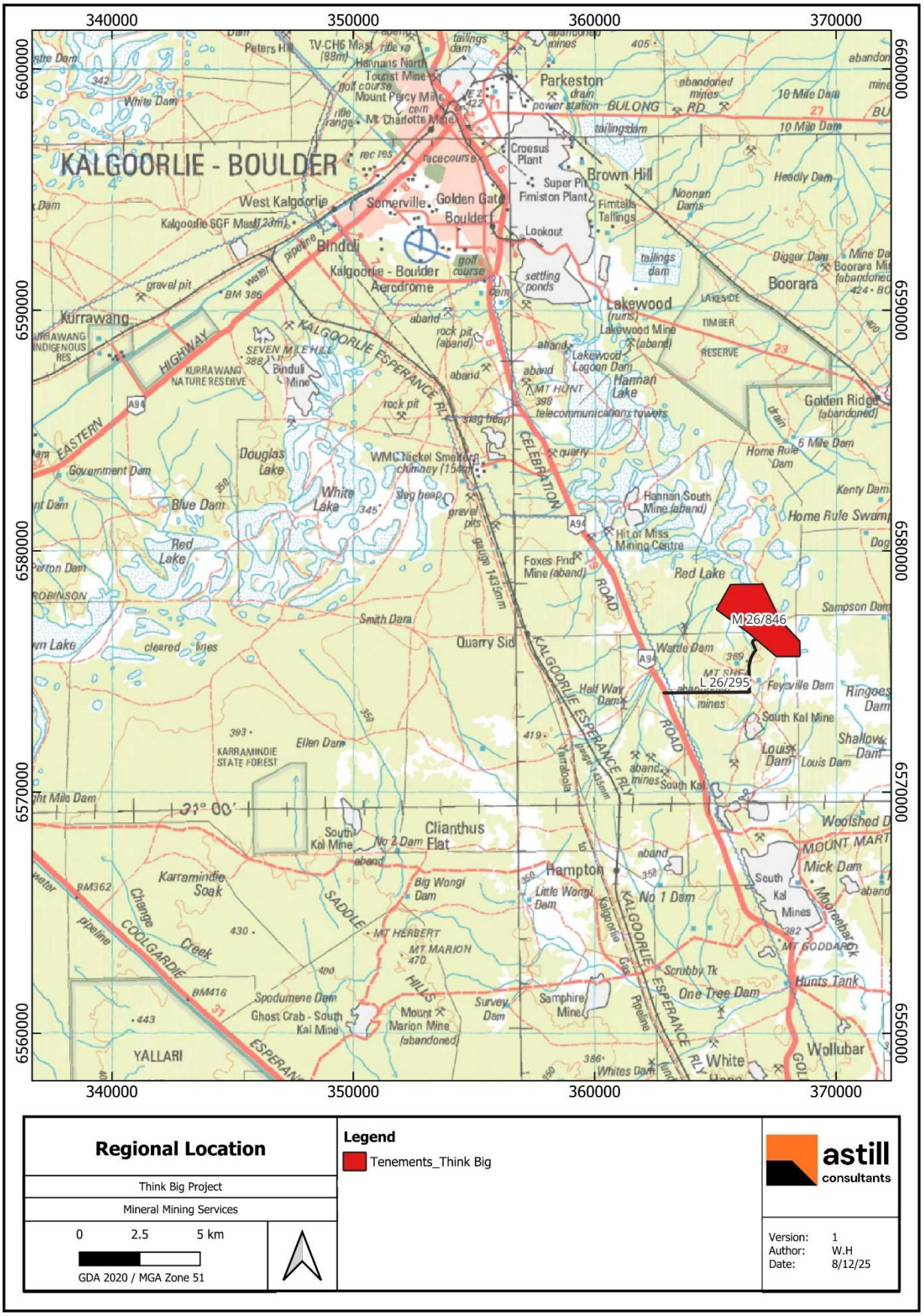
Clearing is proposed on two tenements, mining lease M26/846 and miscellaneous licence L26/295. Tenements are held by Feysville Gold Pty Ltd, a subsidiary of Astral Reosurces who have a partnership with MMS. Tenement details are provided in **Table 1** below.

Table 1: Tenement details

Tenement ID	Holder	Area (ha)	Expiry
M26/846	Feysville Gold Pty Ltd	543	22/12/2046
L26/295	Feysville Gold Pty Ltd	27.97	28/10/2046

1.2 Clearing Envelope

MMS is requesting a total allowable clearing area of 230 ha within a clearing envelope of 570 ha as depicted in **Figure 2** (Note: proposed infrastructure layout is indicative only).



Regional Location

Think Big Project

Mineral Mining Services

0 2.5 5 km

GDA 2020 / MGA Zone 51

Legend

Tenements_Think Big

astill consultants

Version: 1
Author: W.H
Date: 8/12/25

Figure 1: Regional location of the Project

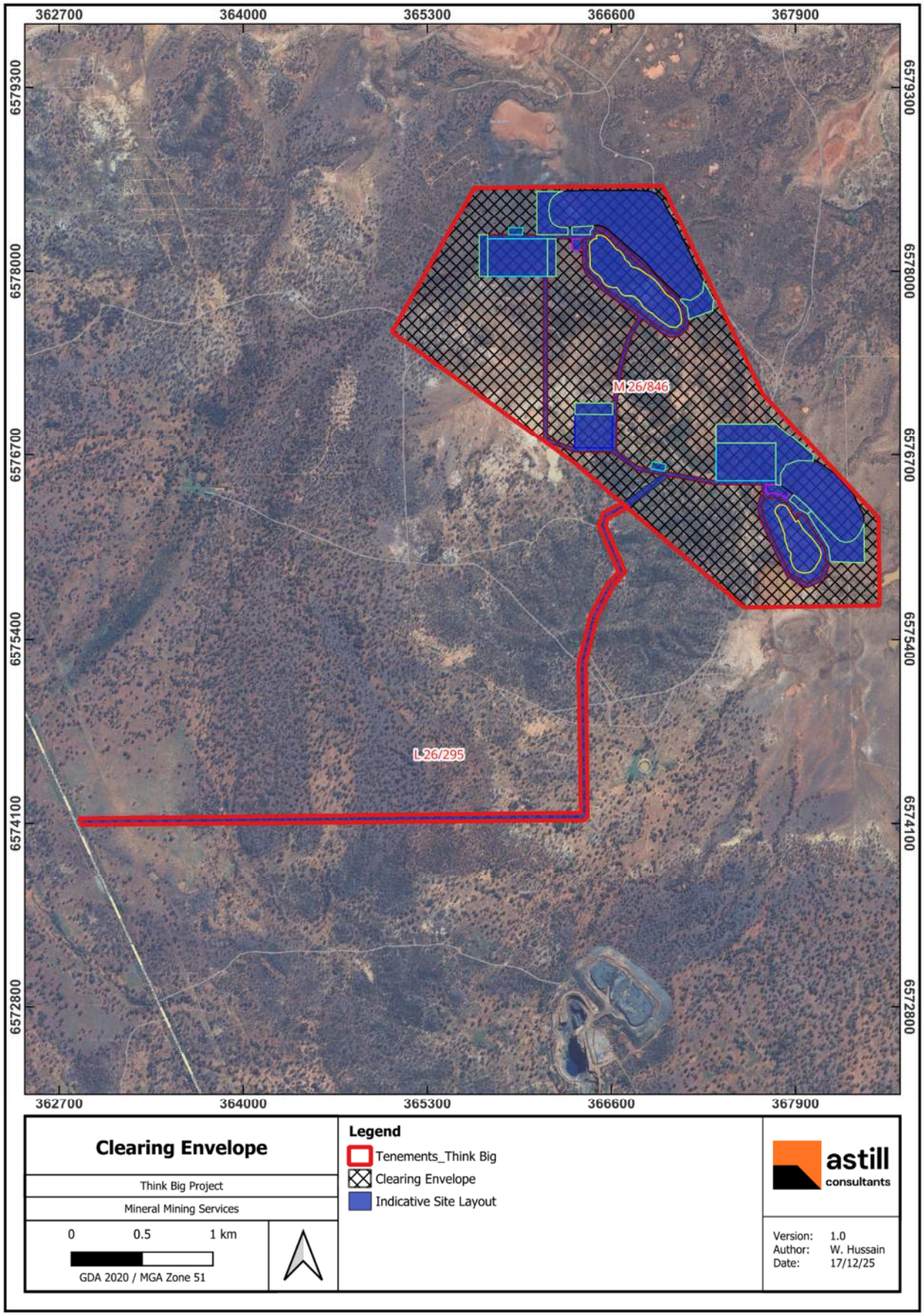


Figure 2: Indicative site plan

2. Environmental Setting

2.1 Climate

The Project is located near Kalgoorlie-Boulder, within the Coolgardie bioregion. Climate in the is characterised as semi-arid, with hot, dry summers and mild winters. Rainfall is low and mainly occurs during winter months. Mean maximum temperatures of the Kalgoorlie-Boulder area range from 33.7°C in January, to 16.9°C in July; mean minimum temperatures range from 18.4°C in January, to 5.1 °C in July (BoM, 2025). Rainfall is irregular but with a relatively even distribution over the year, with mean annual rainfall approximately 266 mm (BoM, 2025). Cyclonic activities in the north of Western Australia can occasionally cause heavy rainfall events and flooding in this area during summer months. Climate data from the Kalgoorlie-Boulder Airport weather station (12038) between 1939 and 2025 (BoM, 2025) is presented in **Figure 3** below.

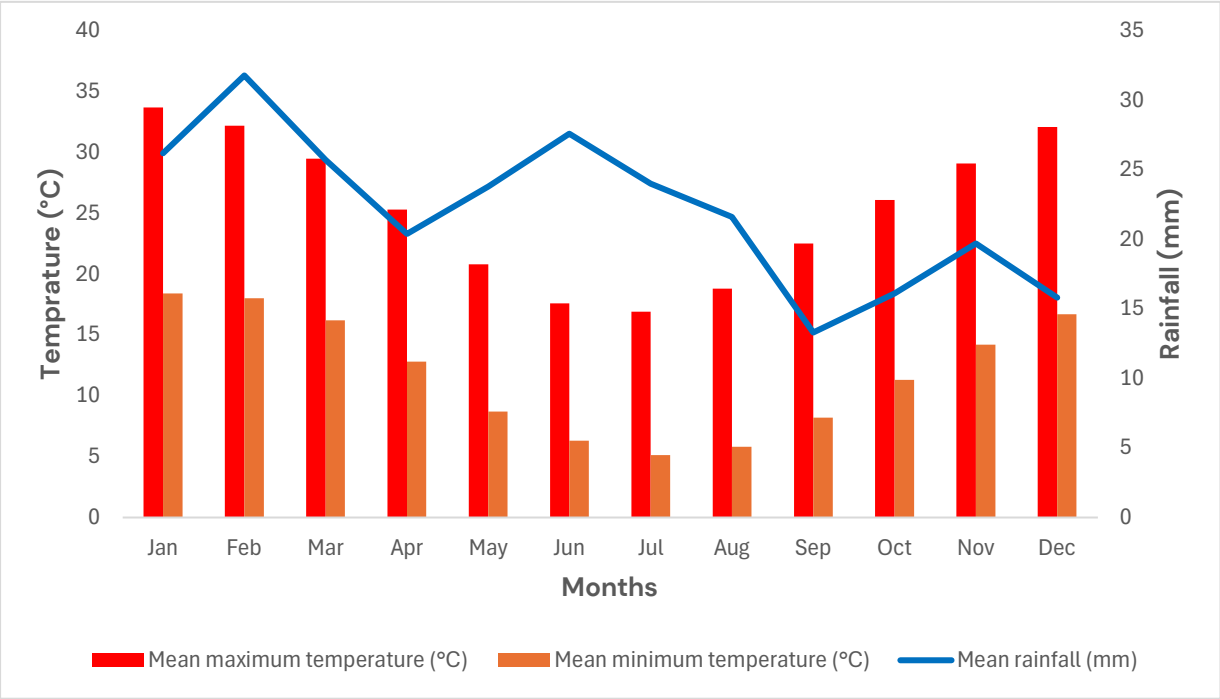


Figure 3: Mean rainfall and climatic data for Kalgoorlie-Boulder

Average long-term annual rainfall (~260 mm) is exceeded by the average annual evaporation rate (~2,600 mm) by a factor of about 10:1. Evaporation exceeds rainfall in all months of the year, with June having the lowest daily evaporation and January the highest.

Wind conditions from Kalgoorlie-Boulder Airport weather station (#12038) show that morning wind conditions are predominantly easterlies averaging between 12 and 17 km/hr. Afternoon wind direction is variable averaging between 13 and 18 km / hr.

2.2 Landscape

2.2.1 Bioregion

The Interim Biogeographic Regionalisation of Australia (IBRA) divides Australia into 89 bioregions based on major biological, geographical and geological attributes. These bioregions are subdivided into 419 subregions as part of a refinement of the IBRA framework (IBRA 2010).

The Think Big Project occurs within the Coolgardie bioregion and Eastern Goldfields subregion (COO03). In close proximity to the north lies the Murchison bioregion, but both tenements M26/846 and L26/295 sit within the Eastern Goldfields (COO03) as mapped by IBRA.

The Eastern Goldfields subregion lies on the eastern part of the Yilgarn Craton, within the Kalgoorlie geological terranes. Relief is subdued, comprising gently undulating plains with scattered low hills and ridges of Archaean greenstones and extensive granitic–gneissic basement. Calcareous earths (red–brown calcareous loamy earths) dominate the plains and greenstone areas. Drainage is largely occluded, with broad saline playa systems and lunettes; diverse Eucalyptus woodlands occur around salt lakes, on ranges and in valleys, with dwarf samphire shrublands on saline flats. (DBCA 2025)

Soil-landscape mapping places the tenement area within the Kalgoorlie Province soil-landscape, where red/brown calcareous loamy earths are the principal surface soils on flat to undulating plains developed over granite and greenstone; occasional stony plains, low ranges and salt lakes punctuate the landscape. (DBCA 2025)

Underlying basement geology is dominated by Archean granite, gneiss and greenstone belts of the Eastern Goldfields super terrane; these rocks record multiple deformation phases associated with the regional goldfields architecture. (Painter, Groenewald & McCabe, 2003)

Hydrology is characterised by internal drainage and predominantly ephemeral watercourses; wetland expression is via saline playas, with semi-permanent features locally (e.g., the Rowles Lagoon wetland complex) within the broader Eastern Goldfields setting. *(DWER, 2017)*

Vegetation in the Eastern Goldfields includes mallees, Acacia thickets and shrub-heaths on sandplains, with diverse Eucalyptus woodlands in valleys, on ranges and around salt lakes; samphire (*Halosarcia/Tecticornia*) shrublands occupy saline flats, and hummock grasslands, saltbush and bluebush occur in mosaics across calcareous plains**.** (CALM, 2002)

2.2.2 Soils

The Think Big Project area encompasses multiple land systems, including Lefroy, Graves, Gumland, Kanowna, and Monger Land System, as classified under the soil-landscape and land system mapping framework (DPIRD, 2025). The Lefroy system dominates much of the project area and is characterised by gently undulating plains and low rises on greenstone and granite, with calcareous loamy earths and red loamy earths as the principal soils. Vegetation typically includes eucalypt woodlands and mixed shrublands on calcareous plains. The Graves system occurs as stony plains and low greenstone rises, supporting Acacia shrublands and scattered eucalypts. The Gumland system is associated with broad saline flats and playa margins, featuring samphire shrublands and halophytic vegetation. The Kanowna system comprises gently undulating plains and low rises on lateritic surfaces, with gravelly loamy soils and red

sandy duplexes supporting mallee woodlands and mixed shrublands. The Monger land system consists of gently undulating plains and low rocky rises on granite and greenstone, with red loamy earths and calcareous loamy soils. It supports diverse eucalypt woodlands dominated by salmon gum and gimlet, with an understorey of acacias and chenopod shrubs.

The project area lies within the Kambalda Zone of the Kalgoorlie Province soil-landscape (Tille, 2007). Soils of this zone include calcareous loamy earths and red sandy duplexes, often associated with salt lakes and hardpan shallow loams. These soils are generally nutrient poor, with low cation exchange capacity and limited agricultural potential. Previous studies in similar settings (Landloch, 2008; Norilsk, 2013) indicate topsoil is typically non-saline and neutral to acidic, with kaolinitic clays, low organic carbon, and low levels of essential plant nutrients and trace elements. Subsurface profiles commonly comprise gravelly clays over ferricrete hardpan, followed by saprolitic clays and completely weathered felsic or greenstone rocks (PNL, 2021).

2.3 Biodiversity

2.3.1 Flora and Vegetation

A flora and vegetation survey was undertaken by Native Vegetation Solutions (2025) to determine the presence and likelihood of significant vegetation, flora and fauna within the Project area. The flora and vegetation survey is provided in **Appendix B.**

2.3.2 Vegetation

The Eastern Goldfields subregion comprises undulating plains with Archaean greenstone ridges and low hills, extensive calcareous earths, and large playa lakes. Vegetation is dominated by *Eucalyptus* woodlands, chenopod shrublands (e.g., *Maireana*, *Atriplex*), and *Tecticornia* dwarf shrublands around salt lake systems; Acacias are rich and often form thickets or mixed shrubland. (CALM, 2002)

Pre-European vegetation association datasets (Beard mapping and Statewide Vegetation Statistics) indicate the survey area intersects two vegetation associations: (9 and 540) both retaining >97% of their pre-European extent at the State, bioregion and subregion scales. Areas retaining ≤ 90% of their pre-European extent remaining are generally considered at risk; both associations are well above this threshold. Development within the clearing envelope is therefore not expected to significantly reduce the extent of pre-European vegetation associations or increase risk of loss (Beard 1990). Pre-European vegetation association descriptions are detailed in **Table 2** below**.**

Table 2: Pre-European vegetation associations

Vegetation association	Structural description	Floristic description	Extent remaining (%)
Beard 9	Woodland	Medium woodland; coral gum (E. torquata) & Goldfields blackbutt (E. lesouefii) (also some e10,11).	98.29
Beard 540	Woodland	Succulent steppe with open low woodland; sheoak over saltbush.	99.04

2.3.2.1 Vegetation Communities

Vegetation assessments included 20×20 m relevés and traverses to characterise communities and map broad-scale vegetation groups. Nineteen vegetation groups (A–S) and one additional unit (Bare Claypan) were mapped within the survey area. Vegetation conditions across these groups ranged from Completely Degraded to Very Good (Keighery 1994). Dominant vegetation groups include *Tecticornia* shrubland (O), Mixed *Eucalyptus* over mixed sclerophyll shrubland on hills (A), and *E. salubris* & *E. oleosa* woodland over chenopod shrubland (C). Vegetation groups within the Project area are described in **Table 3** below;

Table 3: Vegetation groups

Name	Landscape position	Community description
A – Mixed *Eucalyptus* over mixed sclerophyll shrubland on hills	Hills & undulating rises	Low Woodland A. Mixed Eucalyptus (incl. *E. lesouefii, E. griffithsii, E. ravida, E. yilgarnensis*) over sclerophyll shrubs (*Dodonaea, Grevillea, Eremophila*) with chenopods on rocky/skeletal soils; area 178.74 ha (16.30%).
B – Transitional *Eucalyptus* woodland	Plains & lower slopes	Woodland with mixed canopy (*E. lesouefii, E. salmonophloia, E. salubris*) transitioning to chenopod understorey; 169.60 ha (15.46%).
C – *E. salubris* & *E. oleosa* woodland over chenopod shrubland	Plains	Low Woodland A over *Maireana/Atriplex* shrubland; 172.00 ha (15.68%).
D – *E. lesouefii* woodland over *Maireana sedifolia* and chenopod shrubland	Localised rises	Open Low Woodland A; 1.46 ha (0.13%)
E – *E. salmonophloia* woodland over chenopod shrubland	Plains	Open Tall Woodland; 2.66 ha (0.24%)
F – *E. ravida* woodland	Plains	Low Woodland A; 1.12 ha (0.10%)
G – *E. lesouefii* woodland over *Melaleuca sheathiana* over *Maireana sedifolia* and sclerophyll shrubland	Plains	Low Forest A; 8.94 ha (0.81%)
H – Open *E. salmonophloia* woodland over *Maireana sedifolia* shrubland	Plains	Open Tall Woodland; 3.08 ha (0.28%)
I – *E. lesouefii* woodland over *Melaleuca sheathiana* shrubland	Plains	Low Woodland A; 31.00 ha (2.83%)
J – *E. griffithsii* woodland over sclerophyll shrubland and *Triodia* grassland on undulating hills	Hills	Open Tree Mallee; 6.55 ha (0.60%)
K – *E. lesouefii* woodland over *Melaleuca sheathiana* over mixed sclerophyll shrubland	Plains	Low Woodland A; 44.19 ha (4.03%)
L – Eucalyptus woodland over quartz outcrop	Quartz outcrops	Open Low Woodland A; 1.56 ha (0.14%)
M – Open chenopod shrubland	Plains & low rises	Open Dwarf Scrub C of *Maireana, Atriplex, Sclerolaena*; 111.37 ha (10.16%).

N – Sclerophyll shrubland	Plains	Heath B; 20.74 ha (1.89%)
O – *Tecticornia* shrubland	Saline flats / fringing playa	Low Heath D dominated by *Tecticornia spp.*; 204.34 ha (18.63%)
P – *Melaleuca lateriflora* shrubland	Low swales / saline margins	Scrub dominated by *Melaleuca lateriflora;* 59.67 ha (5.44%).
Q – *E. oleosa* over sclerophyll shrubland and Spinifex	Plains	Open Tree Mallee; 0.51 ha (0.05%)
R – *Acacia acuminata* shrubland	Plains	Scrub; 31.17 ha (2.84%)
S – *Myoporum platycarpum* over *Acacia donaldsonii* and sclerophyll shrubland	Plains	Scrub; 9.00 ha (0.82%)
Bare claypan	Localised saline pans	Non-vegetated claypan; 0.20 ha (0.02%).

2.3.2.2 Vegetation Condition

Historic exploration tracks and localised clearing occur across the area. Condition assessments (Keighery 1994) indicate vegetation ranges from Completely Degraded to Very Good, with most of the area rated "Good." Vegetation condition ratings are provided in **Table 4** (Native Vegetation Solutions, 2025).

Table 4: Vegetation condition

Vegetation Condition	Area (ha)	% of total
Very Good	383.85	35.0
Good	668.02	61.0
Poor/Fair	6	0.5
Completely Degraded	38.86	3.54
Total	**1096.73**	**100**

2.3.2.3 Significant Vegetation

No Threatened or Priority Ecological Communities (TECs/PECs) or Environmentally Sensitive Areas or conservation reserves were identified within the clearing envelope. The Hannan Lake drainage basin intersects a portion of the boundary but is an ephemeral Salt Lake system typical of the region.

2.3.2.4 Environmentally Sensitive Areas

The nearest Environmentally Sensitive Area (ESA) to the Think Big Project is the Lakeside Timber Reserve, located approximately 6.5 km north of the project area (**Figure 4**). Direct impacts on this ESA are unlikely; however, standard environmental management measures, such as dust suppression and controlled clearing within the approved envelope, will be implemented to avoid any indirect impacts.

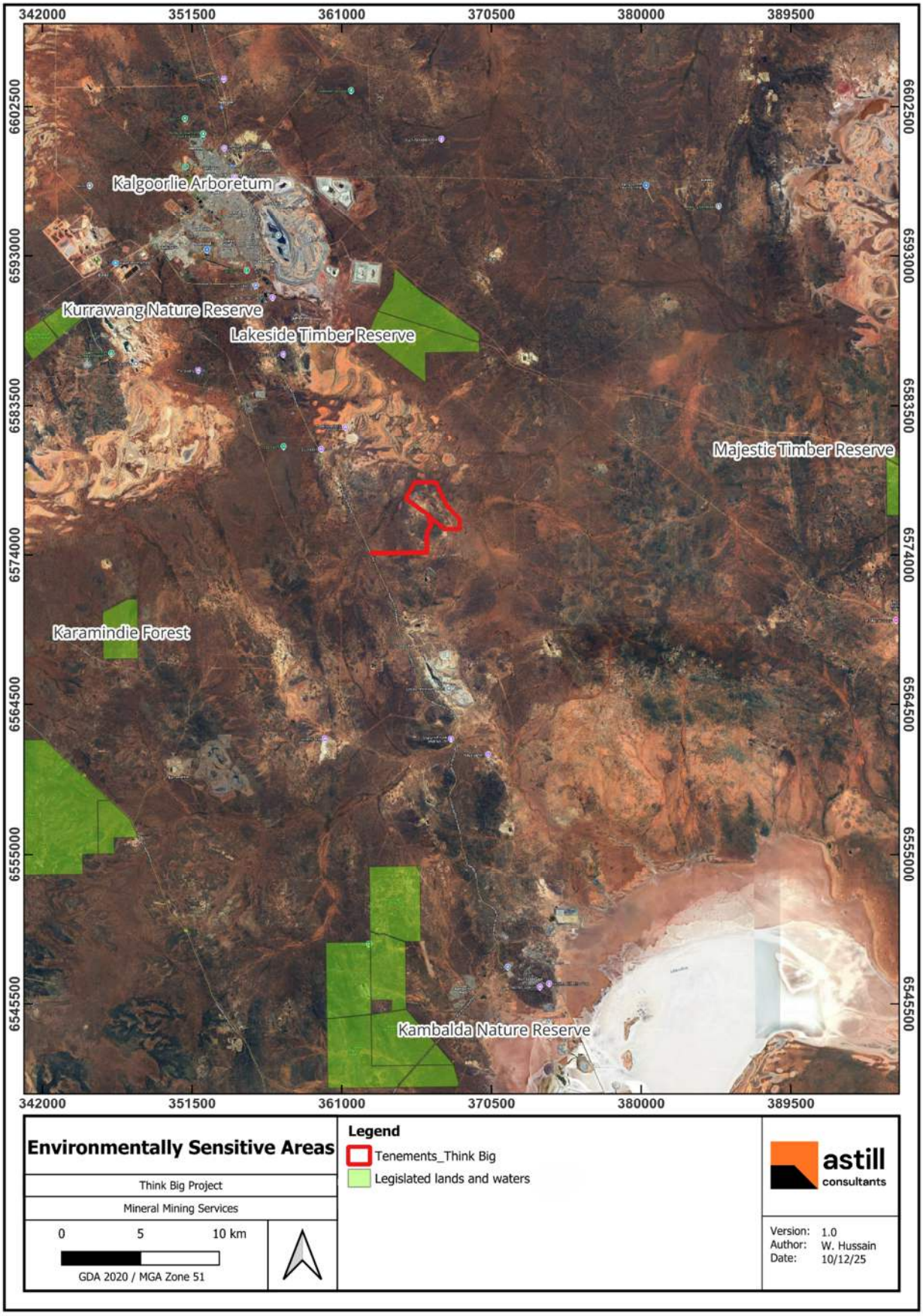


Figure 4: Environmentally sensitive areas

2.3.3 Flora

A flora survey was conducted for the Feysville Gold Project by Native Vegetation Solutions in 2024 to identify conservation-significant species, including Threatened (TF) and Priority Flora (PF), in accordance with EPA Technical Guidance (EPA, 2016a) and DBCA requirements (DBCA, 2023) .

2.3.3.1 Threatened and Priority Flora

No Threatened (Declared Rare) or Priority Flora or Ecological Communities (TECs or PECs) were recorded during field surveys of the Project area.

2.3.3.1 Introduced Flora

No introduced flora species were recorded in the Native Vegetation Solution (2025) survey of the Think Big project area.

2.3.4 Fauna

A Basic vertebrate fauna survey was conducted by Terrestrial Ecosystems in 2024. The fauna survey demonstrated that most fauna identified during field observations are common and widespread, with fauna abundance by taxa summarised in **Table 5** below.

Table 5: Fauna abundance

Survey	Species number (field search)				
	Total	Amphibians	Birds	Mammals	Reptiles
Terrestrial Ecosystems (2024)	120	4	70	20	26

2.3.4.1 Fauna Habitat

Four broad fauna habitats have been mapped in the Project area and described in the biological survey. These fauna habitats are considered relatively common and representative of the local area and are widespread throughout the region. Disturbed areas from historical exploration and mining have very low fauna habitat value (Terrestrial Ecosystems, 2025).

Fauna habitats with example images are summarised in **Table 6** below.

Table 6: Fauna habitats

Habitat type	Description	Example image
Chenopod and Tecticornia samphire	A dominate low-lying saline flats and wetland margins. These areas are characterised by clay or loamy soils that can become seasonally inundated following heavy rainfall. Vegetation is typically sparse but includes salt-tolerant shrubs such as *Maireana*, *Atriplex*, and samphire species (*Tecticornia* spp.), providing foraging opportunities for ground-dwelling reptiles and occasional migratory shorebirds when water is present.	
Mixed Eucalypt woodland with shrubs on rocky hills	These habitats occur on undulating rises and rocky outcrops, where skeletal soils and scattered stones support a canopy of *Eucalyptus* species such as *E. lesouefii* and *E. griffithsii*. The understorey is diverse, comprising sclerophyll shrubs including *Dodonaea*, *Grevillea*, and *Eremophila*. These areas offer microhabitats for reptiles and woodland birds and are generally in good to very good condition where disturbance is minimal.	
Mixed Eucalypt woodland with shrubs	Therse type of habitats consists of mixed eucalypt woodland with shrubs on plains and gentle slopes. Dominant tree species include *E. salubris* and *E. oleosa*, with an understorey of mixed shrubs and occasional spinifex. Soils range from loamy sands to clay loams, and while some patches show signs of historical disturbance, these woodlands remain important for supporting a variety of birds, small mammals, and reptiles.	
Mixed shrubland	Typically found on flats and low rises interspersed with chenopod patches. Vegetation is dominated by drought-tolerant shrubs, particularly *Acacia* species, along with chenopods and other hardy plants adapted to arid conditions. Soils are sandy loam to clayey sand, often with scattered stones. This habitat provides shelter and foraging opportunities for small reptiles and ground-foraging birds. Habitat condition varies from poor in disturbed areas to good in intact patches.	

2.3.4.2 Significant Fauna

Based on the combined desktop review and field assessments (Terrestrial Ecosystems, 2024), an evaluation was undertaken of the likelihood that fauna of conservation significance occurs within the Think Big Project area. The federal EPBC Protected Matters Search Tool flags several threatened species as potentially present in the wider locality (e.g., Malleefowl *Leipoa ocellata*, Grey Falcon *Falco hypoleucos*, Curlew Sandpiper *Calidris ferruginea*, Night Parrot *Pezoporus occidentalis*, Chuditch *Dasyurus geoffroii*, and the Arid Bronze Azure butterfly *Ogyris subterrestris petrina*), noting modelled or indicative distributions rather than confirmed occurrences; these outputs were used to guide field effort and risk evaluation.

During the on-ground survey, no evidence of Malleefowl was recorded in the Project area, including no active nest mounds, old mounds, tracks or other secondary signs and the habitat is considered unsuitable for, therefore it is considered unlikely to be resident within the clearing envelope. The Peregrine Falcon (*Falco peregrinus*) may forage over the site, but suitable breeding habitat (e.g., substantial cliffs or gorges) is absent, and the species' very large home range means individuals, if present, would readily use adjacent areas without being dependent on habitats inside the clearing envelope. The survey's discussion of avifauna emphasises that birds of conservation significance, including Peregrine Falcon and other arid-adapted taxa, would readily shift to nearby habitat when disturbed, and that any impact would be negligible in a bioregional context (Terrestrial Ecosystems, 2025).

A small population of Southern Whiteface (*Aphelocephala leucopsis*) may occur intermittently, with seasonal nesting possible in mature eucalypt woodland. Consistent with this, the fauna report recommends checking proposed clearing areas between April and September (and earlier after substantial autumn rains) for active nests and maintaining a 250 m no-clearance buffer until chicks have fledged if an active nest is found (Terrestrial Ecosystems, 2025).

Other conservation listed species were assessed as unlikely or highly unlikely to occur in the Project area given habitat constraints: for example, Night Parrot (*Pezoporus occidentalis*) is highly unlikely due to a lack of suitable long-unburnt spinifex and roosting structures, and Chuditch (*Dasyurus geoffroii*) is considered unlikely in light of scarce recent regional records and suboptimal shelter resources (Terrestrial Ecosystems, 2025).

Because the Arid Bronze Azure (ABAB) butterfly is obligately associated with the host ant *Camponotus terebrans*, a targeted survey was completed across the Feysville woodlands during the optimal activity window. No host ant colonies were detected, therefore, ABAB is assessed as absent from the Project area (Terrestrial Ecosystems, 2024)

While some habitats onsite are broadly suitable for occasional foraging or passage, most conservation listed fauna are expected to be infrequent visitors or vagrants, and residency or breeding within the development footprint is unlikely. No significant impact on vertebrate fauna of conservation significance is expected, provided standard avoidance and management measures are implemented. It should be noted that while habitats onsite are considered possibly suitable, some or all may be marginal in extent/quality and therefore fauna species considered as possibly occurring may in fact only visit the area for short periods as infrequent vagrants (Terrestrial Ecosystems, 2025). A summary of significant fauna likelihood is detailed in **Table 7** below.

Table 7: Significant fauna likelihood

Species name	Common name	Conservation status		Assessment	Likelihood
		EPBC Act	BC Act		
Mammals					
Myrmecobius fasciatus	Numbat	EN	EN	Historical Atlas/WAM records exist regionally, but species is now absent from the Goldfields due to long-term predation. No suitable, intact habitat or recent records in/near the project area.	Low (Absent)
Macrotis lagotis	Bilby	VU	VU	Historical Atlas/WAM records exist regionally, but species is now absent from the Goldfields due to long-term predation. No suitable, intact habitat or recent records in/near the project area.	Low (Absent)
Dasyurus geoffroii	Chuditch, Western Quoll	VU	VU	Unlikely to occur; limited recent regional records and suboptimal denning habitat within the footprint.	Low
Reptiles					
None Flagged	-	-	-	The fauna survey concludes no reptile species of conservation significance are expected to be impacted; habitat is common and widespread regionally.	-
Birds					
Leipoa ocellata	Malleefowl	VU	VU	No mounds/tracks recorded; habitat patchwork and local disturbance reduce suitability. Presence in the footprint is unlikely.	Low
Falco peregrinus	Peregrine Falcon	N/A	Other	Highly mobile, may forage over site; no breeding habitat (cliffs/gorges) in footprint; would readily use adjacent areas.	Medium (foraging only)
Falco hypoleucos	Grey Falcon	VU	VU	Modelled distribution includes the region; potential overflight/foraging only, with limited local records.	Low
Calidris ferruginea	Curlew Sandpiper	CR	MI	Wetland-dependent; site lacks lakes/shoreline habitat. If present, would be vagrant/transient following rainfall events elsewhere.	Low
Calidris acuminata	Sharp-tailed Sandpiper	VU	MI	As above, requires wetlands; project footprint provides little suitable habitat; potential vagrant only.	Low
Aphelocephala leucopsis	Southern Whiteface	Not Listed	Not Listed	Small bush bird that may nest in mature eucalypt woodland. Survey recommends nest checks Apr–Sep and a 250 m buffer if an active nest is found.	Medium (Seasonal Nesting)
Insects					

Species name	Common name	Conservation status		Assessment	Likelihood
		EPBC Act	BC Act		
Ogyris subterrestris petrina	Arid Bronze Azure (ABAB)	CR	CR	Targeted survey (Sept 2024) exceeded guideline effort: 319 trees assessed for host ant *Camponotus terebrans* and ~91 km transects walked; host ant and ABAB not detected → assessed absent.	Low (Absent)

*Conservation Status: State – Listed under Biodiversity Conservation Act 2016 or Department of Biodiversity, Conservation and Attractions Conservation List, Federal – Listed under Environmental Protection and Biodiversity Conservation Act 1999. CR – Critically Endangered, EN – Endangered, VU – Vulnerable, IA/MI – Migratory, MA – Marine, P – Listed as Priority by DBCA, Other – Other specially protected species under Biodiversity Conservation Act 2016.

2.3.4.3 Subterranean Fauna

A desktop assessment of subterranean fauna (stygofauna and troglofauna) was undertaken for the Project. The review considered regional geology, hydrogeology, and Western Australian Museum records. The project area is dominated by ultramafic and volcanic lithologies with shallow colluvium and alluvium, which lack interconnected voids necessary for subterranean fauna. Hydrogeological drilling confirmed minimal fracturing, and groundwater is hypersaline, further reducing habitat suitability. No subterranean fauna records exist for the Kalgoorlie region, and the likelihood of stygofauna or troglofauna presence within the project footprint is assessed as low. No further survey work is recommended, as the desktop review meets EPA (2021) technical guidance requirements (Invertebrate Solutions, 2025).

2.3.4.4 Introduced Fauna

The Basic Vertebrate Fauna Survey recorded no introduced vertebrate species within the Project area during field assessments. While feral species such as cats (*Felis catus*) and foxes (*Vulpes vulpes*) are common in the broader Goldfields region, no direct evidence (tracks, scats, or sightings) was observed within the survey footprint (Invertebrate Solutions, 2025).

2.4 Hydrology

The Think Big Project area is located within an arid climatic zone where surface water features are limited and ephemeral in nature. Regional drainage is characterised by low-relief landforms and internal drainage systems that ultimately discharge into salt lakes and claypans. Surface water flow occurs only during infrequent, high-intensity rainfall events associated with tropical lows or winter fronts, and any runoff is short-lived due to high evaporation rates and permeable soils (GRM, 2025b).

The project is situated in a low-lying area which experiences flooding after significant rainfall events. A surface water management assessment is being prepared for the site to ensure appropriate diversions are in place that do not impact surrounding surface water patterns and will be assessed as part of the MDCP process. Clearing of these areas is not expected to have any significant ecological risks as demonstrated in the baseline flora and vegetation surveys.

The hydrogeology of the Project area is dominated by fractured bedrock aquifers and minor palaeochannel deposits. Groundwater typically occurs within fracture zones in fresh basement rocks beneath a weathered saprolite horizon (10–20 m thick) and transitional saprock zone.

These fractured aquifers are associated with major fault structures and shears, which exhibit moderate to high permeability compared to surrounding intact bedrock (Kern, 1996)

Hydraulic testing indicates that permeability varies significantly across the site, ranging from 0.005–0.051 m/day in low-permeability zones to 0.32–0.65 m/day in fault-controlled aquifers. Groundwater levels range from 0.85–3.96 m below ground level at Think Big. Groundwater quality is hypersaline, with Total Dissolved Solids (TDS) between 95,600 and 148,000 mg/L, averaging approximately 113,000 mg/L, and is of sodium chloride type with elevated sulphate concentrations. These salinity levels render groundwater unsuitable for potable or stock use but potentially viable for mining applications such as dust suppression. Recharge is limited to episodic rainfall events, and groundwater flow is generally toward regional palaeo drainage systems and salt lakes. Given the hypersaline nature of groundwater and the absence of significant connectivity to sensitive receptors, hydrogeological impacts from clearing and mining are expected to be minimal (GRM, 2025a)

Regional surface hydrology drainage is shown below in **Figure 5**

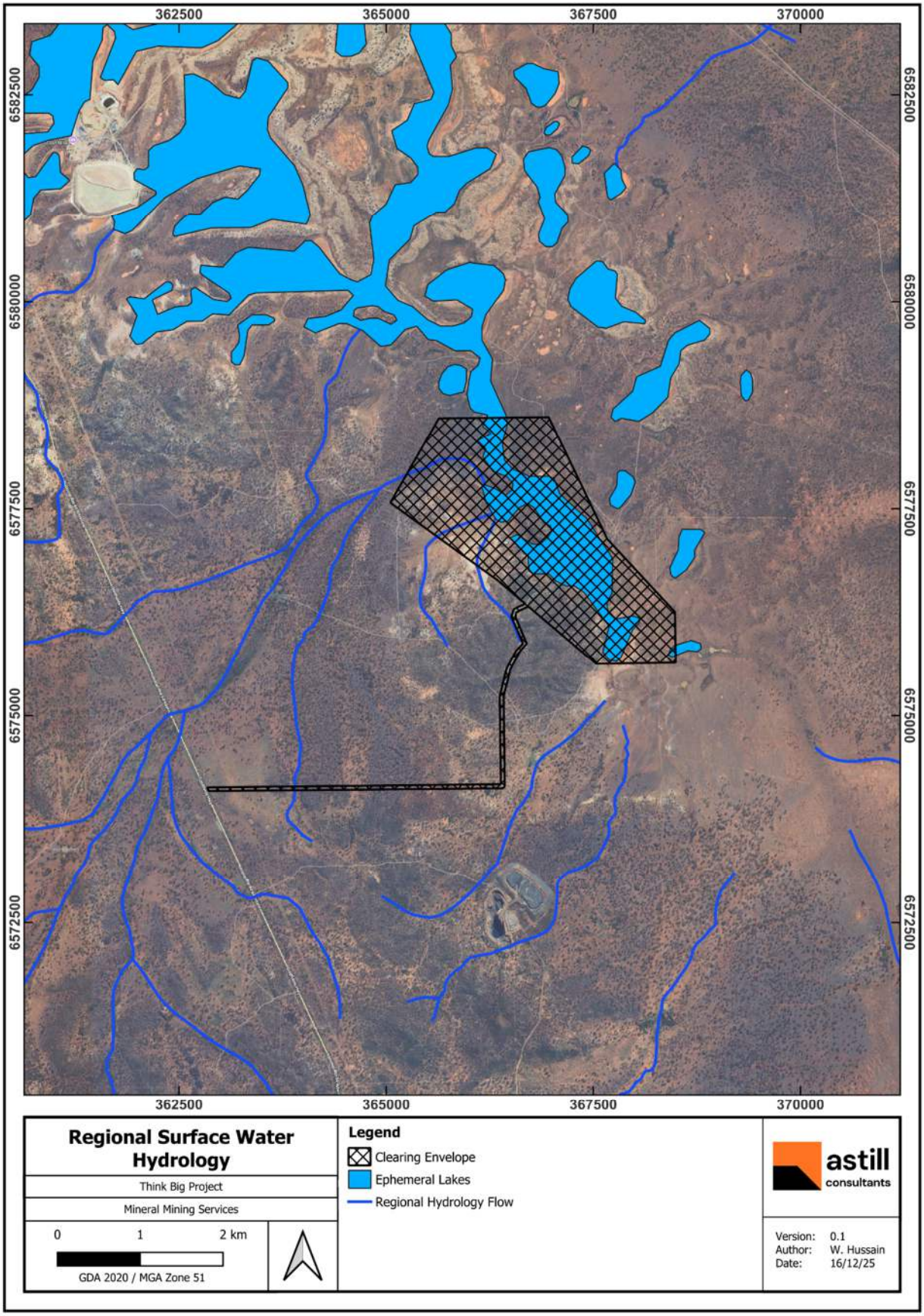


Figure 5: Regional surface water hydrology

2.5 Heritage

2.5.1 Aboriginal Heritage

A search of the Department of Planning, Lands and Heritage (DPLH) Aboriginal Cultural Heritage Inquiry System (ACHIS) identified no lodged or registered Aboriginal heritage sites within the proposed clearing envelope.

The nearest recorded Aboriginal heritage site is artefact scatter MG22-01 (ID 40396; Lodged) located 500 m north of the clearing envelope (**Figure 6**)

Prior to any ground-disturbing activities, an Aboriginal heritage survey will be undertaken in consultation with the relevant Traditional Owners and Native Title parties to identify any cultural heritage values within the project footprint. If any sites are identified, appropriate management measures will be implemented, which may include:

- Establishing buffer zones around identified heritage sites.
- Avoiding disturbance to culturally significant areas.
- Incorporating heritage protection protocols into the project's environmental management plan.

The project will comply with the Aboriginal Cultural Heritage Act 1972 (WA) and associated guidelines to ensure all activities respect and protect Aboriginal cultural heritage.

2.5.2 European Heritage

A search of State Heritage Office Inherit database in December 2025 showed no Local, State or National Heritage Listings in the vicinity of the Project.

The nearest Statutory Heritage Listing, Kings Battery (Place number: 3311) is located approximately 15 km south of the clearing envelope. Accordingly, no European heritage sites will be impacted by proposed clearing and mining activities.

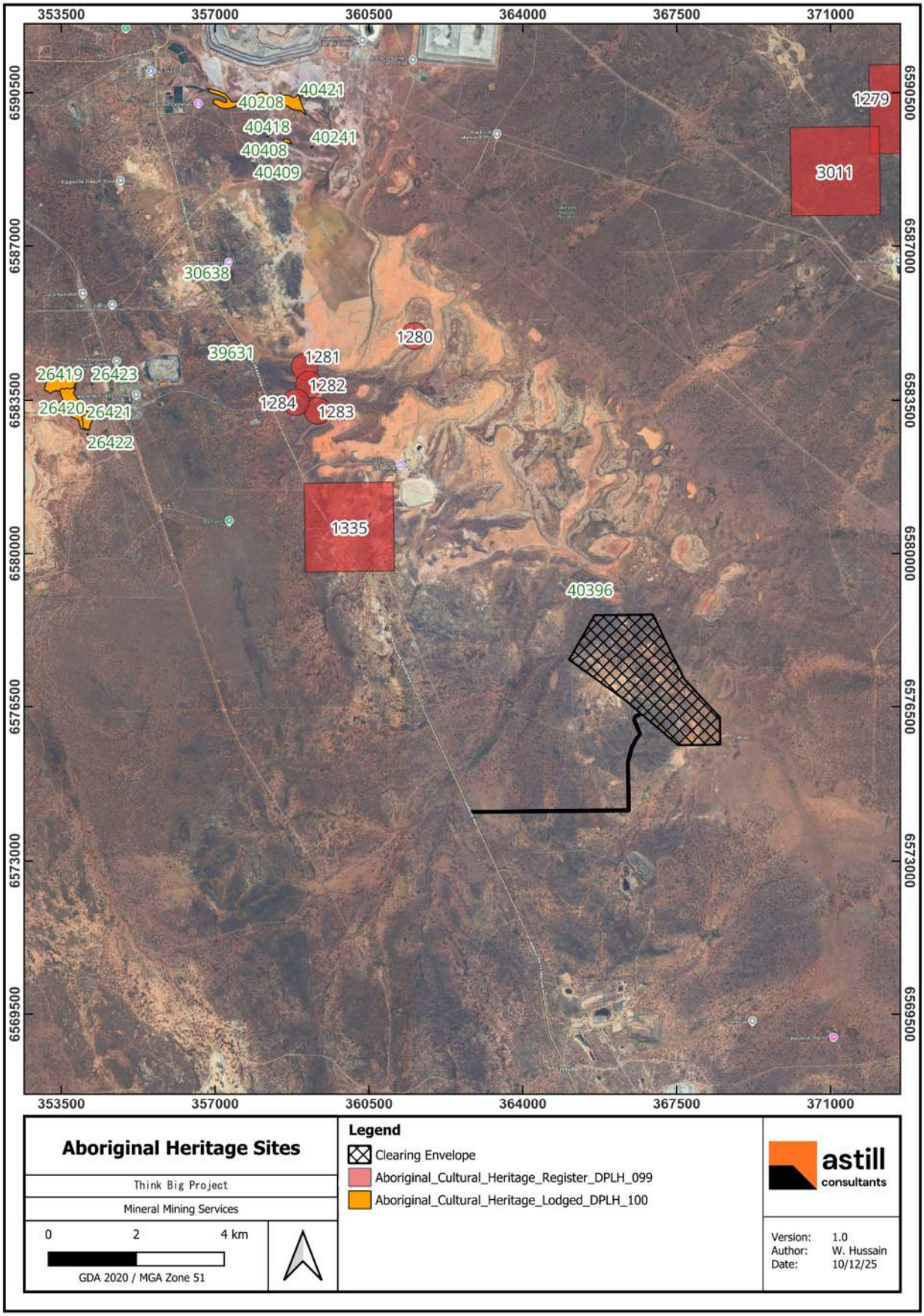


Figure 6: Aboriginal heritage sites

3. Assessment Against Clearing Principles

An assessment against each of the ten clearing principles as defined under Schedule 5 of the *Environmental Protection Act 1986* demonstrates that the proposed clearing is unlikely to be at variance with any of principles as outlined in **Table 8** below.

Table 8: Clearing principles assessment

Clearing principle	Assessment	Outcome
a) Native vegetation should not be cleared if it comprises a high level of biological diversity.	The vegetation within the proposed clearing area is typical of the regional landscape and does not exhibit an unusually high level of species richness or structural complexity. It is representative of common vegetation associations and does not support unique ecological processes that would elevate its biodiversity significance. No significant flora species or high-value vegetation communities were identified in the provided surveys.	Unlikely to be at variance to this principle.
b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.	The habitat present within the project footprint is analogous to surrounding areas and does not provide critical breeding or nesting sites for conservation-significant fauna. While species such as Malleefowl, Peregrine Falcon and Southern Whiteface may occur, the area does not contain features essential for their lifecycle. The vegetation structure and condition do not support designation as significant habitat.	Unlikely to be at variance to this principle.
c) Native vegetation should not be cleared if it includes or is necessary for the continued existence of rare flora.	No Threatened or Priority flora species have been recorded within the project area during recent vegetation and flora surveys or in historical datasets. The vegetation comprises widespread species typical of the bioregion, and no evidence suggests the presence of flora requiring special conservation measures.	Unlikely to be at variance to this principle
d) Native vegetation should not be cleared if it comprises the whole or a part of or is necessary for the maintenance of a threatened ecological community.	The project area does not intersect any Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs). No analogous vegetation types were identified during assessment.	Not at variance to this 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 site is not a remnant in an extensively cleared landscape. It forms part of the Great Western Woodlands, where similar vegetation remains widespread. Clearing will not diminish remnant significance.	Not at variance to this 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.	The project area contains minor, low-lying samphire zones that only hold water briefly following significant rainfall events. These features are highly ephemeral and do not provide critical or permanent wetland habitat. Migratory shorebirds preferentially utilise large, well-resourced systems such as Lake Lefroy, located approximately 30 km south, rather than these small, temporary areas.	Unlikely to be at variance to this principle

g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	The proposed clearing will not result in appreciable land degradation. The project footprint is small relative to the surrounding landscape, and standard environmental management measures such as dust suppression, weed control, and progressive rehabilitation will be implemented. These controls ensure soil stability, prevent weed invasion, and maintain environmental integrity throughout the project lifecycle.	Unlikely to be at variance to this 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 project area does not function as an ecological corridor or provide critical linkages for fauna movement. Extensive, intact vegetation remains in the surrounding Great Western Woodlands, ensuring regional connectivity and ecological integrity. Clearing within the proposed footprint will have no measurable impact on the environmental values of adjacent conservation areas or the broader landscape.	Not at variance to this principle.
i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	Groundwater in the project area is hypersaline (95,600–148,000 mg/L TDS; average ~113,000 mg/L TDS) and unsuitable for potable or stock use. There are no permanent surface water features within the project footprint. Groundwater recharge is minimal due to the arid climate and will not be impacted by clearing activities. Dewatering discharge will be managed on-site via evaporation ponds or licensed disposal to nearby salt lakes, ensuring no deterioration in water quality.	Unlikely to be at variance to this 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 project area is characterised by low relief and an arid climate, with average annual rainfall of approximately 255-287 mm and annual evaporation of 2,643 mm, almost ten times greater than rainfall. There are no permanent rivers or creeks within the project footprint; drainage lines and shallow depressions are ephemeral watercourses and lakes that only hold water intermittently following significant rainfall events. These features typically dry out rapidly due to high evaporation rates. Numerical groundwater modelling indicates that mine dewatering will not increase flood risk, as water will be managed on-site through evaporation ponds or, where necessary, via licensed discharge to nearby salt lakes. Consequently, vegetation clearing and mine development will not exacerbate flooding within or beyond the project area.	Unlikely to be at variance to this principle

4. Clearing Process

Vegetation will be cleared by mechanical clearing. Clearing areas will be kept to the minimum area required for mine activities and undertaken progressively as required. Existing disturbances will be utilised where possible.

4.1 Equipment

Equipment required to undertake and support clearing activities may include a combination of:

- Dozer;
- Loader;
- Excavator;
- Water Cart; and
- Service Vehicles.

4.2 Methodology

Prior to any clearing, a surface disturbance permit will be authorised by MMS to ensure clearing is able to be undertaken under a clearing permit or valid clearing exemption (i.e., Regulation 20 of the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*).

Proposed clearing will be demarcated by a surveyor using high visibility tape / survey pegs to ensure clear visual boundaries for operators prior to clearing commencement. A toolbox meeting will be held between the supervisor and clearing operator to ensure awareness of clearing areas and any areas to be avoided.

Where practicable, raised blade clearing will be used. Where this is not practicable, topsoil will be stripped up to 200 mm depth and stockpiled for use in rehabilitation, along with removed vegetation. Once clearing has been completed, surveyors will complete a pickup of cleared areas and provide the data to the environmental department for their records and external reporting obligations.

4.3 Rehabilitation

Rehabilitation of cleared areas will occur in accordance with the Mine Development and Closure Plan (MDCP) which will be developed for the Think Big Project and submitted to DMPE in tandem with this application.

5. Environmental Management

MMS maintains an Environmental Management System (EMS) which includes management strategies and procedures for key environmental areas including those related to clearing activities (i.e., air quality, fauna, land and soils, vegetation, and weeds). Applicable management measures are summarised below.

5.1 Air Quality

Dust is generated from clearing activities, topsoil stripping and spreading. Excessive dust can increase local particulate levels, impacting surrounding vegetation and sensitive receptors.

The following management measures will be implemented to mitigate air quality impacts:

- Weather conditions are monitored, and dust impacts are assessed during clearing;
- Topsoil stripping and spreading activities will be restricted if dust cannot be adequately controlled during periods of high winds; and
- Water carts are available and utilised for wetting down of soils as required.

5.2 Land and Soils

Land and soils may be impacted by clearing activities including minor hydrocarbon spills and poor topsoil stripping and handling practises. These impacts may have long term effects on rehabilitation performance.

The following management measures will be implemented to conserve land and soil resources:

- Regular inspections and maintenance of machinery including daily pre-starts;
- Spill kits closely available during clearing activities;
- Stripping topsoil up to 200 mm;
- Topsoil stripping to be undertaken as close as possible to commencement of activities; and
- Soils to be paddock-dumped into stockpiles of no greater than 2 m in height and have adequate distance between them to create a series of mounds and troughs.

5.3 Fauna

Fauna impacts (vehicle strike) during clearing activities may result in injury or death of native fauna or livestock. Whilst not all incidents are avoidable, impacts can be minimised.

The following management measures will be implemented to reduce the risk to fauna:

- Speed limits will be signed and enforced;
- Any injury or death of fauna will be recorded and investigated;
- Access to food wastes will be minimised by ensuring effective storage and disposal; and
- Personnel are prohibited from direct contact with fauna, including feeding.

5.3.1 Significant Fauna

Southern Whiteface (*Aphelocephala leucopsis*) is a small, ground-feeding bird native to arid and semi-arid regions of Western Australia and is known to occur in the region. The bird's range is geographically widespread and will readily move if disturbed. The survey determined that clearing in the project area is unlikely to impact the species, however MMS will implement following precautionary measures in line with recommendations from Terrestrial Ecosystems (2025).

- If clearing is to be conducted between 1 April to 30 September (breeding season), an inspection will be performed by a suitably qualified person to identify any active Southern Whiteface nests.
- Should an active (in-use) Southern Whiteface nest be identified, a 250 m buffer will implemented in which no clearing activities shall occur until chicks have fledged.

5.4 Vegetation

Vegetation clearing can be minimised through design controls and ensuring that clearing only occurs as required.

The following management measures will be implemented to minimise vegetation clearing:

- Utilising existing disturbances where possible for mine infrastructure;
- Choosing paths of least resistance through vegetation when siting roads and other linear infrastructure (where practicable); and
- Retention of canopy trees where possible.

5.5 Weeds

Activities which disturb land and soils, including clearing have the potential to create favourable conditions for weed infestation. Weeds can be difficult to eradicate once introduced and prevention of weed infestation has long term benefits for rehabilitation outcomes.

The following management measures will be implemented to manage weed impacts:

- All vehicles and equipment arriving on site will be free of soil, seeds, and vegetative matter;
- Movement of vehicles and equipment will be restricted to areas to be cleared; and
- Weed spray programs may be implemented on a seasonal basis to eradicate identified weed infestations.

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Appendix A: Proof of Ownership

Astral Resources NL

ACN 009 159 077

Suite 2, 6 Lyall St

South Perth, WA, 6151

6 January 2026

To Whom It May Concern,

RE: Authority to Act – Regulatory Correspondence for Mining Approvals (Feysville Project)

Astral Resources NL ("Astral"), through its 100% owned subsidiary Feysville Gold Pty Ltd, is the registered holder or beneficial owner of various mineral rights over the Feysville Project, located on mining tenements in Western Australia.

The purpose of this letter is to provide formal acknowledgement, on behalf of Astral, of Mineral Mining Services Pty Ltd ("MMS") being authorised to liaise with relevant government agencies and/or governmental departments in relation to the procurement of necessary approvals, permits, and licenses, including but not limited to Programmes of Work and Mine Development and Closure Plans, required to carry out mining operations upon the following tenements:

M26/846, L26/295, P26/3943, P26/3949, P26/3948, P26/3950, P26/3951

This acknowledgement is provided solely for the purpose of enabling MMS to act as Astral's authorised representative in relation to regulatory approvals and does not confer any legal or equitable interest in the tenements. This authority remains in effect unless otherwise revoked in writing by Astral.

Should you require any further information, please contact the undersigned at MDucler@astralresources.com.au.

Yours sincerely

Marc Ducler

Managing Director

Astral Resources NL

Department of **Mines, Petroleum and Exploration**

GOVERNMENT OF WESTERN AUSTRALIA

eMiTS MINERAL TITLES ONLINE

MINING TENEMENT SUMMARY REPORT

MINING LEASE 26/846

Status: Live

TENEMENT SUMMARY

Area:	532.96089 HA	**Death Reason :**	
Mark Out :	05/11/2018 10:25:00	**Death Date :**	
Received :	09/11/2018 14:34:27	**Commence :**	23/12/2025
Term Granted :	21 Years	**Expiry :**	22/12/2046

CURRENT HOLDER DETAILS

Name and Address
FEYSVILLE GOLD PTY LTD
AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD,
PO BOX 1434, WANGARA, WA, 6947, xxxxxxxxx@austwidemining.com.au, xxxxxxx400

DESCRIPTION

Locality: Feysville
Datum: Datum is situated at GDA 94, Zone 51 at coordinates 6575630N 367530E
Boundary: thence to proceed to coordinates 6576640N 366340E
thence to proceed to coordinates 6577570N 365050E
thence to proceed to coordinates 6578590N 365630E
thence to proceed to coordinates 6578610N 366960E
thence to proceed to coordinates 6577120N 367680E
thence to proceed to coordinates 6576250N 368490E
thence to proceed to coordinates 6575640N 368490E
thence to proceed to coordinates 6575630N 367530E
back to datum.

Area :

Type	Dealing No	Start Date	Area
Granted		23/12/2025	532.96089 HA
Applied For		05/11/2018	543.00000 HA

SHIRE DETAILS

Shire	Shire No	Start	End	Area
KALGOORLIE-BOULDER CITY	4280	09/11/2018		532.96089 HA

RENT STATUS

Due For Year End 22/12/2026: OVERPAID $187.00
Due For Year End 22/12/2027: $15,616.90

EXPENDITURE STATUS

Expended Year End : N/A

Current Year Commitment : $53,300.00

Department of **Mines, Petroleum and Exploration**

GOVERNMENT OF WESTERN AUSTRALIA

eMiTS MINERAL TITLES ONLINE

MINING TENEMENT SUMMARY REPORT

MISCELLANEOUS LICENCE 26/295

Status: Live

TENEMENT SUMMARY

Area:	27.97166 HA	**Death Reason :**	
Mark Out :	N/A	**Death Date :**	
Received :	19/05/2021 14:24:15	**Commence :**	29/10/2025
Term Granted :	21 Years	**Expiry :**	28/10/2046

CURRENT HOLDER DETAILS

Name and Address
FEYSVILLE GOLD PTY LTD
AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD,
PO BOX 1434, WANGARA, WA, 6947, xxxxxxxxx@austwidemining.com.au, xxxxxxx400

DESCRIPTION

Locality: Woolibar

Datum: Starting point is situated at GDA94, Zone 51 at coordinates 366719.842mE 6576324.088mN

Boundary: Thence proceed to coordinates 366572.276mE 6576250.801mN Thence proceed to coordinates 366560.205mE 6576199.146mN Thence proceed to coordinates 366697.056mE 6575872.641mN Thence proceed to coordinates 366611.976mE 6575771.663mN Thence proceed to coordinates 366500.532mE 6575560.207mN Thence proceed to coordinates 366417.223mE 6575230.420mN Thence proceed to coordinates 366432.551mE 6574145.106mN Thence proceed to coordinates 366408.308mE 6574121.505mN Thence proceed to coordinates 362859.509mE 6574089.066mN Thence proceed to coordinates 362839.534mE 6574133.071mN Thence proceed to coordinates 366385.023mE 6574172.481mN Thence proceed to coordinates 366369.415mE 6575230.193mN Thence proceed to coordinates 366451.437mE 6575561.663mN Thence proceed to coordinates 366563.166mE 6575778.424mN Thence proceed to coordinates 366649.273mE 6575875.156mN Thence proceed to coordinates 366510.682mE 6576198.525mN Thence proceed to coordinates 366541.444mE 6576289.758mN Thence proceed to coordinates 366682.391mE 6576357.011mN Thence proceed to coordinates 366719.842mE 6576324.088mN back to datum

Area :

Type	Dealing No	Start Date	Area
Granted		29/10/2025	27.97166 HA
Applied For		19/05/2021	27.97000 HA

SHIRE DETAILS

Shire	Shire No	Start	End	Area
KALGOORLIE-BOULDER CITY	4280	19/05/2021		27.97166 HA

RENT STATUS

Due For Year End 28/10/2026: PAID IN FULL
Due For Year End 28/10/2027: $756.00

EXPENDITURE STATUS

Expended Year End : NO EXPENDITURE REQUIRED
Current Year Commitment :

Appendix B: Flora and Vegetation Survey (Native Vegetation Solutions, 2025)

Reconnaissance Flora and Vegetation Survey of the Feysville Gold Project – November 2024

Prepared for

Astral Resources NL

FINAL V2.0

October 2025

Prepared by:
Native Vegetation Solutions
PO Box 41
KALGOORLIE
Ph: (08) 9021 5818
Mob: 0407 998 953
Email: eren@nativevegsolutions.com.au

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1 INTRODUCTION

Astral Resources NL (ASX:AAR) are expanding exploration at the Feysville Gold Project in Western Australia's Coolgardie Region (DCCEEW, 2023).

AAR require a reconnaissance flora and vegetation survey to determine any impact to flora and vegetation within the proposed survey area.

Native Vegetation Solutions (NVS) was supplied with a survey area located approximately 21 km southeast of Kalgoorlie-Boulder, in the Coolgardie Region (COO) of Western Australia (Figure 1).

The total survey area received from AAR covered approximately 1,096.73 ha. The survey area lies within Prospecting Tenements P 26/3950, P 26/4631, P 26/4633, P 26/3948, P 26/3943, P 26/3951, P 26/4630 and P 26/4632. Actual disturbance footprints are not yet defined; however, clearing required within the boundary of the survey area is anticipated to be less than the total survey area.

This report will encompass results of the reconnaissance flora and vegetation survey within the proposed Feysville Gold Project survey area.

Figure 1: Regional map of survey location

1.1 Purpose and Scope

The objective of this report is to document the results of the flora and vegetation component of a reconnaissance assessment conducted in accordance with:

- *Environmental Factor Guideline- Flora and Vegetation* (EPA, 2016); and
- *Technical Guidance- Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016a).

A reconnaissance assessment has two components:

1). Desktop study which includes a literature review and a search of the relevant databases;
2). Reconnaissance survey of the survey area to verify the desktop survey, to define vegetation units present in the area, search for species of conservation significance and to determine potential sensitivity to impact.

As part of the reporting for the reconnaissance assessment, NVS has conducted a flora and vegetation survey which includes broad-scale vegetation mapping and vegetation condition mapping of the survey area.

The scope of work for the reconnaissance flora and vegetation survey was to:

- conduct a desktop study that includes a literature review and search of the relevant databases;
- describe the vegetation associations in the survey area;
- prepare an inventory of species occurring in the survey area;
- identify any vegetation communities or flora species of conservation significance;
- map broad-scale vegetation groups found within the survey area, including vegetation condition; and
- provide recommendations, including the management of perceived impacts to flora and vegetation within the survey area.

1.2 Statutory Framework and Guidance

This assessment took into account relevant sections of Commonwealth and State legislation and guidelines:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- *Environmental Protection Act 1986* (EP Act)
- *Biodiversity Conservation Act 2016* (BC Act)
- *Biosecurity and Agriculture Management Act 2007* (BAM Act)

The Minister for the Environment publishes lists of flora species in need of special protection because they are considered rare, likely to become extinct, or are presumed extinct. The current listings were published in the Government Gazette on 30 April 2024 (Lawn, 2024) and were taken into account.

As well as those listed above, the assessment took into account relevant sections of:

- EPA (2023) *Statement of environmental principles, factors, objectives and aims of EIA*;
- EPA (2016) *Environmental Factor Guideline: Flora and Vegetation;* and
- EPA (2016a) *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment*, known as *Flora and Vegetation Technical Guidance*

1.2.1 Western Australian *Biodiversity Conservation Act 2016*

The Western Australian *Biodiversity Conservation Act 2016* (BC Act) provides for the conservation, protection and ecologically sustainable use of biodiversity and biodiversity components in Western Australia. The BC Act replaced the *Wildlife Conservation Act 1950*.

Threatened species (both flora and fauna) that meet the categories listed within the Act are highly protected and require authorisation by the Ministerial to take or disturb. These are known as Threatened Flora and Threatened Fauna. The conservation categories of Critically Endangered, Endangered and Vulnerable have been aligned with those detailed in the EPBC Act, as below.

Flora and fauna species may be listed as being of special conservation interest if they have a naturally low population, restricted natural range, are subject to or recovering from a significant population decline or reduction of range or are of special interest, and the Minister considers that taking may result in depletion of the species. Migratory species and those subject to international agreement are also listed under the BC Act. These are known as specially protected species in the BC Act.

Threatened Ecological Communities (TECs) are also protected under BC Act and are categorised using the same criteria as threatened species.

1.2.2 Environmental Protection Act 1986

The *EP Act 1986* was created to provide for an Environmental Protection Authority (the EPA) that has the responsibility for:

- prevention, control and abatement of pollution and environmental harm
- conservation, preservation, protection, enhancement and management of the environment
- matters incidental to or connected with the above.

The EPA is responsible for providing the guidance and policy under which environmental assessments are conducted. It conducts environmental impact assessments (based on the information included in environmental assessments and provided by the proponent), initiates measures to protect the environment and provides advice to the Minister responsible for environmental matters.

1.2.3 Environment Protection and Biodiversity Conservation Act 1999

At a Commonwealth level, Threatened taxa are protected under the EPBC Act, which lists species and ecological communities that are considered Critically Endangered, Endangered, Vulnerable, Conservation Dependent, Extinct, or Extinct in the Wild (Section 6 below).

1.2.4 Flora

1.2.4.1 Threatened and Priority Flora

Conservation significant flora species are those that are listed as TF (Threatened Flora) and (within Western Australia) as PF (Priority Flora). TF species are listed as threatened by the Western Australian Department of Biodiversity Conservation and Attractions (DBCA) and protected under the provisions of the BC Act. Some State-listed TF are provided with additional protection as they are also listed under the Commonwealth EPBC Act. Species can also be listed under the EPBC Act without being listed under the BC Act.

Flora are listed as PF where populations are geographically restricted or threatened by local processes, or where there is insufficient information to formally assign them to TF categories. Whilst PF are not specifically listed in the BC Act, some may qualify as being of special conservation interest and these may require a greater level of protection than unlisted species. Generally though, PF have no statutory protection. They are generally considered in environmental impact assessments under the state approval processes by Department of Mines, Industry Regulation and Safety (DEMIRS) under the *Mining Act 1978* and DBCA under the EP Act. Under this approval process measures are usually taken to protect and avoid PF.

There are seven categories covering State-listed TF and PF species (DBCA, 2023) which are defined in Section 7 below. PF for Western Australia are regularly reviewed by DBCA whenever new information becomes available, with species status altered or removed from the list (Lawn, 2024) when data indicates that they no longer meet the requirements outlined in Section 7 below.

1.2.4.2 Other Significant Flora

According to the Flora and Vegetation Technical Guidance (EPA 2016a) other than being listed as Threatened or Priority Flora, a species can be considered as significant if it is considered to be:

- locally endemic or association with a restricted habitat type (e.g., surface water or groundwater dependent ecosystems)
- a new species or has anomalous features that indicate a potential new species
- at the extremes of range, recently discovered range extensions (generally considered greater than 100 km or in a different bioregion), or isolated outliers of the main range
- unusual species, including restricted subspecies, varieties or naturally occurring hybrids and
- relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

1.2.5 Ecological Communities and Vegetation

1.2.5.1 Threatened and Priority Ecological Communities

Nationally Listed Threatened Ecological Communities

An ecological community is a naturally occurring group of plants, animals and other organisms interacting in a unique habitat. The complex range of interactions between the component species provides an important level of biological diversity in addition to genetics and species. At Commonwealth level, Threatened Flora and TECs are protected under the Commonwealth EPBC Act. An ecological community may be categorised into one of the three subcategories:

- Critically Endangered, if it is facing an extremely high risk of extinction in the wild in the immediate future
- Endangered, if it is not critically endangered and is facing a very high risk of extinction in the wild in the near future and
- Vulnerable, if it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future.

State Listed Threatened Ecological Communities

The Western Australian DBCA also maintains a list of TECs, protected under the BC Act, which are further categorised into three subcategories much like those of the EPBC Act.

State Listed Priority Ecological Communities

DBCA maintains a list of Priority Ecological Communities (PECs). PECs include potential TECs that do not meet survey criteria, or that are not adequately defined.

1.2.5.2 Other Significant Vegetation

According to the Flora and Vegetation Technical Guidance (EPA 2016a), other than being listed as a TEC or PEC, vegetation can be considered as significant if it is considered to have:

- restricted distribution
- a degree of historical impact from threatening processes
- a role as a refuge; and/or
- provides an important function required to maintain ecological integrity of a significant ecosystem.

1.2.5.3 Declared Pest Plants

The Western Australian Organism List (WAOL) details organisms listed as Declared Pests under the BAM Act). Under the BAM Act, Declared Pests are listed as one of the three categories, or exempt:

- 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 established pests where it is not feasible or desirable to manage them in order to limit their damage; or
- Exempt (no category).

2. EXISTING ENVIRONMENT

2.1 Geology and Vegetation

The survey area lies in the Coolgardie (COO) bioregion, more specifically the Eastern Goldfields (COO03) subregion. The Eastern Goldfields subregion covers over 5 million hectares and comprises the Yilgarn craton's 'Eastern Goldfields' Terrains. The subregion is characterised by gentle undulating plains, the west containing Archaean greenstone ridges and low hills, while the east contains a horst of Proterozoic granulite. In the western half there are a series of large playa lakes which are remnants of an ancient major drainage line. The dominant soil type is Calcareous earth, which cover most of the plains and greenstone areas. The vegetation of the Eastern Goldfields botanical subregion consists of mallees, diverse *Eucalyptus* woodlands and *Dodonaea* shrublands and is rich in endemic Acacias. The salt lakes support dwarf shrublands of samphire. Acacia thickets and shrubheaths are found on sandplains (CALM, 2002).

2.2 Climate

The climate of the Coolgardie Region is classified as Arid with 200-300 mm of rainfall, sometimes in summer but usually in winter (CALM, 2002). The nearest official meteorological weather station with the most complete and up to date temperature information is Kalgoorlie-Boulder Airport (station number 012038), which is located approximately 21.2 km northwest of the survey area.

2.2.1 Temperature

Mean annual minimum temperature at Kalgoorlie-Boulder Airport is 11.8°C and mean annual maximum temperature is 25.4°C (BOM, 2025). The coldest temperatures are attained in July (mean minimum temperature 5.1°C), the hottest is January (mean maximum temperature 33.7°C) and diurnal temperature variations are relatively consistent throughout the year (Figure 2).

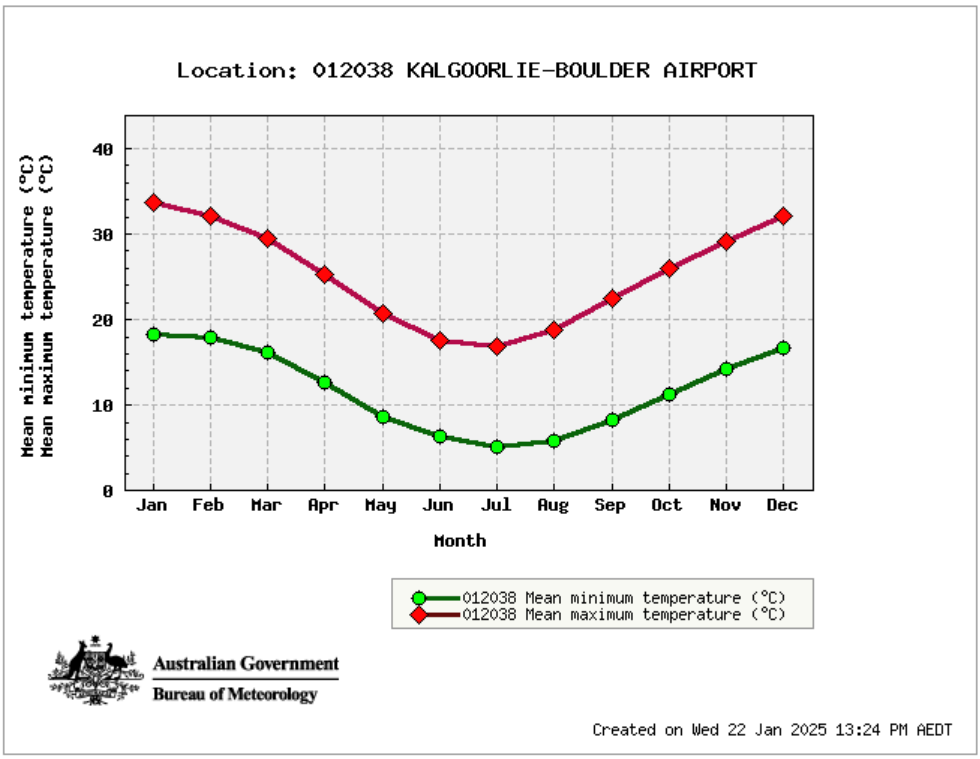

Figure 2: Mean temperature ranges for Kalgoorlie-Boulder Airport weather station

2.2.2 Rainfall

The annual average rainfall at Kalgoorlie-Boulder Airport is 265.3 mm, which falls (>1 mm) on an average of 39.1 rain-days (BOM, 2025). Larger rainfall events occur from January to August (Figure 3). Prior to the survey in 2024, rainfall in March, June, July and November exceeded monthly averages while rainfall for all other months remained below monthly averages (BOM, 2025).

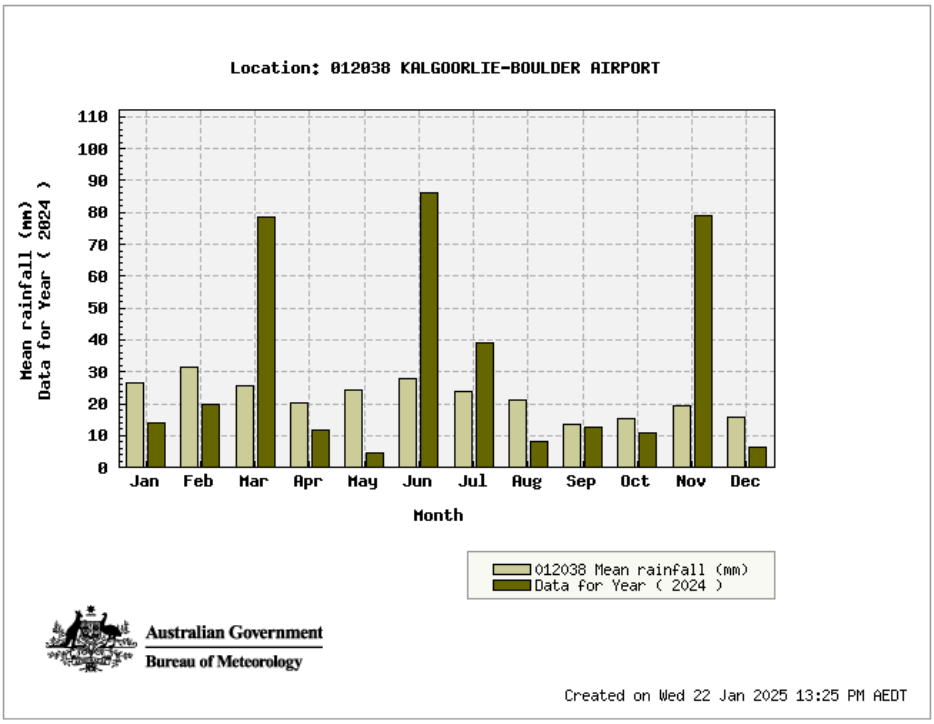

Figure 3: Monthly and mean rainfall for Kalgoorlie-Boulder Airport weather station

3. ASSESSMENT METHODOLOGY

3.1 Personnel and Reporting

The following personnel were involved in the Reconnaissance flora and vegetation survey:

- Mr Eren Reid (*BSc- Biological Science),* Principal Botanist, Native Vegetation Solutions, undertook the survey, vegetation mapping, data collation, field identification of flora, preparation and review of the report. Mr Eren Reid has over 20 years' experience in botanical surveys throughout the Coolgardie Region and over a variety of environments across Western Australia.
- Ms Adele Thomasz (*BSc*- Conservation and Wildlife Biology), Native Vegetation Solutions, data collation and preparation of the report. Adele Thomasz has over 5 years' experience working in the conservation sector and three years specifically working on botanical survey reporting; and
- Mr Frank Obbens (*BSc*), Consultant Botanist, Bushtech Consultancy, undertook identification of unknown samples collected in the field. Mr Frank Obbens has over 22 years' experience offering botanical identification and conducting taxonomic investigations to consultancies and industry.

3.2 Preliminary Desktop Study

A preliminary assessment of the survey area and its potential constraints was undertaken by reviewing relevant government agency managed databases (Sections 3.2.1 to 3.2.5, and Appendices 1 & 2) and consulting with government agencies where necessary. The following sections provide a summary of desktop searches undertaken for the project.

3.2.1 *Environment Protection and Biodiversity Conservation Act* Protected Matters

The *EPBC Act* Protected Matters Search tool was utilised to provide results for matters of National Environmental Significance within the survey area using the survey area as the search criteria with a 10 km buffer (DCCEEW, 2024).

3.2.2 Threatened Flora and Communities

The Threatened and Priority Flora Database managed by the Department of Biodiversity, Conservation and Attractions (DBCA) was searched for threatened and priority flora within a 20 km radial area of the survey area (DBCA, 2020b).

The TEC and PEC database was searched to determine the presence of PECs or TECs (DBCA, 2020a), with Geographic Information System (GIS) data supplied for assessment, within a 20 km radial area of the survey area.

3.2.3 Environmentally Sensitive Areas (ESAs) and Conservation Reserves

The Department of Water and Environmental Regulation (DWER, 2024) Clearing Permit System Map Viewer was used to determine the location of any ESAs and Conservation Reserves.

3.2.4 Vegetation Type, Extent and Status

Vegetation extent and status data was sourced from the Department of Agriculture and Food (DAFWA) report and its associated GIS file (Shepherd *et al*, 2002). This data comprises Beard's Pre-European vegetation groups.

DBCA's Statewide Vegetation Statistics (DBCA, 2019) was also referenced for the current extent of Beard's Vegetation Groups. The purpose of examining this information is to determine if the survey area lies within any vegetation groups defined by Beard that may have been subjected to

widescale clearing for European settlement. The national objectives and targets for biodiversity conservation recognise that the retention of 30% or more of the pre-clearing extent of a Beard vegetation association is necessary if Australia's biological diversity is to be protected.

3.2.5 Wetlands

The potential of wetlands within the project area was determined by examining DWER's Clearing Permit System Map Viewer (DWER, 2024).

3.2.6 Dieback

Under normal circumstances Dieback is only considered a potential issue for any project if the project area lies within the Southwest Land Division and the mean annual rainfall of the area is greater than 400 mm. There is no record of *Phytophthora cinnamomi* (Dieback*)* establishing in natural ecosystems in regions receiving <400mm rainfall per annum (CALM, 2003).

However, as indicated within the more recent Dieback guidelines (DBCA, 2020), other species of *Phytophthora* may persist east of the 400mm isohyet in unusually wet conditions. It is therefore recommended to conduct a risk assessment as per these guidelines.

3.3 Site Investigation

A site visit of the survey area was carried out by Botanist Eren Reid from Native Vegetation Solutions on the 5th and 6th December 2024 to examine the flora and vegetation groups contained within the survey area. A total of 24 hours was spent on site traversing the survey area, by Yamaha Viking All-Terrain Vehicle (ATV) and on foot.

The survey was conducted in accordance with relevant Environmental Protection Authority's (EPA's) Statements and Technical Guidance (Section 1.1).

The EPA uses the Interim Biogeographic Regionalisation of Australia (IBRA) as the largest unit for Environmental Impact Assessment (EIA) decision making in relation to the conservation of biodiversity. Given the scale and nature of the proposed disturbance as well as the existing disturbance, and that the survey area is located within the Coolgardie (COO) IBRA region, a reconnaissance flora and vegetation survey was deemed adequate.

3.3.1 Licenses

Unrecognised taxa were collected in the field via Scientific License FB62000517, held by Mr Eren Reid with expiry 16/02/2026.

3.3.2 Field Methods

Prior to the field work, the aerial photography was examined and representative sample sites for relevés were chosen to provide coverage over all potential vegetation types.

In the field, 20m x 20m relevé sites were established at these sites, taking into account representation of surrounding vegetation and vegetation boundaries. Relevé sites are represented in Appendix 4.

Each relevé site was captured on a TwoNav Aventura GPS at ±4m accuracy, using Universal Transverse Mercator location on GDA94 datum. Digital photographs were taken of each representative vegetation group present in the survey area.

Data collected at each relevé included:

- Photograph of representative vegetation group:
- GPS Location;
- Species Present;
- Population Count/Estimate of Conservation Significant Flora (if present);
- Disturbance Level; and
- Vegetation Condition

The vegetation structure was assessed using the method developed by Muir (1977). Definitions of the vegetation structure are presented in Appendix 3.

The condition of each relevé was assessed using the method developed by Keighery (1994). Definitions of the condition scale are presented in Appendix 3.

Vegetation groups were mapped using the methods listed in Section 3.3.4 below.

Opportunistic recording of plant taxa and vegetation group mapping was also utilised in the survey area between relevé sampling points, via wandering traverses. Smaller singular relevé sites were also utilised as opportunistic sample sites to record taxa and assist in mapping vegetation groups.

All relevé sample sites and GPS tracks are included in Appendix 4.

3.3.3 Post-Field Methods

Taxa were identified with the use of information published on Florabase (WAHERB, 2025). Threatened flora range extensions and new locations were submitted to the Western Australian Herbarium (WAHERB) as per the EPA Technical Guidelines (EPA 2016a).

Species information was transferred into Microsoft Excel® worksheets representing presence/absence of species per vegetation group.

3.3.4 Mapping

Vegetation mapping was produced via GPS recorded information in the field, cross-referenced with vegetation descriptions made in the field, overlaid on aerial imagery of the survey area. The GPS utilised (TwoNav Aventura GPS) displayed aerial imagery, hence real-time mapping of vegetation groups was available during field work.

Vegetation Health Condition was assessed in the field with reference to Keighery (1994).

GPS tracks and waypoints recorded during field work are presented in Appendix 4.

3.3.5 IBSA Data Package

The Environmental Protection Authority (EPA), Department of Water and Environmental Regulation (DWER) and Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) require Index of Biodiversity Surveys for Assessments (IBSA) Data Packages to be submitted to support assessment and compliance under the *Environmental Protection Act 1986.*

An IBSA data package is a single file in .zip format, containing:

- one survey report in .pdf format;
- one plain-text survey report in .txt format; and
- a set of electronic data files, comprising:
    - one survey details spatial dataset in shapefile (.shp, etc.) or MapInfo (.tab, etc.) format; and
    - one or more survey data spatial datasets, as required, in shapefile (.shp, etc.) or MapInfo (.tab, etc.) format.

The IBSA Data package for this survey will be submitted via the DWER IBSA Submission Portal.

3.4 Nomenclature And Taxonomy

Nomenclature follows that used by the WAHERB (2025).

The WAHERB has updated its sequence and arrangement of collections to conform to the systematic sequence of the Angiosperm Phylogeny Group (APGIII), with the result that many Families and Genera have been moved or renamed. This report attempts to follow those changes in relation to species recorded during this survey.

3.5 Limitations

Table 1 lists potential limitations that may have affected the survey.

Table 1: List of potential survey limitations

Potential Limitations	Constraint (Y/N)	Comment
Competency and experience of the consultants undertaking the survey	N	Experienced and competent personnel conducted the survey. Eren Reid (*BSc*) has over 20 years' experience in botanical surveys throughout the Coolgardie Region and over a variety of environments across Western Australia.
Scope	N	The Scope of work was adequately defined. Vascular flora species were the focus of the survey and were thoroughly sampled.
Proportion of flora identified during survey	N	As the survey was planned to target species of conservation significance and flora within a defined survey area, a complete census of the species present was attempted (Approx. 95%). Sufficient identifications were made to allow vegetation descriptions to be made.
Sources of information	N	Threatened and Priority Flora GIS information was available from DBCA.
Proportion of the task achieved	N	All tasks completed.
Timing/Season	N	The reconnaissance flora and vegetation survey was conducted in November 2024. Flowering annual species were present within the survey area, suggesting recent above average rainfall in March, June and July 2024 was sufficient for the period of survey. The most recent rainfall received in the area was on 26th October 2024.
Disturbance in survey area	N	Minor disturbance (historical mining access tracks and exploration) was observed within the survey area, however, did not compromise the results of the survey as these areas were avoided whilst collecting data.
Intensity of survey effort	N	The survey intensity is considered to have been sufficient for a reconnaissance survey according to EPA (2016) guidelines. Areas most likely to contain threatened and priority species were targeted. Vegetation mapping sites were selected to provide adequate coverage of the survey area.
Resources	N	Resources, in terms of time, equipment, support and personnel were adequate to undertake and complete the reconnaissance survey.
Access problems	N	All the areas in need of survey were easily accessible from existing tracks, or by foot.
Availability of contextual information on the region	N	Contextual information regarding vegetation and flora of the Coolgardie bioregion is readily available. Adequate information was able to be accessed from available databases.

4. RESULTS

4.1 Preliminary Desktop Assessment

4.1.1 EPBC Act Protected Matters

Results of the EPBC Protected Matters search tool are included in Appendix 1.

The EPBC Protected Matters report indicated no TF, TECs or Commonwealth Reserves within the requested survey area (DCCEEW, 2024).

The search results indicated that one State Reserve, Lakeside Timber Reserve 5(1)(g), occurs within 10 km of the survey area.

4.1.2 Threatened Flora and Communities

The DBCA database searches revealed a potential for no Threatened and eight Priority Flora species to occur within a 20 km radius of the survey area (DBCA, 2020b). One known location of Priority Flora, *Austrostipa turbinata* (P3) occurs within the survey area. This location was searched however this species was not detected.

Results of the threatened flora database search are included in Appendix 2 which includes the likelihood of each species to occur within the survey area. Priority Flora species within a 20 km radius of the survey area are displayed in Map 3 of Appendix 4.

The PEC/TEC search (DBCA, 2020a) revealed that no TECs or PECs fall within the survey area, or within 20 km of the survey area.

4.1.3 Environmentally Sensitive Areas and Conservation Reserves

No ESA's or conservation Reserves are located within the survey area. The north boundary of the survey area is directly adjacent to a 'C' Class Reserve, R 29294 (DWER, 2024). Reserve details are displayed in Appendix 1.

4.1.4 Land Systems

As part of the Rangeland resource surveys, the Department of Agriculture mapped the Land Systems of Western Australia (DPIRD, 2017). The Land Systems occurring within the survey area are listed in Table 2 below and displayed in Appendix 4.

Table 2: Land Systems occurring within the survey area (DPIRD, 2017)

Land System	Description	Extent of Survey Area (ha)	% Of Survey Area (%)
Graves System	Basalt and greenstone rises and low hills supporting eucalypt woodlands with prominent saltbush and bluebush understoreys.	166.79	15.56
Gumland System	Extensive pedeplains supporting eucalypt woodlands with halophytic and non-halophytic shrub understoreys.	122.51	11.43
Lefroy System	Salt lakes and fringing saline plains, sandy plains and dunes with chenopod low shrublands.	530.37	49.47
Moriarty System	Low greenstone rises and stony plains supporting chenopod shrublands with patchy eucalypt overstoreys.	252.32	23.54

4.1.5 Vegetation Type, Extent and Status

Two vegetation units defined by Beard (1990) were identified as part of the desktop assessment. The vegetation units identify the pre-European extent of vegetation, as mapped by Beard (1990). The national objectives and targets for biodiversity conservation recognise that the retention of 30% or more of the pre-clearing extent of Beard's vegetation associations is necessary if Australia's biological diversity is to be protected.

Information relating to known Beard (1990) vegetation units within the survey area has been summarised in Table 3, Table 4 and Table 5 below. This information has been compiled through both desktop assessments and the site visit.

The extent of the Beard vegetation units within the survey area at all scales is less than 1% of the total area at each scale (Table 3). All three Beard vegetation units are above the 30% threshold at a State, bioregional and subregional scale.

Table 3: Extent of Beard Associations within the survey area

Beard Vegetation Association	Extent within survey area (ha)	% of survey area (%)	By Association WA	By IBRA Region *(COO)*	By IBRA Sub-region *(COO03)*	By Shire *(City of Kalgoorlie-Boulder)*
9	632.41	58.99	<1%	<1%	<1%	<1%
540	439.60	41.01	<1%	<1%	<1%	<1%

Table 4: Summary of information regarding pre-European and current vegetation extent of Vegetation Association 9 within the survey area

Factor	Value				
Beard Vegetation Association*	9				
Vegetation Association Description*	Medium woodland; coral gum (*E. torquata*) & Goldfields blackbutt (*E. lesouefii*) (also some e10,11)				
Pre-European Extent (ha)	Scale				
	By Association (WA)	By Association (WA)	By IBRA Region (COO)	By IBRA Sub-region (COO03)	By Shire (City of Kalgoorlie-Boulder)
	244,735*	240,509.33 **	240,441.99**	235,047.15**	166,572.37**
% Pre-European Extent Remaining	100.00%*	97.78%**	97.78%**	97.75%**	98.29%**
Surrounding Land Use***	Mining, Exploration, Pastoral Lease				
Weed prevalence***	Low				

* Source: Shepherd *et al.* (2002) Appendix 2
**Source: DBCA, (2019)
***Source: Field Assessment

Table 5: Summary of information regarding pre-European and current vegetation extent of Vegetation Association 540 within the survey area

Factor	Value				
Beard Vegetation Association*	540				
Vegetation Association Description*	Succulent steppe with open low woodland; sheoak over saltbush				
Pre-European Extent (ha)	Scale				
	By Association (WA)	By Association (WA)	By IBRA Region (COO)	By IBRA Sub-region (COO03)	By Shire (City of Kalgoorlie-Boulder)
	163,291*	202,423.88**	75,810.73**	75,810.73**	137,022.73**
% Pre-European Extent Remaining	100.00%*	98.88%**	97.11%**	97.11%**	99.04%**
Surrounding Land Use***	Mining, Exploration, Pastoral Lease				
Weed prevalence***	Low				

* Source: Shepherd *et al.* (2002) Appendix 2
**Source: DBCA, (2019)
***Source: Field Assessment

4.1.6 Wetlands

The DWER Clearing Permit System Map Viewer revealed a portion of the Hannan Lake drainage basin is located within the survey area (DWER, 2024). Hannan Lake is an ephemeral Salt Lake located approximately 7 km northwest of the survey area. The location of the potential wetland is displayed in Appendix 1.

4.1.7 Dieback

The survey area lies south of the 26th parallel, however receives average annual rainfall of 265.3 mm. There is no record of *Phytophthora cinnamomi* establishing in natural ecosystems in regions receiving less than 400mm rainfall per annum (CALM, 2003).

However, as indicated within the more recent Dieback guidelines (DBCA, 2020), other species of *Phytophthora* may persist east of the 400mm isohyet in unusually wet conditions. It is therefore recommended to conduct a risk assessment as per these guidelines.

Additionally, all measures should be taken to prevent any possible soil contamination (including seeds of non-native species *etc.*) which poses a risk in the survey area during seasonally favourable conditions.

4.2 Field Assessment

4.2.1 Threatened Flora

No Priority Flora or Threatened Flora were recorded in the survey area.

4.2.2 Vegetation Type, Extent and Status

A total of 30 Families, 68 Genera and 142 Species were recorded within the survey area. Nineteen major vegetation groups were recorded in the survey area and range from Completely Degraded to Very Good condition (using the scale of Keighery 1994, see Appendix 3). Existing disturbance within the survey area is comprised of historic exploration activities, and access roads.

No unique or restricted vegetation communities were identified, and all vegetation types/communities are common, widespread and well represented in the Eastern Goldfields subregion.

The summary of vegetation groups contained within the survey area is summarised in Table 6 below. Maps of the survey area can be seen in Appendix 4.

Table 6: Vegetation Group Summary

Vegetation Group	Veg Group Code	Families	Genera	Species	Area (ha)	Percentage of survey area (%)
Mixed *Eucalyptus* over mixed sclerophyll shrubland on hills	A	15	21	35	178.74	16.30%
Transitional *Eucalyptus* woodland	B	20	29	55	169.60	15.46%
Eucalyptus salubris and *Eucalyptus oleosa* woodland over chenopod shrubland	C	12	22	46	172.00	15.68%
Eucalyptus lesouefii woodland over *Maireana sedifolia* and chenopod shrubland	D	10	13	19	1.46	0.13%
Eucalyptus salmonophloia woodland over chenopod shrubland	E	10	13	21	2.66	0.24%
Eucalyptus ravida woodland	F	10	13	21	1.12	0.10%
Eucalyptus lesouefii woodland over *Melaleuca sheathiana* over *Maireana sedifolia* and sclerophyll shrubland	G	11	14	23	8.94	0.81%
Open *Eucalyptus salmonophloia* woodland over *Maireana sedifolia* shrubland	H	11	17	28	3.08	0.28%
Eucalyptus lesouefii woodland over *Melaleuca sheathiana* shrubland	I	8	12	20	31.00	2.83%
Eucalyptus griffithsii woodland over sclerophyll shrubland and *Triodia* grassland on undulating hills	J	13	18	28	6.55	0.60%
Eucalyptus lesouefii woodland over *Melaleuca sheathiana* over mixed sclerophyll shrubland	K	11	15	22	44.19	4.03%
Eucalyptus woodland over quartz outcrop	L	9	12	20	1.56	0.14%
Open chenopod shrubland	M	14	21	32	111.37	10.16%
Sclerophyll shrubland	N	13	17	27	20.74	1.89%
Tecticornia shrubland	O	10	16	23	204.34	18.63%
Melaleuca lateriflora shrubland	P	7	13	17	59.67	5.44%
Eucalyptus oleosa over sclerophyll shrubland and Spinifex	Q	11	13	15	0.51	0.05%
Acacia acuminata shrubland	R	9	12	18	31.17	2.84%
Myoporum platycarpum over *Acacia donaldsonii* and sclerophyll shrubland	S	9	15	19	9.00	0.82%
Bare Claypan		N/A	N/A	N/A	0.20	0.02%
Existing Disturbance		N/A	N/A	N/A	38.86	3.54%
	Total	**30***	**68***	**142***	**1096.73#**	**100.00%#**

Note: * Within total survey area (not sum of column)
Sum of column

The vegetation groups within the survey area are described in more detail below.

4.2.2.1 Mixed *Eucalyptus* over mixed sclerophyll shrubland on hills (A)

This Low Woodland A (Muir, 1977) consisted of 15 Families, 21 Genera and 35 Species. The vegetation group was approximately 178.74 ha which makes up 16.30% of the survey area.

Figure 4: Vegetation Group A within the survey area

4.2.2.2 Transitional *Eucalyptus* woodland (B)

This Woodland (Muir, 1977) consisted of 20 Families, 29 Genera and 55 Species. The vegetation group was approximately 169.60 ha which makes up 15.46% of the survey area.

Figure 5: Vegetation Group B within the survey area

4.2.2.3 *Eucalyptus salubris* and *Eucalyptus oleosa* woodland over chenopod shrubland (C)

This Low Woodland A (Muir, 1977) consisted of 12 Families, 22 Genera and 46 Species. The vegetation group was approximately 172.00 ha which makes up 15.68% of the survey area.

Figure 6: Vegetation Group C within the survey area

4.2.2.4 *Eucalyptus lesouefii* woodland over *Maireana sedifolia* and chenopod shrubland (D)

This Open Low Woodland A (Muir, 1977) consisted of 10 Families,13 Genera and 19 Species. The vegetation group was approximately 1.46 ha which makes up 0.13% of the survey area.

Figure 7: Vegetation Group D within the survey area

4.2.2.5 *Eucalyptus salmonophloia* woodland over chenopod shrubland (E)

This Open Tall Woodland (Muir, 1977) consisted of 10 Families, 13 Genera and 21 Species. The vegetation group was approximately 2.66 ha which makes up 0.24% of the survey area.

Figure 8: Vegetation Group E within the survey area

4.2.2.6 Eucalyptus ravida woodland (F)

This Low Woodland A (Muir, 1977) consisted of 10 Families, 13 Genera and 21 Species. The vegetation group was approximately 1.12 ha which makes up 0.10% of the survey area.

Figure 9: Vegetation Group F within the survey area

4.2.2.7 Eucalyptus lesouefii woodland over *Melaleuca sheathiana* over *Maireana sedifolia* and sclerophyll shrubland (G)

This Low Forrest A (Muir, 1977) consisted of 11 Families, 14 Genera and 23 Species. The vegetation group was approximately 8.94 ha which makes up 0.81% of the survey area.

Figure 10: Vegetation Group G within the survey area

4.2.2.8 Open *Eucalyptus salmonophloia* woodland over *Maireana sedifolia* shrubland (H)

This Open Tall Woodland (Muir, 1977) consisted of 11 Families, 17 Genera and 28 Species. The vegetation group was approximately 3.08 ha which makes up 0.28% of the survey area.

Figure 11: Vegetation Group H within the survey area

4.2.2.9 Eucalyptus lesouefii woodland over *Melaleuca sheathiana* shrubland (I)

This Low Woodland A (Muir, 1977) consisted of 8 Families, 12 Genera and 20 Species. The vegetation group was approximately 31.00 ha which makes up 2.83% of the survey area.

Figure 12: Vegetation Group I within the survey area

4.2.2.10 Eucalyptus griffithsii woodland over sclerophyll shrubland and *Triodia* grassland on undulating hills (J)

This Open Tree Mallee (Muir, 1977) consisted of 13 Families, 18 Genera and 28 Species. The vegetation group was approximately 6.55 ha which makes up 0.60% of the survey area.

Figure 13: Vegetation Group J within the survey area

4.2.2.11 Eucalyptus lesouefii woodland over *Melaleuca sheathiana* over mixed sclerophyll shrubland (K)

This Low Woodland A (Muir, 1977) consisted of 11 Families, 15 Genera and 22 Species. The vegetation group was approximately 44.19 ha which makes up 4.03% of the survey area.

Figure 14: Vegetation Group K within the survey area

4.2.2.12 Eucalyptus woodland over quartz outcrop (L)

This Open Low Woodland A (Muir, 1977) consisted of 9 Families, 12 Genera and 20 Species. The vegetation group was approximately 1.56 ha which makes up 0.14% of the survey area.

Figure 15: Vegetation Group L within the survey area

4.2.2.13 Open chenopod shrubland (M)

This Open Dwarf Scrub C (Muir, 1977) consisted of 14 Families, 21 Genera and 32 Species. The vegetation group was approximately 111.37 ha which makes up 10.16% of the survey area.

Figure 16: Vegetation Group M within the survey area

4.2.2.14 Sclerophyll shrubland (N)

This Heath B (Muir, 1977) consisted of 13 Families, 17 Genera and 27 Species. The vegetation group was approximately 20.74 ha which makes up 1.89% of the survey area.

Figure 17: Vegetation Group N within the survey area

4.2.2.15 Tecticornia shrubland (O)

This Low Heath D (Muir, 1977) consisted of 10 Families, 16 Genera and 23 Species. The vegetation group was approximately 204.34 ha which makes up 18.63% of the survey area.

Figure 18: Vegetation Group O within the survey area

4.2.2.16 Melaleuca lateriflora shrubland (P)

This Scrub (Muir, 1977) consisted of 7 Families, 13 Genera and 17 Species. The vegetation group was approximately 59.67 ha which makes up 5.44% of the survey area.

Figure 19: Vegetation Group P within the survey area

4.2.2.17 Eucalyptus oleosa over sclerophyll shrubland and Spinifex (Q)

This Open Tree Mallee (Muir, 1977) consisted of 11 Families, 13 Genera and 15 Species. The vegetation group was approximately 0.51 ha which makes up 0.05% of the survey area.

Figure 20: Vegetation Group Q within the survey area

4.2.2.18 Acacia acuminata shrubland (R)

This Scrub (Muir, 1977) consisted of 9 Families, 12 Genera and 18 Species. The vegetation group was approximately 31.17 ha which makes up 2.84% of the survey area.

Figure 21: Vegetation Group R within the survey area

4.2.2.19 Myoporum platycarpum over *Acacia donaldsonii* and sclerophyll shrubland (S)

This Scrub (Muir, 1977) consisted of 9 Families, 15 Genera and 19 Species. The vegetation group was approximately 9.00 ha which makes up 0.82% of the survey area.

Figure 22: Vegetation Group S within the survey area

4.2.2.20 Bare Claypan

Bare Claypans within the survey area made up approximately 0.20 ha which is 0.02% of the survey area.

Figure 23: Bare Claypan within the survey area

4.2.2.22 Existing Disturbance

Existing disturbance within the survey area consisted of historic exploration clearing and access roads and was approximately 38.86 ha which makes up 3.54% of the survey area.

No Photograph captured

4.2.3 Weeds

Six weed species was recorded within the survey area, *Mesembryanthemum nodiflorum* (Slender Iceplant), *Asphodelus fistulosus* (Onion Weed), *Centaurea melitensis* (Maltese Cockspur), *Oncosiphon suffruticosum* (Calomba Daisy), *Symphyotrichum squamatum* (Bushy Starwort) and *Salvia verbenaca* (Wild Sage). These species are not considered a Declared Pest under the BAM Act (DPIRD, 2025).

4.2.4 Vegetation Condition

Evidence of historic exploration and access tracks were observed during the field assessment.

Overall, the condition of the vegetation was determined to range from “Completely Degraded” to “Very Good” with most of the area falling into the “Good” Category. Areas which were affected by historic exploration and clearing were deemed in “Completely Degraded” condition. A map of the vegetation condition within the survey is depicted in Appendix 4.

5. DISCUSSION

The field assessment established that the condition of the vegetation in the proposed disturbance area ranged from “Completely Degraded” to “Very Good” with most of the area falling into the “Good” Category. Areas which were affected by historic exploration were deemed in “Completely Degraded” condition. No areas of vegetation were assessed to be in “Pristine” condition.

Six weed species was recorded within the survey area, *Mesembryanthemum nodiflorum* (Slender Iceplant), *Asphodelus fistulosus* (Onion Weed), *Centaurea melitensis* (Maltese Cockspur), *Oncosiphon suffruticosum* (Calomba Daisy), *Symphyotrichum squamatum* (Bushy Starwort) and *Salvia verbenaca* (Wild Sage). These species are not considered a Declared Pest under the BAM Act.

No Priority or Threatened Flora were recorded in the survey area.

No TECs or PECs were recorded in the survey area.

No unique or restricted vegetation communities were identified, and all vegetation types/communities are common, widespread and well represented in the Eastern Goldfields subregion.

Any proposed disturbance/clearing of vegetation will result in a loss of some flora and vegetation. However, given the size of the area and the extent of the Beard (1990) vegetation association elsewhere, the impact on the vegetation and its component flora will not affect the conservation values of either, or create fragmentation or patches of remnant vegetation.

The following recommendations arise from the reconnaissance flora survey:

- Weed control measures should be implemented during and following earthworks; and
- Dust control measures should be implemented during earthworks.

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7. GLOSSARY

Acronyms:

BOM	Bureau of Meteorology, Australian Government
BSc	Bachelor of Science
CALM	Department of Conservation and Land Management (now DBCA)
COO	Coolgardie Bioregion (IBRA)
COO03	Eastern Goldfields Subregion (IBRA)
CPS	Clearing Permit System (DWER)
DBCA	Department of Biodiversity, Conservation and Attractions, Western Australia
DCCEEW	Department of Climate Control, Energy, the Environment and Water, Australian Government
DEMIRS	Department of Energy, Mines, Industry Regulation and Safety, Western Australia
DPAW	Department of Parks and Wildlife, Western Australia (now DBCA)
DPIRD	Department of Primary Industries and Regional Development, Western Australia
DRF	Declared Rare Flora (now classed as Threatened Flora)
DWER	Department of Water and Environmental Regulation, Western Australia
EPA	Environmental Protection Authority, Western Australia
EP Act	Environmental Protection Act 1986, Western Australia
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth Act)
ESA	Environmentally Sensitive Area
GIS	Geographical Information System
ha	Hectare (10,000 square metres)
IBRA	Interim Biogeographic Regionalisation for Australia, DCCEEW
IUCN	International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union
km	Kilometres
m	Metres
NVS	Native Vegetation Solutions
PEC	Priority Ecological Community, Western Australia
PF	Priority Flora
Ramsar	A wetland site designated of international importance under the Ramsar Convention (UNESCO)
TEC	Threatened Ecological Community
TF	Threatened Flora
UNESCO	United Nations Educational, Scientific and Cultural Organization
WA	Western Australia
WAHERB	Western Australian Herbarium (DBCA)
WAOL	Western Australian Organism List (DPIRD)

Definitions:

DBCA (2023) Conservation Codes for Western Australian Flora and Fauna. Department of Biodiversity, Conservation and Attractions, Western Australia, August 2023: -

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

Priority is not a listing category under the BC Act. The Priority Flora and Fauna lists are maintained by the department and are published on the department's website.

All fauna and flora are protected in WA following the provisions in Part 10 of the BC Act. The protection applies even when a species is not listed as threatened or specially protected, and regardless of land tenure (State managed land (Crown land), private land, or Commonwealth land).

Species that may possibly be threatened species that do not meet the criteria for listing under the BC Act because of insufficient survey 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 prioritisation for survey and evaluation of conservation status so that consideration can be given to potential listing as threatened.

Species that are adequately known, meet criteria for near threatened, or are rare but not threatened, or that have been recently removed from the threatened species list or conservation dependent or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of priority status 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.

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.

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.

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. These species need further survey.

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 a conservation dependent specially protected species.
c) Species that have been removed from the list of threatened species or lists of conservation dependent or other specially protected species, during the past five years for reasons other than taxonomy.
d) Other species in need of monitoring.

Appendix 1: Relevant Government Database Search Results

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: 27-Aug-2024

- 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:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	8
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 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:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	10
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:	1
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	2
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

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 likely to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may 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 may 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
INSECT			
Ogyris subterrestris petrina Arid Bronze Azure [77743]	Critically Endangered	Species or species habitat may occur within area	In feature area
MAMMAL			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Dasyurus geoffroii			
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area	In feature area

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 may occur within area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may 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

Other Matters Protected by the EPBC Act

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
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
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may 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 likely 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 feature area

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Lakeside Timber Reserve	5(1)(g) Reserve	WA	In buffer area only

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Nava-1 Cable System	2001/510	Controlled Action	Completed	In buffer area only
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area

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 are 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

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

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

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
- 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
-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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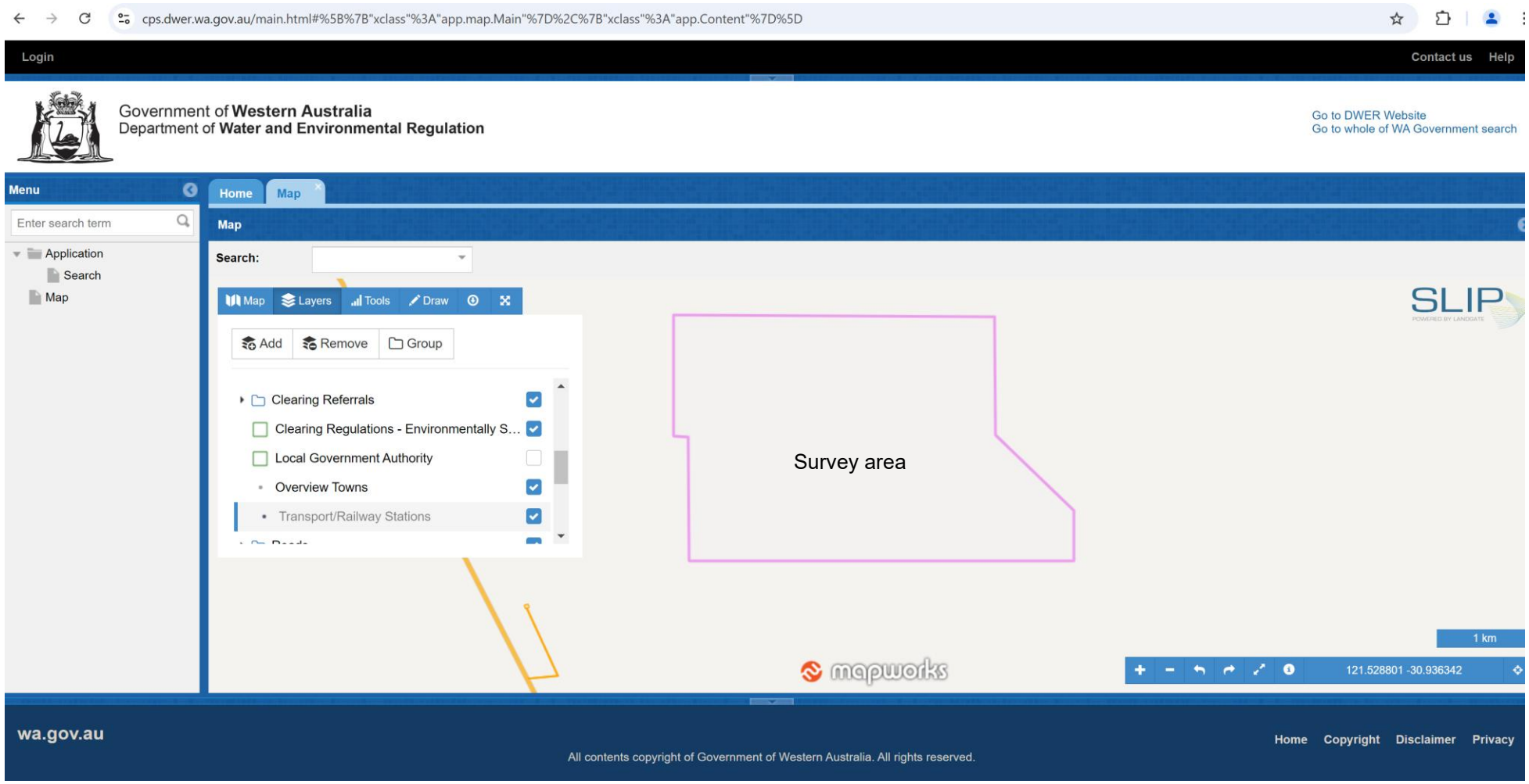
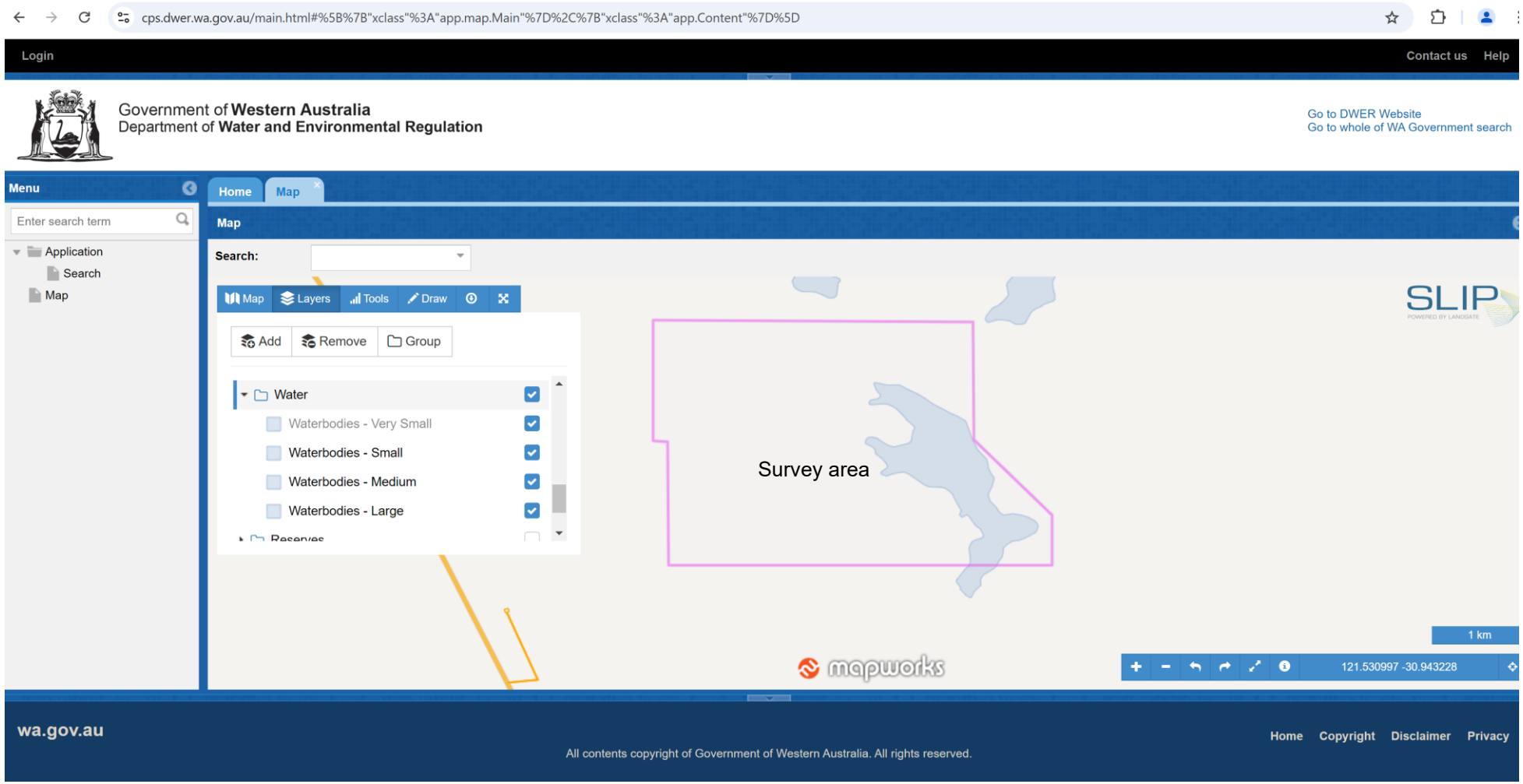
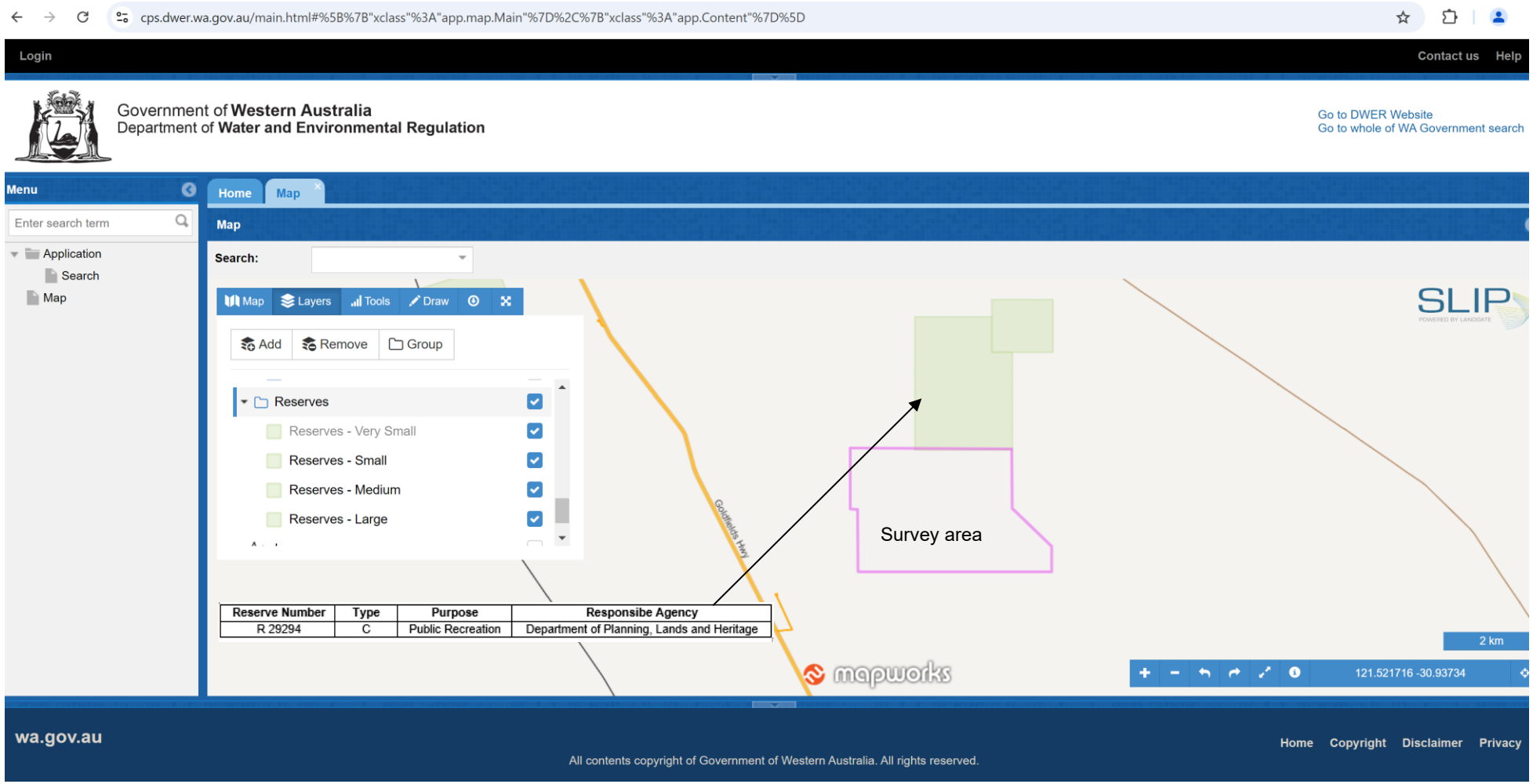


DWER's Clearing Permit System Map Viewer showing no ESA's (dark green shaded areas) within the survey area (DWER, 2024)



DWER Clearing Permit System Map Viewer showing Hannan Lake drainage basin within the survey area (DWER, 2024)



DWER Clearing Permit System Map Viewer showing Class C Reserve R 29294 (Green polygon) adjacent to the survey area (DWER, 2024)

Appendix 2: Threatened Flora Databases Search Results

GIS information provided in the Search results listed the following species within a 20 km radius of the survey area (DBCA, 2020b):

Taxon	Conservation Code	Comment (Post field work)
Alyxia tetanifolia	P3	Unlikely- Possible suitable habitat, extensively searched
Austrostipa turbinata	P3	Possible- Known location inside the survey area from DBCA database results, location visited, but was not recorded during field work
Eremophila praecox	P2	Unlikely- Possible suitable habitat, extensively searched
Goodenia salina	P2	Unlikely- Possible suitable habitat, extensively searched
Isolepis australiensis	P3	Unlikely- Possible suitable habitat, extensively searched
Melaleuca coccinea	P3	Unlikely- Possible suitable habitat, extensively searched
Ptilotus procumbens	P1	Unlikely- Possible suitable habitat, extensively searched
Thryptomene planiflora	P2	Unlikely- No suitable habitat
Xanthoparmelia dayiana	P3	Unlikely- Possible suitable habitat, extensively searched

Appendix 3: Vegetation Definitions

Vegetation Condition Definitions (Keighery, 1994)

Pristine (1). Pristine or nearly so, no obvious signs of disturbance.

Excellent (2). Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.

Very Good (3). Vegetation structure altered, obvious signs of disturbance.
For example, disturbance to vegetation structure caused by repeating fires, the presence of some more aggressive weeds, dieback, logging and grazing.

Good (4). Vegetation structure significantly altered by very obvious signs of multiple disturbance.
Retains basic vegetation structure or ability to regenerate it.
For example, disturbance to vegetation structure caused by frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.

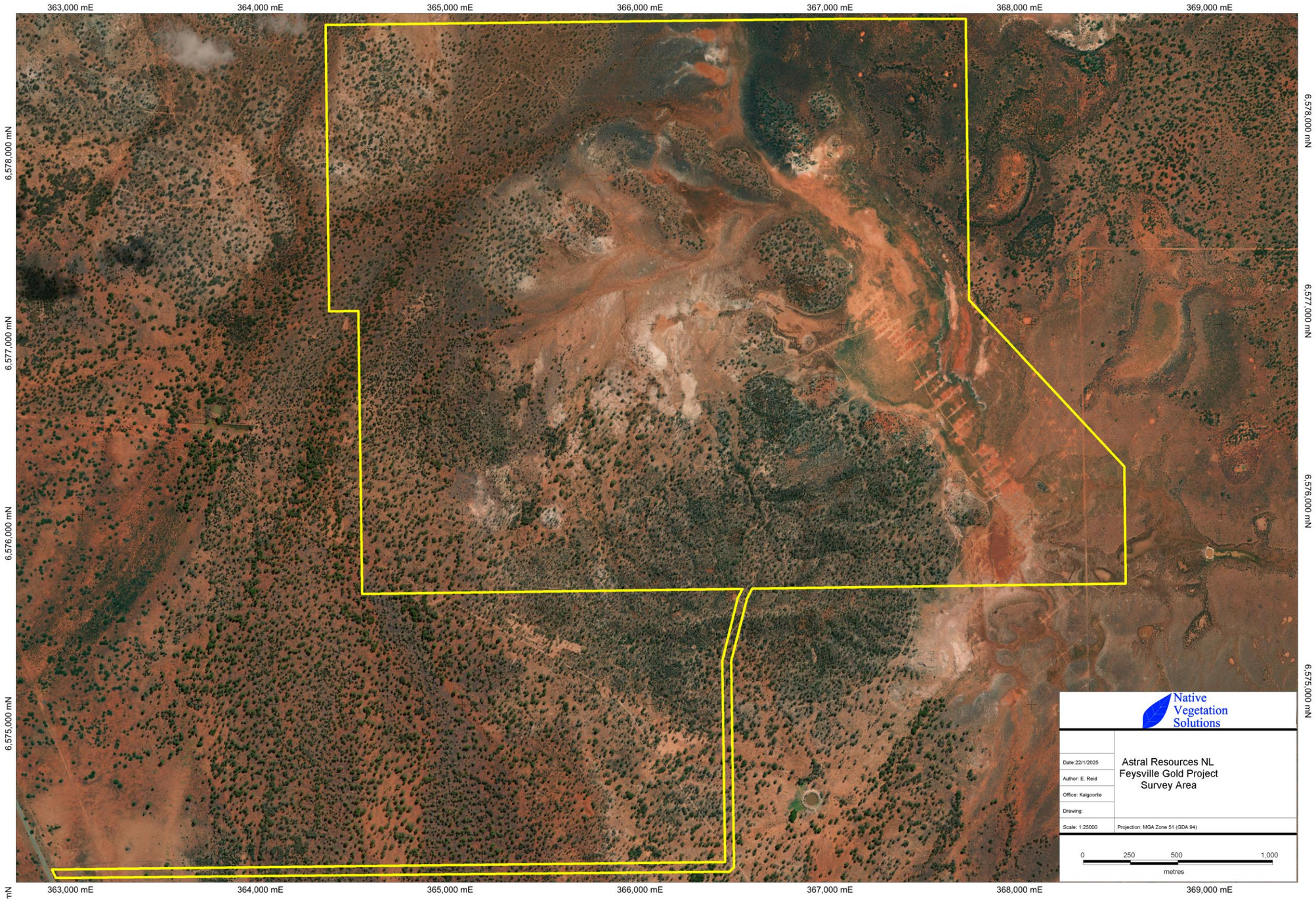
Degraded (5). Basic vegetation structure severely impacted by disturbance.
Scope for regeneration but not to a state approaching good condition without intensive management.
For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.

Completely Degraded (6). The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.
These areas are often described as 'parkland cleared' with the flora compromising weed or crop species with isolated trees or shrubs.

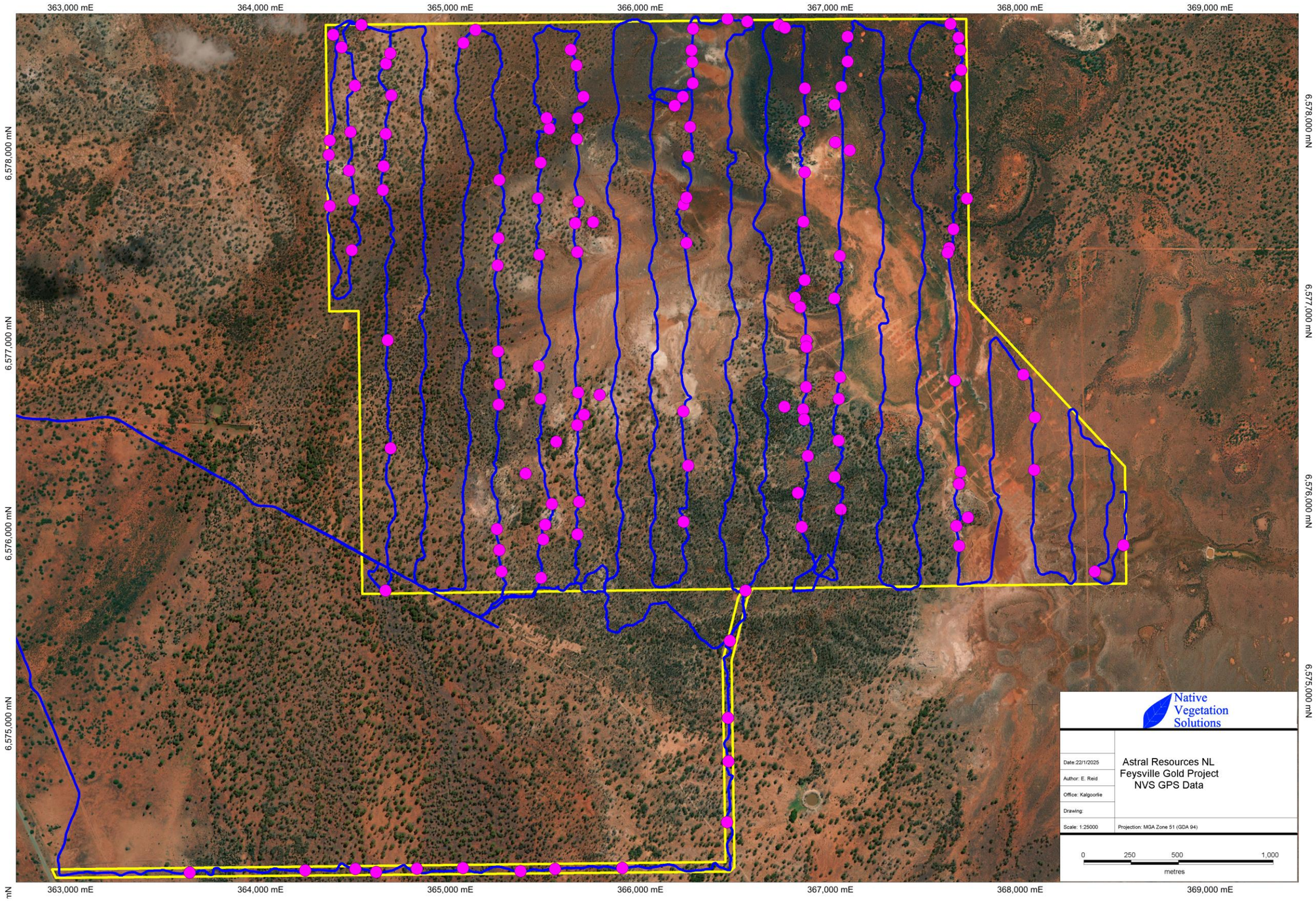
Vegetation Structure Definitions (Muir, 1977)

Life Form/Height Class	Canopy Cover			
	Dense 70-100% d	Mid-Dense 30-70% c	Sparse 10-30% i	Very Sparse 2-10% r
T Trees>30m	Dense Tall Forest	Tall Forest	Tall Woodland	Open Tall Woodland
M Trees 15-30m	Dense Forest	Forest	Woodland	Open Woodlnd
LA Trees 5-15m	Dense Low Forest A	Low Forest A	Low Woodland A	Open Low Woodland A
LB Trees<5m	Dense Low Forest B	Low Forest B	Low Woodland B	Open Low Woodland B
KT Mallee tree form	Dense Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree Mallee
KS Mallee shrub form	Dense Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub Mallee
S Shrubs>2m	Dense Thicket	Thicket	Scrub	Open Scrub
SA Shrubs 1.5-2.0m	Dense Heath A	Heath A	Low Scrub A	Open Low Scrub A
SB Shrubs 1.0-1.5m	Dense Heath B	Heath B	Low Scrub B	Open Low Scrub B
SC Shrubs 0.5-1.0m	Dense Low Heath C	Low Heath C	Dwarf Scrub C	Open Dwarf Scrub C
SD Shrubs 0.0-0.5m	Dense Low Heath D	Low Heath D	Dwarf Scrub D	Open Dwarf Scrub D
P Mat plants	Dense Mat Plants	Mat Plants	Open Mat Plants	Very Open Mat Plants
H Hummock Grass	Dense Hummock Grass	Mid-Dense Hummock Grass	Hummock Grass	Open Hummock Grass
GT Bunch grass >0.5m	Dense Tall Grass	Tall Grass	Open Tall Grass	Very Open Tall Grass
GL Bunch grass <0.5m	Dense Low Grass	Low Grass	Open Low Grass	Very Open Low Grass
J Herbaceous spp.	Dense Herbs	Herbs	Open Herbs	Very Open Herbs
VT Sedges >0.5m	Dense Tall Sedges	Tall Sedges	Open Tall Sedges	Very Open Tall Sedges
VL Sedges <0.5m	Dense Low Sedges	Low Sedges	Open Low Sedges	Very Open Low Sedges
X Ferns	Dense Ferns	Ferns	Open Ferns	Very Open Ferns
Mosses, liverwort	Dense Mosses	Mosses	Open Mosses	Very Open Mosses

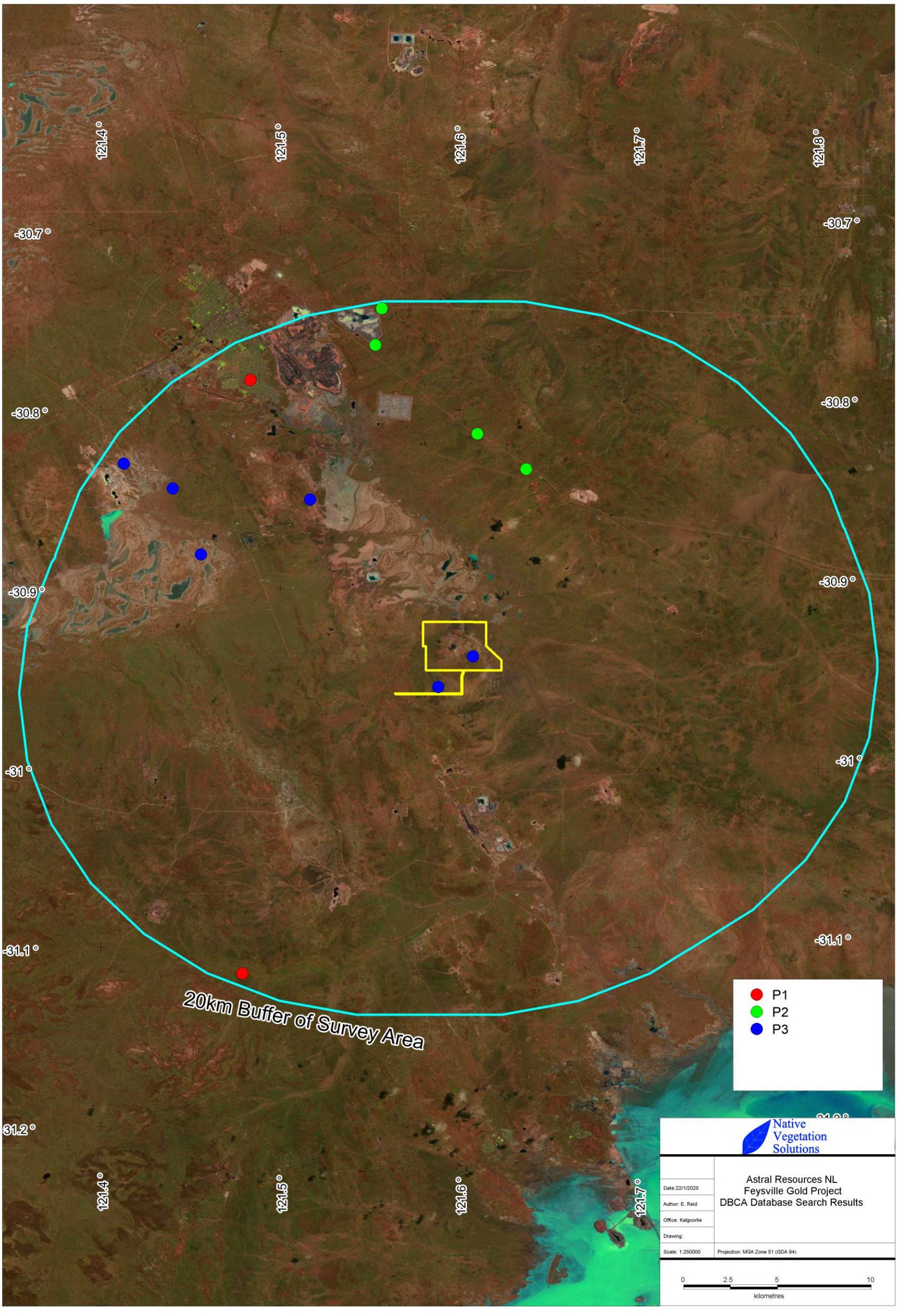
Appendix 4: Vegetation Mapping



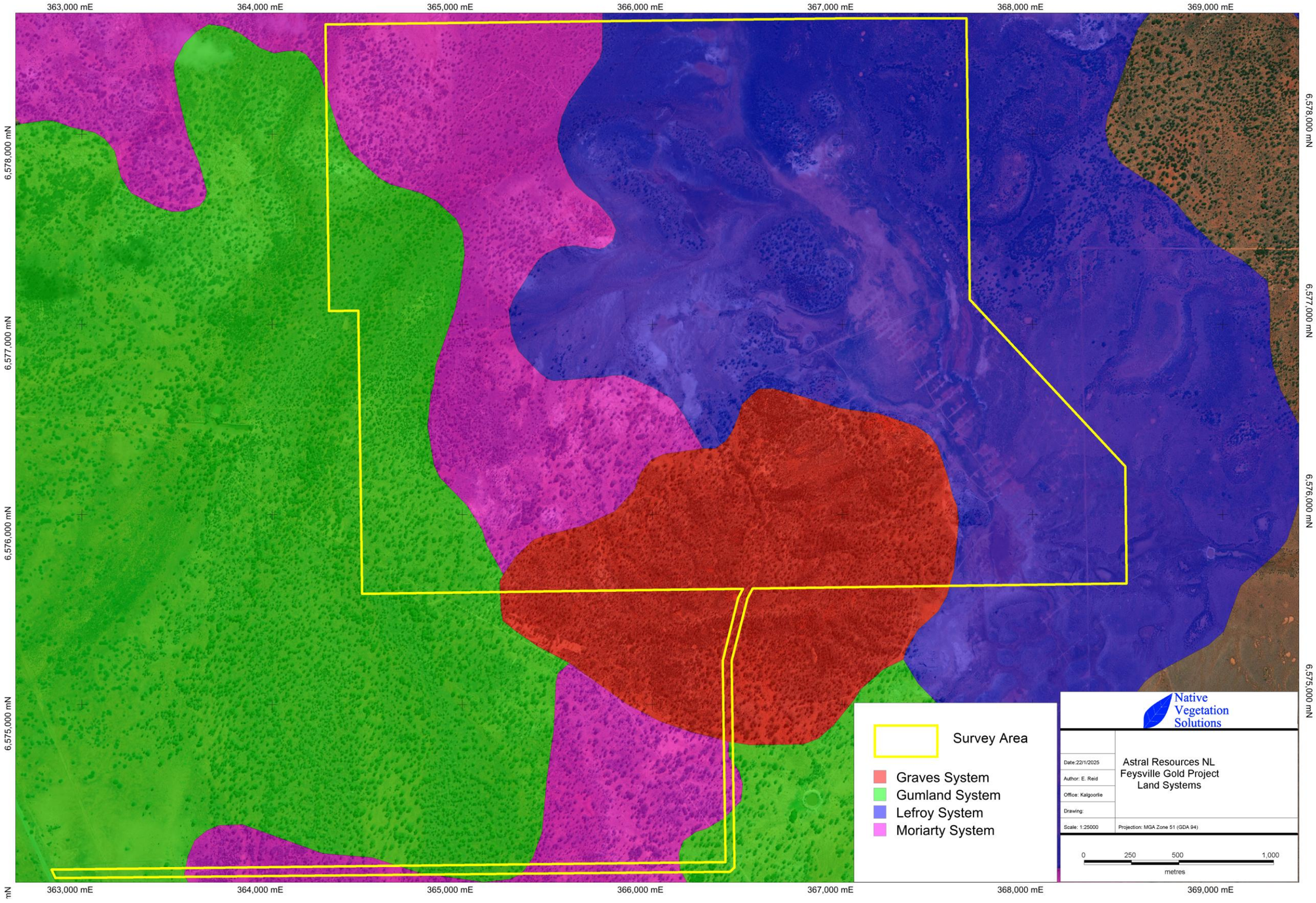
Map 1: Survey Area



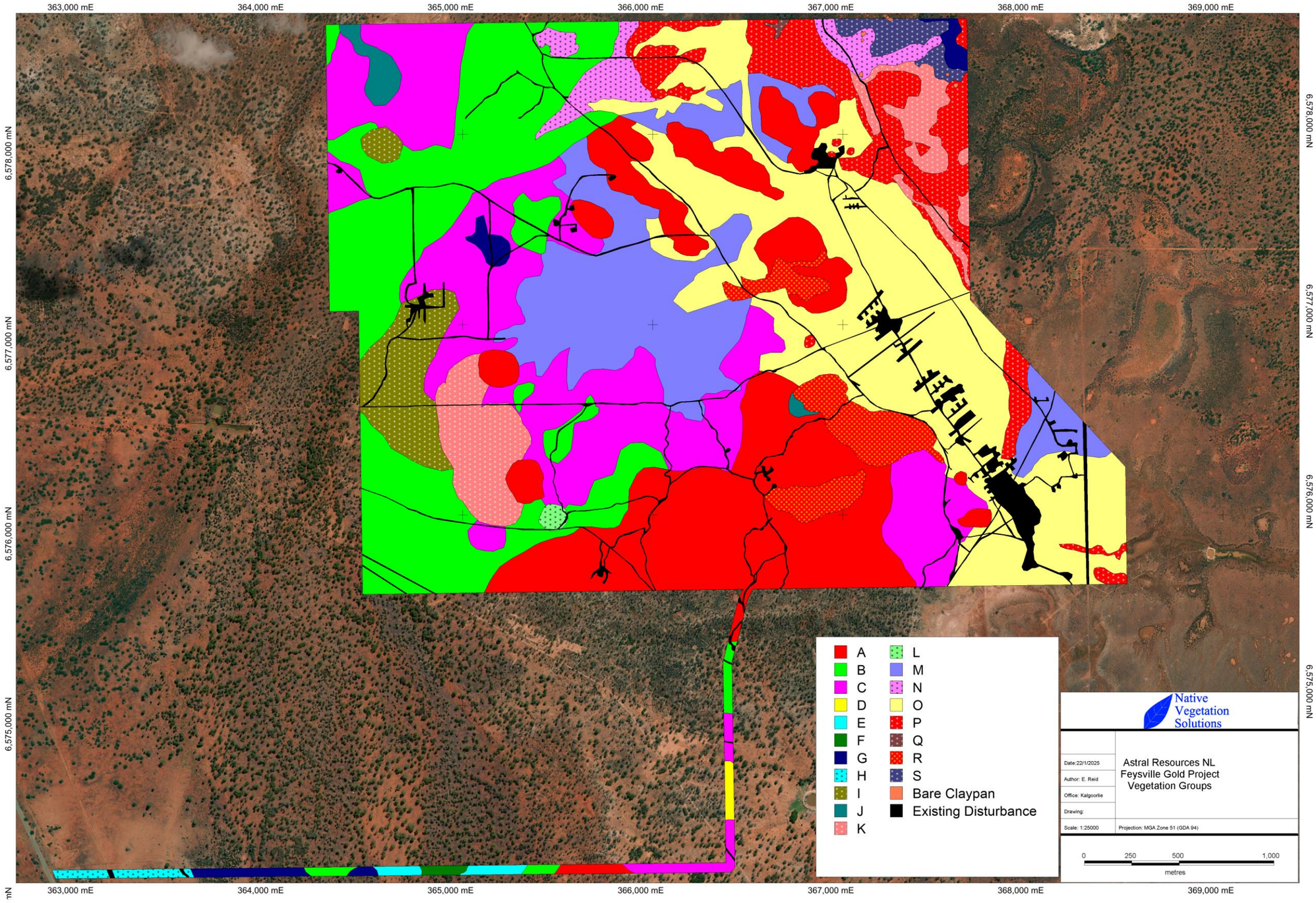
Map 2: NVS GP Data



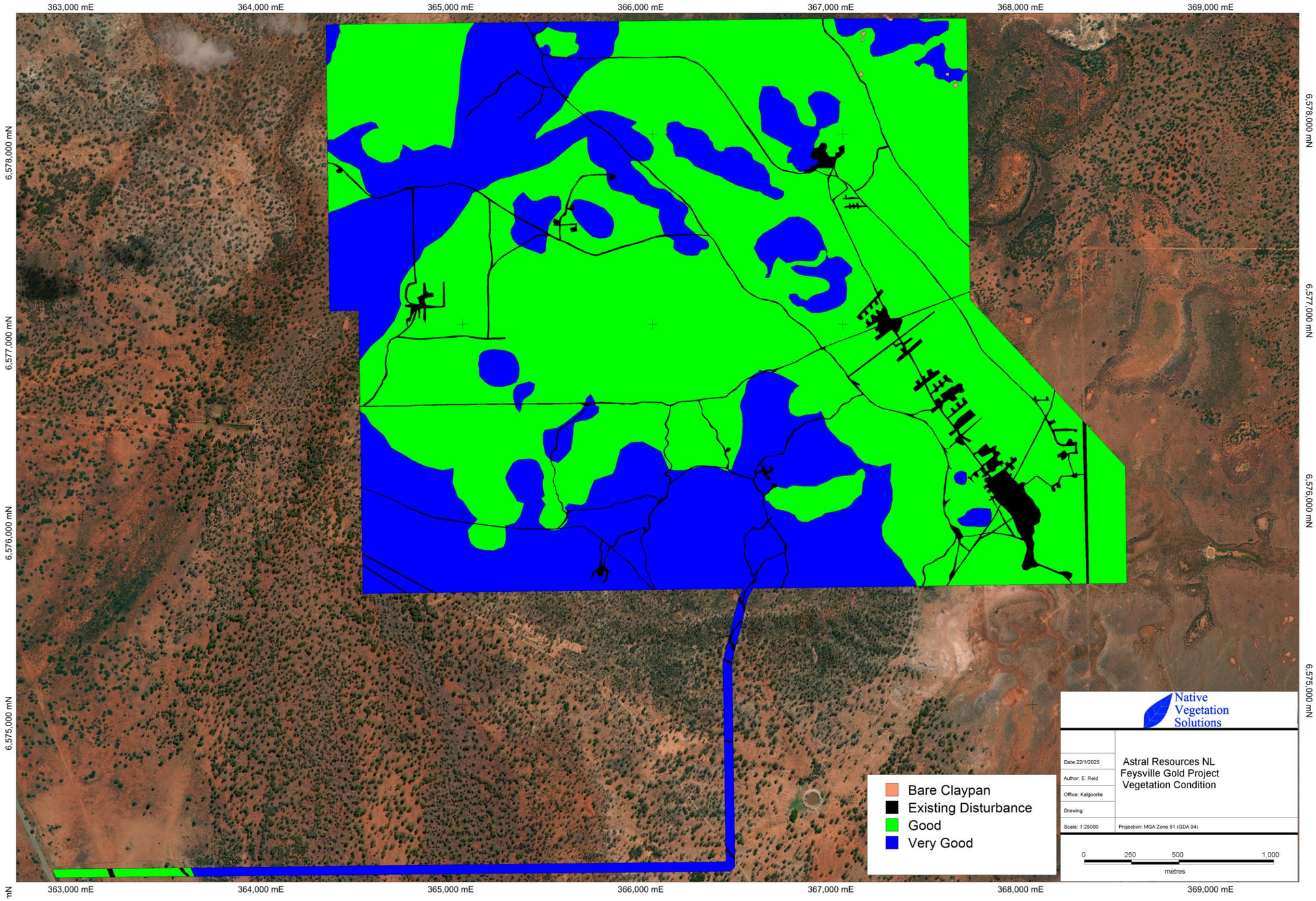
Map 3: DBCA Databases Search Results



Map 4: Land Systems



Map 5: Vegetation Groups



Map 6: Vegetation Condition

Appendix 5: Species List

Species List per Vegetation Group

Family	Genus	Taxon	A, P, NN	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
Aizoaceae	*Carpobrotus*	*Carpobrotus modestus*	P			*											*					
Aizoaceae	*Disphyma*	*Disphyma crassifolium*	P			*										*		*	*			
Aizoaceae	*Gunniopsis*	*Gunniopsis quadrifida*	P																	*		
Aizoaceae	*Mesembryanthemum*	*Mesembryanthemum nodiflorum**	A,NN			*										*						
Amaranthaceae	*Ptilotus*	*Ptilotus aervoides*	A		*									*			*					
Amaranthaceae	*Ptilotus*	*Ptilotus exaltatus*	A		*	*		*	*	*		*				*				*	*	
Amaranthaceae	*Ptilotus*	*Ptilotus obovatus*	P	*	*	*	*	*	*		*	*	*			*	*			*	*	*
Apocynaceae	*Alyxia*	*Alyxia buxifolia*	P							*												
Apocynaceae	*Leichhardtia*	*Leichhardtia australis*	P	*	*																*	
Asparagaceae	*Thysanotus*	*Thysanotus manglesianus*	P															*				
Asphodelaceae	*Asphodelus*	*Asphodelus fistulosus**	A,NN													*						
Asteraceae	*Centaurea*	*Centaurea melitensis**	A,NN													*						
Asteraceae	*Cephalipterum*	*Cephalipterum drummondii*	A	*																		
Asteraceae	*Chrysocephalum*	*Chrysocephalum puteale*	A	*																		
Asteraceae	*Cratystylis*	*Cratystylis conocephala*	P		*							*			*							*
Asteraceae	*Cratystylis*	*Cratystylis microphylla*	P		*										*		*					
Asteraceae	*Cratystylis*	*Cratystylis subspinescens*	P		*											*	*					*
Asteraceae	*Gnephosis*	*Gnephosis angianthoides*	A			*												*				
Asteraceae	*Gnephosis*	*Gnephosis brevifolia*	A								*											
Asteraceae	*Olearia*	*Olearia muelleri*	P	*	*	*	*			*		*	*	*			*			*	*	
Asteraceae	*Oncosiphon*	*Oncosiphon suffruticosum**	A,NN		*																	
Asteraceae	*Rhodanthe*	*Rhodanthe charsleyae*	A													*						
Asteraceae	*Rhodanthe*	*Rhodanthe floribunda*	A							*												
Asteraceae	*Schoenia*	*Schoenia ayersii*	A															*				
Asteraceae	*Schoenia*	*Schoenia cassiniana*	A															*				
Asteraceae	*Streptoglossa*	*Streptoglossa liatroides*	A			*	*				*							*				
Asteraceae	*Symphyotrichum*	*Symphyotrichum squamatum**	A,NN															*				
Asteraceae	*Vittadinia*	*Vittadinia eremaea*	A			*					*							*				
Boryaceae	*Daviesia*	*Daviesia aphylla*	P		*																	
Brassicaceae	*Lepidium*	*Lepidium oxytrichum*	A								*											
Casuarinaceae	*Casuarina*	*Casuarina pauper*	P	*	*			*	*				*									
Chenopodiaceae	*Atriplex*	*Atriplex codonocarpa*	A		*													*				
Chenopodiaceae	*Atriplex*	*Atriplex holocarpa*	A															*				
Chenopodiaceae	*Atriplex*	*Atriplex nummularia* subsp. *spathulata*	P	*		*	*	*	*	*	*						*					*
Chenopodiaceae	*Atriplex*	*Atriplex stipitata*	P			*	*	*	*		*				*	*			*	*		
Chenopodiaceae	*Atriplex*	*Atriplex vesicaria*	P		*	*	*	*	*		*				*	*					*	*
Chenopodiaceae	*Dysphania*	*Dysphania cristata*	A																*			
Chenopodiaceae	*Enchylaena*	*Enchylaena tomentosa* var. *tomentosa*	P		*	*						*										
Chenopodiaceae	*Eriochiton*	*Eriochiton sclerolaenoides*	P					*	*		*											*
Chenopodiaceae	*Maireana*	*Maireana amoena*	P			*										*			*			

Family	Genus	Taxon	A, P, NN	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
Chenopodiaceae	*Maireana*	*Maireana brevifolia*	P															*				
Chenopodiaceae	*Maireana*	*Maireana georgei*	P		*					*		*										
Chenopodiaceae	*Maireana*	*Maireana glomerifolia*	P			*										*			*			
Chenopodiaceae	*Maireana*	*Maireana pentatropis*	P	*	*	*	*					*			*							
Chenopodiaceae	*Maireana*	*Maireana pyramidata*	P			*																
Chenopodiaceae	*Maireana*	*Maireana sedifolia*	P		*	*	*	*	*	*	*	*			*		*				*	*
Chenopodiaceae	*Maireana*	*Maireana thesioides*	P																	*		
Chenopodiaceae	*Maireana*	*Maireana tomentosa*	P	*	*	*		*	*		*	*				*	*					*
Chenopodiaceae	*Maireana*	*Maireana trichoptera*	P	*		*				*	*	*			*	*						
Chenopodiaceae	*Maireana*	*Maireana triptera*	P	*	*	*	*	*	*	*	*				*							*
Chenopodiaceae	*Rhagodia*	*Rhagodia drummondii*	P																	*		*
Chenopodiaceae	*Sclerolaena*	*Sclerolaena cuneata*	P		*	*										*	*		*			*
Chenopodiaceae	*Sclerolaena*	*Sclerolaena densiflora*	P		*	*	*				*	*										
Chenopodiaceae	*Sclerolaena*	*Sclerolaena diacantha*	P		*	*	*				*	*			*				*			
Chenopodiaceae	*Sclerolaena*	*Sclerolaena eriacantha*	P			*													*			
Chenopodiaceae	*Sclerolaena*	*Sclerolaena patenticuspis*	P		*	*										*	*					
Chenopodiaceae	*Tecticornia*	*Tecticornia disarticulata*	P		*	*		*	*							*	*		*			
Chenopodiaceae	*Tecticornia*	*Tecticornia indica* subsp. *bidens*	P			*										*		*				
Chenopodiaceae	*Tecticornia*	*Tecticornia pergranulata* subsp. *pergranulata*	P															*				
Chenopodiaceae	*Tecticornia*	*Tecticornia undulata*	P															*				
Combretaceae	*Alectryon*	*Alectryon oleifolius* subsp. *canescens*	P		*																	
Convolvulaceae	*Frankenia*	*Frankenia cinerea*	P			*												*				
Convolvulaceae	*Frankenia*	*Frankenia interioris*	P													*						
Convolvulaceae	*Frankenia*	*Frankenia pauciflora* var. *pauciflora*	P			*		*	*							*	*	*				
Convolvulaceae	*Frankenia*	*Frankenia setosa*	P			*										*	*	*				
Euphorbiaceae	*Beyeria*	*Beyeria sulcata* var. *sulcata*	P		*																	
Fabaceae	*Acacia*	*Acacia acanthoclada* subsp. *acanthoclada*	P											*								
Fabaceae	*Acacia*	*Acacia acuminata*	P	*									*								*	
Fabaceae	*Acacia*	*Acacia andrewsii*	P											*								
Fabaceae	*Acacia*	*Acacia donaldsonii*	P																			*
Fabaceae	*Acacia*	*Acacia erinacea*	P	*	*									*	*							
Fabaceae	*Acacia*	*Acacia hemiteles*	P		*						*			*								
Fabaceae	*Acacia*	*Acacia kalgoorliensis*	P	*															*			
Fabaceae	*Acacia*	*Acacia merrallii*	P										*									
Fabaceae	*Acacia*	*Acacia tetragonophylla*	P	*	*					*			*								*	
Fabaceae	*Dillwynia*	*Dillwynia acerosa*	P										*									
Fabaceae	*Mirbelia*	*Mirbelia depressa*	P											*								
Fabaceae	*Senna*	*Senna artemisioides* subsp. *artemisioides*	P								*											
Fabaceae	*Senna*	*Senna artemisioides* subsp. *filifolia*	P	*	*		*				*	*	*	*	*		*		*		*	*
Fabaceae	*Senna*	*Senna cardiosperma*	P		*						*											
Fabaceae	*Swainsona*	*Swainsona canescens*	P		*																	
Goodeniaceae	*Goodenia*	*Goodenia havilandii*	A																		*	

Family	Genus	Taxon	A, P, NN	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
Goodeniaceae	*Goodenia*	*Goodenia mimuloides*	A																		*	
Goodeniaceae	*Scaevola*	*Scaevola spinescens*	P	*	*			*	*	*			*	*	*		*			*	*	*
Hemerocallidaceae	*Dianella*	*Dianella revoluta* var. *divaricata*	P		*																	
Lamiaceae	*Prostanthera*	*Prostanthera althoferi*	P																	*		
Lamiaceae	*Prostanthera*	*Prostanthera grylloana*	P										*									
Lamiaceae	*Salvia*	*Salvia verbenaca**	A,NN			*	*				*					*						
Lamiaceae	*Westringia*	*Westringia rigida*	P	*	*								*	*								
Malvaceae	*Lawrencia*	*Lawrencia squamata*	P													*						
Myrtaceae	*Eucalyptus*	*Eucalyptus griffithsii*	P	*									*									
Myrtaceae	*Eucalyptus*	*Eucalyptus lesouefii*	P	*	*	*	*			*		*	*	*	*		*					
Myrtaceae	*Eucalyptus*	*Eucalyptus oldfieldii*	P			*																
Myrtaceae	*Eucalyptus*	*Eucalyptus oleosa* subsp. *oleosa*	P	*								*	*							*		
Myrtaceae	*Eucalyptus*	*Eucalyptus ravida*	P						*													
Myrtaceae	*Eucalyptus*	*Eucalyptus salmonophloia*	P		*	*		*			*											
Myrtaceae	*Eucalyptus*	*Eucalyptus salubris*	P		*	*									*							
Myrtaceae	*Eucalyptus*	*Eucalyptus torquata*	P	*																		
Myrtaceae	*Eucalyptus*	*Eucalyptus transcontinentalis*	P		*							*										
Myrtaceae	*Eucalyptus*	*Eucalyptus yilgarnensis*	P		*	*		*	*					*								
Myrtaceae	*Melaleuca*	*Melaleuca lateriflora*	P	*														*	*			
Myrtaceae	*Melaleuca*	*Melaleuca sheathiana*	P							*		*	*	*								
Poaceae	*Aristida*	*Aristida contorta*	A											*		*						
Poaceae	*Austrostipa*	*Austrostipa elegantissima*	P					*	*	*				*	*	*	*					
Poaceae	*Austrostipa*	*Austrostipa nitida*	P	*	*	*	*			*		*		*			*		*			*
Poaceae	*Eragrostis*	*Eragrostis dielsii*	A															*	*			
Poaceae	*Eriachne*	*Eriachne pulchella* subsp. *pulchella*	A			*																
Poaceae	*Triodia*	*Triodia scariosa*	P										*							*		
Polygonaceae	*Duma*	*Duma florulenta*	P															*				
Portulacaceae	*Calandrinia*	*Calandrinia eremaea*	A													*		*				
Portulacaceae	*Calandrinia*	*Calandrinia polyandra*	A													*		*				
Proteaceae	*Grevillea*	*Grevillea acuaria*	P	*	*											*	*					
Pteridaceae	*Cheilanthes*	*Cheilanthes sieberi* subsp. *sieberi*	P																		*	
Rhamnaceae	*Cryptandra*	*Cryptandra aridicola*	P										*									
Rhamnaceae	*Trymalium*	*Trymalium myrtillus* subsp. *myrtillus*	P											*								
Santalaceae	*Exocarpos*	*Exocarpos aphyllus*	P	*	*	*		*	*				*	*			*			*		*
Santalaceae	*Santalum*	*Santalum acuminatum*	P		*																	
Santalaceae	*Santalum*	*Santalum spicatum*	P	*							*				*							
Sapindaceae	*Dodonaea*	*Dodonaea lobulata*	P	*	*					*			*	*	*							
Sapindaceae	*Dodonaea*	*Dodonaea viscosa* subsp. *angustissima*	P								*					*				*		
Scrophulariaceae	*Duboisia*	*Duboisia hopwoodii*	P										*									
Scrophulariaceae	*Eremophila*	*Eremophila alternifolia*	P																		*	
Scrophulariaceae	*Eremophila*	*Eremophila caperata*	P										*							*		
Scrophulariaceae	*Eremophila*	*Eremophila decipiens* subsp. *decipiens*	P								*		*									

Family	Genus	Taxon	A, P, NN	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
Scrophulariaceae	*Eremophila*	*Eremophila dempsteri*	P														*					
Scrophulariaceae	*Eremophila*	*Eremophila georgei*	P					*	*													
Scrophulariaceae	*Eremophila*	*Eremophila glabra* subsp. *glabra*	P	*	*	*	*	*	*	*	*		*	*	*	*	*	*				
Scrophulariaceae	*Eremophila*	*Eremophila glutinosa*	P																		*	
Scrophulariaceae	*Eremophila*	*Eremophila granitica*	P										*									
Scrophulariaceae	*Eremophila*	*Eremophila interstans* subsp. *virgata*	P		*	*	*			*												
Scrophulariaceae	*Eremophila*	*Eremophila ionantha*	P		*												*					
Scrophulariaceae	*Eremophila*	*Eremophila metallicorum*	P		*																	
Scrophulariaceae	*Eremophila*	*Eremophila oldfieldii* subsp. *angustifolia*	P	*	*					*			*		*				*		*	
Scrophulariaceae	*Eremophila*	*Eremophila oppositifolia* subsp. *angustifolia*	P							*			*	*	*							
Scrophulariaceae	*Eremophila*	*Eremophila parvifolia* subsp. *auricampa*	P	*		*					*			*			*					
Scrophulariaceae	*Eremophila*	*Eremophila scoparia*	P	*	*	*		*	*	*		*				*	*		*	*		*
Scrophulariaceae	*Myoporum*	*Myoporum platycarpum* subsp. *platycarpum*	P																			*
Solanaceae	*Lycium*	*Lycium australe*	P		*	*	*									*	*		*			*
Zygophyllaceae	*Roepera*	*Roepera apiculata*	A	*	*								*									
Zygophyllaceae	*Roepera*	*Roepera aurantiaca*	A		*																	
Zygophyllaceae	*Roepera*	*Roepera eremaea*	A	*	*	*	*	*	*	*	*	*	*								*	
Zygophyllaceae	*Roepera*	*Roepera ovata*	A	*						*	*										*	

Appendix C: Vertebrate Fauna Survey (Terrestrial Ecosystems, 2025)

TERRESTRIAL ECOSYSTEMS

Basic Vertebrate Fauna Survey and Assessment

Feysville project

Prepared for: Astral Resources NL

Version 1. April, 2025

RECORD OF DISTRIBUTION

No. of copies	Report File Name	Report Status	Date	Prepared for:	Initials
Electronic	2024-0050-004-GT V1	DRAFT	21 November 2024	Astral Resources NL	ST
Electronic	2024-0050-004-GT V1	FINAL	26 April 2025	Astral Resources NL	ST

Suggested Citation: Terrestrial Ecosystems (2025) *Basic vertebrate fauna survey and assessment for the Feysville project*, Unpublished report for Astral Resources NL, Perth

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EXECUTIVE SUMMARY

Astral Resources NL (Astral) is planning to undertake additional exploration and development of the Feysville project ('project area'), which is ~20km south of Kalgoorlie, 30km north of Kambalda and east of the Goldfields Highway (Figure 1). To facilitate the environmental impact assessment, Astral requested a Basic vertebrate fauna survey and assessment to determine the potential impacts on vertebrate fauna. The assessed project area was ~1098.4ha, but only a portion will be disturbed.

There are four broad fauna habitats in the project area: chenopod and tecticornia samphire; mixed Eucalypt woodland with shrubs on rocky hills; mixed Eucalypt woodland with shrubs; and mixed shrubland plus disturbed areas where there will be almost no vertebrate fauna.

The site investigation recorded no evidence (e.g. mounds or tracks) of Malleefowl (listed as Vulnerable) in the area. There is a possibility that the Southern Whiteface (listed as Vulnerable) may be resident. Peregrine Falcon (listed as other specially protected fauna), the mallee form of the Western Rosella (Listed as Priority 4) and the Central Long-eared Bat (Listed as Priority 4) may infrequently be seen in the project area. Vegetation clearing and mining activities are unlikely to significantly impact these species as they will readily move once vegetation clearing commences.

The project area has a substantial wetland and samphire area that could support migratory shorebirds. Lake Lefroy is approximately 30km to the south of the project area and is a much larger lake with a greater range of foraging habitats and resources, so when it contains water, it will be preferentially foraged by migratory shorebirds compared with shallower areas in the region. Clearing vegetation and foraging habitat for migratory shorebirds in the project area is unlikely to significantly impact these birds, as most will have gone elsewhere, and any of these birds present during vegetation clearing will readily move to another lake system.

Clearing native vegetation in the project area is likely to result in the loss of small vertebrate fauna on-site that cannot move away during the clearing process, however, this loss is not likely to be significant when viewed in a bioregional context. The few larger animals, such as kangaroos, large goannas and snakes, and most birds will move into adjacent areas once vegetation clearing commences, so potential impacts will be low. There may be an ongoing loss of small native fauna to vehicle strikes on access tracks, but overall, this impact will be very low. Forced fauna migrants, because of vegetation clearing, increase competition for resources, which may result in the subsequent loss of migrants or local individuals. Individuals who shifted out of their established activity areas are also vulnerable to predation until they have become established in their new areas.

Impacts on vertebrate fauna associated with clearing vegetation in the project area in a landscape or bioregional context are likely low as there are vast tracts of similar fauna habitat in adjacent areas.

Feral predators such as cats are likely to have a much larger impact on the vertebrate fauna in a landscape context than clearing the vegetation and developing exploration and mining operations at this location.

Implementing the following recommendations will minimise and mitigate potential impacts of vegetation clearing and mining operations:

- an induction program that includes a component on managing fauna is mandatory for staff working in the project area;
- information on protecting fauna and reporting deaths and sightings of Malleefowl and other species of conservation significance is incorporated into the mine induction program;
- the impacts of dust on adjacent vegetation and fauna habitat are managed against appropriate KPIs and following the clients' Construction Environmental Management Plan;
- all areas disturbed during mining are rehabilitated as soon as practical after they are no longer required;
- where possible, access routes are aligned to existing roads, tracks and other barriers or follow the boundaries of broad-scale vegetation associations in the area;

- pets are not permitted on the project;
- areas to be cleared of vegetation between April and September, and earlier if there have been substantial autumn rains, are checked for active Southern Whiteface nests;
- an area of 250m around any active Southern Whiteface nest should not be cleared until the chicks have fledged;
- all waste and rubbish be contained in bins and regularly removed from the project or placed in land fill and suitably covered to exclude access to predator species;
- feeding of native fauna is prohibited;
- a feral cat control program is implemented in the project area and surrounds;
- a log of all on-site drill holes be maintained detailing when they were capped, how and by whom;
- a vertebrate fauna management plan is prepared and implemented for the life of the project; and
- where practicable, mature Eucalypt trees with hollows are avoided in the development program.

1. INTRODUCTION

1.1 BACKGROUND

Astral Resources NL (Astral) is planning to undertake additional exploration and development of the Feysville project ('project area'), which is ~20km south of Kalgoorlie, 30km north of Kambalda and east of the Goldfields Highway (Figure 1). To facilitate the environmental impact assessment, Astral requested a Basic vertebrate fauna survey and assessment to determine the potential impacts on vertebrate fauna. The assessed project area was ~1098.4ha, but only a portion will be disturbed.

1.2 PROJECT OBJECTIVES AND SCOPE OF WORKS

The purpose of a Basic vertebrate fauna survey and assessment is to inform the proponent of the potential impacts on the vertebrate fauna assemblage in the project area to enable the proposed development to be adequately assessed. The methodology broadly follows that described in the Environmental Protection Authority (2020) *Technical Guidance Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment*.

This Basic vertebrate fauna survey involved a desktop review and an on-site assessment with the objectives to:

- indicate the vertebrate fauna assemblage (reptiles, amphibians, mammals and birds) on and near the project area so that potential impacts on the fauna and fauna assemblage might be adequately assessed;
- identify the presence and/or potential risk of impacts on species of conservation significance that are present or likely to be present in the project area;
- assess the impact and environmental risks associated with the proposed development on the vertebrate fauna assemblage;
- determine if any additional surveys are required to assess the potential impact on vertebrate fauna assemblage in the project area, including impacts on species of conservation significance; and
- make recommendations that avoid, mitigate or minimise potential impacts on resident fauna.

To achieve these objectives, Terrestrial Ecosystems:

- reviewed Terrestrial Ecosystems' database [includes Atlas of Living Australia and WA Museum records] to identify potential vertebrate fauna within the area;
- searched the DBCA's online database for Threatened and Priority Species;
- searched the Commonwealth Government's database of fauna of national environmental significance to identify species potentially occurring within the area that are protected under the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act 1999*) or international migratory bird agreements (JAMBA/CAMBA);
- reviewed previous fauna surveys conducted near the project area and in similar habitat;
- undertook a site visit to assess fauna habitat types and quality;
- searched the available habitat for Malleefowl (mounds, tracks and scats);
- undertook an assessment of the potential risks to the fauna associated with clearing additional areas of native vegetation;
- discussed the likelihood of *EPBC Act 1999* and *Biodiversity Conservation Act 2016* (*BC Act 2016*) listed species being present in the project area; and
- provided management recommendations to avoid, mitigate and minimise potential impacts on the fauna in the project area.

2. EXISTING ENVIRONMENT

2.1 LOCATION OF PROJECT AREA

The project area is within the Coolgardie (COO3-Eastern Goldfield) Interim Biogeographic Regionalisation of Australia (IBRA) subregion. This subregion is a gently undulating plain on the Yilgarn Craton with calcareous soil being dominant (Cowan 2002). The subregion supports a diverse eucalypt woodland around the salt lakes, on the low ranges and in the broad valleys and mallee and Acacia thickets and shrub heaths on the plains (Cowan 2002). The sub-region is rich in endemic Acacias (Cowan 2002).

2.2 LAND USE HISTORY

The dominant land uses in this bioregion are pastoralism, crown reserves and mining. Mining is evident in many areas around Kalgoorlie, Kambalda, Higginsville, Widgiemooltha and Norseman, with numerous small abandoned and operational mines scattered throughout the landscape.

Many of the larger trees in the bioregion were removed decades ago to support the mining and power generation industries. These trees have often not been replaced by replanting programs.

2.3 CLIMATE

The project area is characterised as semi-arid. Chart 1 shows the average mean monthly maximum and minimum temperatures and rainfall for Kalgoorlie, the closest weather station (~20km north). Temperatures are highest in December–February, and most rain comes in winter, with additional rain from summer thunderstorms. Winter rain results from low-pressure cells that move in an easterly direction from the south-west of the state, whereas summer rain is often from thunderstorms that move in from either the west or the north-west.

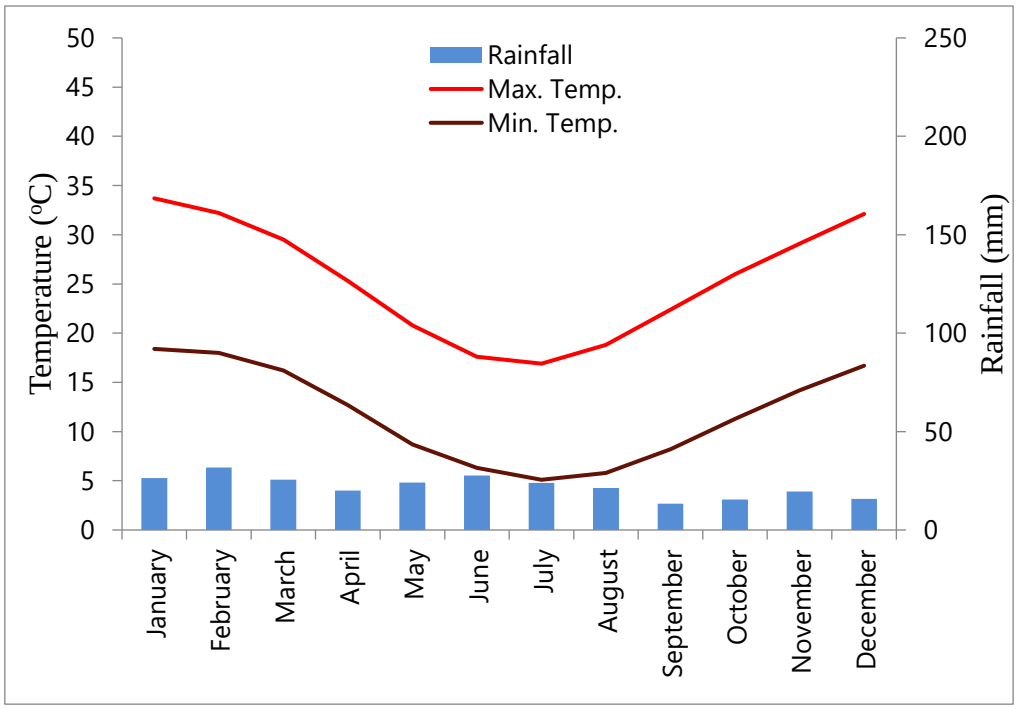

Chart 1. Climatic averages for Kalgoorlie

2.4 REGIONAL BIOLOGICAL FAUNA CONTEXT OF PROJECT AREA

The frogs, reptiles, mammals, and birds in the goldfields have been surveyed on many occasions for various purposes, with the surveys completed by environmental consultants and government agencies. Individual records for fauna are also contained in the Atlas of Living Australia, which incorporates data from the Western Australian Museum collection.

Fauna surveys and assessments undertaken near the project area or with similar habitats that have been reviewed for this assessment include:

- ATA Environmental (2006a) *Fauna Assessment St Ives Cave Rocks Satellite Pit, Waste Dump and Haul Road*. Unpublished report for Jim's Seeds, Weeds and Trees, Ltd, Perth.
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- Harewood, G. (2010d) *Terrestrial Fauna Survey (Level 1) of the proposed West Idough Mine Area St Ives – Kambalda.* Unpublished report for Botanica Consulting. Bunbury.
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- Thompson, S. (2004) *Mine site rehabilitation index using reptile assemblage as a bio-indicator*, PhD thesis and additional surveys.
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The most relevant fauna survey data comes from around St Ives and includes ATA Environmental (2006b), Bamford Consulting Ecologists (2010), Dames and Moore (1999), Keith Lindbeck and Associates (2007), Ninox Wildlife Consulting (2004b) and Western Wildlife (2006, 2013). The McKenzie *et al*. (1992) report is part of the WAM/DEC's Eastern Goldfields survey undertaken in the mid 1980's and the Chapman et al. (1991) report is the results of fauna surveys of four timber reserves that are all nearby. All the GHD reports (2010b, a, 2014, 2015b, a) and Terrestrial Ecosystems reports (2015a, d, b, c, 2017b, c, a, 2018b, 2021b, a, 2023, 2024) are desktop assessments of the vertebrate fauna. In addition, Terrestrial Ecosystems has included in the Thompson (2004) fauna survey data, data collected after Thompson's (2004) PhD was completed. Much of this work has been published or been presented at various workshops and conferences (Thompson 2001, Thompson and Thompson 2002, Thompson 2002, Thompson et al. 2003a, Thompson et al. 2003b, Thompson et al. 2003c, Thompson and Thompson 2003a, Thompson 2003c, a, b, Thompson and Thompson 2003b, Thompson and Thompson 2004a, Thompson 2004, Thompson and Thompson 2004b, Thompson and Thompson 2005a, Thompson and Thompson 2005c, b, Thompson et al. 2005a, b, Thompson and Thompson 2006a, Thompson and Thompson 2006b, Thompson and Thompson 2006d, c, Thompson and Thompson 2007a, b, Thompson and Thompson 2008).

Data in the Atlas of Living Australia records and data from the Department of Biodiversity, Conservation and Attractions threatened species database has also been added to the information contained in Appendix B, and the compilation of the species lists for the project area.

The trapping effort employed during many of these surveys is now considered inadequate to assess species richness or assemblage structure, however, they provide helpful contextual information concerning the project area and compile a species list.

These fauna surveys, when considered together, provide a near-complete list of the vertebrate species likely to be found in the project area. The composition of vertebrate fauna assemblages varies from habitat to habitat and site to site within the bioregion, however, the survey data contained in the attached appendices provide a good indication of the vertebrate fauna assemblage that is likely to be found in the project area. These data, therefore, provide a good regional context and indicate the extent of fauna assemblage variation that might be anticipated from site to site and temporally.

2.5 GREAT WESTERN WOODLANDS

The Feysville project is part of the Great Western Woodlands (Watson et al. 2008, pp. vi) on unallocated crown land. The Great Western Woodlands represents the largest and most intact eucalypt woodland remaining in southern Australia and one of the best examples of its type worldwide. It is home to an impressive 3,000 flowering plant species, 20 per cent of Australia's known flora, as well as a diverse range of animals dependent on its varied habitats (Department of Environment and Conservation 2010).

The Wilderness Society (Watson et al. 2008) argued that the fauna and flora diversity in the area has evolved with the landscape due to an unbroken biological lineage stretching back 250 million years. Although the woodlands are not recorded as a conservation significant area or habitat, their value is in their vastness and their being relatively undisturbed when considered in a landscape context. The conservation strategy (Department of Environment and Conservation 2010) for the woodland, as it relates to prospecting, exploration, and mining, is that there should be an improvement in the condition of native vegetation and connectedness, and there should be no net loss of native vegetation. There are also expectations that the exploration and mining process contributes to controlling and managing feral and pest animals and weeds, and that the WA community benefits from compatible land uses that positively contribute to conserving the area's natural values. Mine development and management are expected to be sympathetic to these strategies and, where practical, address and incorporate them into their planning and operations.

2.6 FAUNA SPECIES AT RISK

Cowan (2002) reported the fauna species at risk in the Eastern Goldfields subregion as Malleefowl (*Leipoa ocellata*), Carpet Python (*Morelia imbricata*), Peregrine Falcon (*Falco peregrinus*) Chuditch (*Dasyurus geoffroii*) and Freckled Duck (*Stictonetta naevosa*). This report assesses the potential for these species to be found in the project area, and potential impact that exploration or mining development might have on these species and other fauna of conservation significance. Since 2002, the Night Parrot (*Pezoporus occidentalis*) has been rediscovered in Western Australia and is also considered a species at risk in the region, along with the Southern Whiteface (*Aphelocephala leucopsis*) that is now listed as Vulnerable.

3. METHODOLOGY

3.1 DATABASE SEARCHES

A review of the *EPBC Act 1999* list of protected species was undertaken to identify species of conservation interest to the Commonwealth Government using a search buffer of 20km around the project area (Appendix A). In addition, a desktop search of Terrestrial Ecosystems' fauna survey database was used to develop an appreciation of the vertebrate fauna assemblages in relevant sections of the bioregion near the project area. Other more general texts were also used to provide supplementary information on vertebrates in the bioregion, including Tyler et al. (2000) for frogs; Storr et al. (1983, 1990, 1999, 2002) and Thompson and Thompson (2006d) for reptiles; Johnstone and Storr (1998, 2004) for birds; and Van Dyck and Strahan (2008) for mammals.

3.2 SITE INSPECTION AND FAUNA HABITAT ASSESSMENT

A site visit was undertaken on 10, 11 and 17 September 2024 to assess fauna habitat types and conditions in the project area. This information included a description of the habitat structure, habitat condition, landform, soils and vegetation and time since the last fire.

The fauna habitat assessment had two foci:

- assessing fauna habitat types and their condition; and
- assessing the possible presence of and recording evidence of species of conservation significance fauna.

Dr Scott Thompson, Tom Raymond and Isaac Cable, who undertook the site assessments, stopped at multiple locations within the project area and recorded a suite of data about the fauna habitat and its condition. This information included a description of the habitat structure, habitat condition, landform, soils and vegetation and time since the last fire. Table 1 indicates the variables recorded at each location.

Table 1. Fauna habitat assessment variables

Observer's Name:			
Coordinates of the location as UTM (GDA94):			
Fire history – options			
☐	> 5 years		
☐	1-5 years		
☐	< 1 year		
Landform – options			
☐	Beach	☐	Lower slope
☐	Clay plain	☐	Mid slope
☐	Cliff	☐	Ridge
☐	Creek line	☐	River
☐	Dam	☐	Rocky outcrop / breakaway
☐	Drainage line	☐	Salt lake
☐	Dune crest	☐	Sand dune
☐	Dune slope	☐	Sand plain
☐	Dune swale	☐	Stony plain

☐	Escarpment	☐	Swamp
☐	Flat	☐	Undulating
☐	Gorge	☐	Upper slope
☐	Gully	☐	Wetland
☐	Intertidal / mangrove	☐	Water hole
☐	Lake / lake edge		

Habitat quality – options	
☐	*High-quality fauna habitat*—These areas closely approximate the vegetation mix and quality that would have been in the area prior to any disturbance. The habitat is connected to other habitats and is likely to contain the most natural vertebrate fauna assemblage.
☐	*Very good fauna habitat*—These areas show minimal signs of disturbance (e.g., grazing, clearing, fragmentation, weeds) and generally retain many of the characteristics of the habitat if it had not been disturbed. The habitat is connected to other habitats, and fauna assemblages in these areas are likely to be minimally affected by disturbance.
☐	*Good fauna habitat*—These areas showed signs of disturbance (e.g., grazing, clearing, fragmentation, weeds) but generally retained many of the characteristics of the habitat if it had not been disturbed. The habitat has connectivity with other habitats, and fauna assemblages in these areas are likely to be affected by disturbance.
☐	*Disturbed fauna habitat*– These areas showed signs of significant disturbance. Many of the trees, shrubs, and undergrowth have been cleared. These areas may be in the early succession and regeneration stages. Areas may show signs of significant grazing, containing weeds or damaged by vehicles or machinery. Habitats are fragmented or have limited connectivity with other fauna habitats. Fauna assemblages in these areas will likely differ significantly from what might be expected in the area had the disturbance not occurred.
☐	*Highly degraded fauna habitat* – These areas often have a significant loss of vegetation, an abundance of weeds, and many vehicle tracks or are completely cleared. Limited or no fauna habitat connectivity. Fauna assemblages in these areas will likely be significantly different from what might have been in the area pre-disturbance.

Soil Type – options			
☐	Sand	☐	Silty loam
☐	Loamy sand	☐	Sand clay loam
☐	Clayey sand	☐	Clay
☐	Clay loam	☐	Peat / organic
☐	Silty clay loam	☐	Stony
☐	Sandy loam		
Soil colour – options			
☐	Black	☐	Red
☐	Brown	☐	White
☐	Grey	☐	Yellow
☐	Orange		
Surface stones – options			
☐	None	☐	Boulders (>250mm)
☐	Pebbles (0-50mm)	☐	Rocks
☐	Cobbles (51-250)		

3.3 REPORTING STAFF

Dr Scott Thompson, Tom Raymond, and Isaac Cable undertook the site investigations, fauna habitat assessment, and search for Malleefowl and their mounds. Tom Raymond and Dr S Thompson also undertook the habitat mapping. Dr G Thompson drafted this report, and Dr Scott Thompson reviewed it before it was sent to the client.

Both senior scientists have appropriate, relevant post-graduate qualifications, extensive experience in conducting fauna assessments in the Goldfields, and have published research articles on biodiversity, fauna assemblages, conservation significant species, trapping techniques and temporal variations in trapped fauna assemblages based on Goldfields surveys and are therefore appropriately trained and experienced for the task of preparing this assessment.

Dr Scott Thompson is the only environmental practitioner in Western Australia who has independent specialist certification (CEnvP - Ecology Specialist) in combination with postgraduate tertiary qualifications and is a licenced pest management technician (LPMT). This unique set of skills and qualifications ensures Scott undertakes fauna surveys, assessments, and control programs to the highest standard and quality assurance.

All staff have undertaken multiple assessments in the goldfields and are familiar with the habitat in the project area and surrounding areas. The qualifications and experience of the survey and reporting personnel are shown in Table 2.

Table 2. Project personnel and their qualifications

Name	Experience and qualifications	Tasks
Dr Scott Thompson	BSc. (Env. Sc.), MSc. (Env. Mngt.), PhD (Env. Sc./Mngt), Cert III (Vertebrate Pest Mngt), Cert IV (WHS), CEnvP (Ecology Specialist), 20+ years of experience and a good familiarity with the vertebrate fauna in the Goldfields	Habitat analysis and mapping and reviewing the report
Dr Graham Thompson	Post Grad. Dip. (Zool.), PhD (Zoology), Cert III (Vertebrate Pest Mngt), 20+ years of experience and a good familiarity with the vertebrate fauna in the Goldfields	Reporting
Tom Raymond	BSc Hons (Zoology); Cert III (Rural and Env Pest Mngt), 3+ years of experience and a familiarity with the vertebrate fauna in the Goldfields	Fieldwork, habitat analysis and mapping
Isaac Cable	BSc (Conservation & Wildlife Biology and Marine Biology); 2+ years of experience and a familiarity with the vertebrate fauna in the Goldfields	Fieldwork

3.4 TAXONOMY AND NOMENCLATURE

Taxonomy and nomenclature for fauna species used in this report are generally based on the WA Museum species list. Terrestrial Ecosystems has presumed that the identifications referred to in the appendices or reports used to provide local and regional comparative data were correct, and we have only corrected obvious records where the nomenclature was known to be incorrect.

3.5 LIMITATIONS

Conclusions and management recommendations regarding the vertebrate fauna assemblage have been based on the data from other nearby fauna surveys and a site visit. It is acknowledged that multiple surveys conducted

in different seasons, repeated over several years, are necessary to understand the vertebrate fauna in the project area.

Lists of species potentially in and around the project area have been compiled from WAM records, Atlas of Living Australia and reports of fauna surveys undertaken nearby. Some records in the Atlas of Living Australia and WAM are very old, and those species are no longer present in the area. Terrestrial Ecosystems have not been able to verify the primary data and, therefore, cannot vouch for the accuracy of these records. All data sources are known to contain errors, which should be considered when reading this assessment.

The *EPBC Act* online MNES database for terrestrial fauna includes historical records and places a wide buffer around previously known locations of threatened species in its database. A search of this database will invariably include species that are either locally extinct or were never present in parts of the search area.

It is acknowledged that multiple surveys conducted in different seasons, repeated over several years are necessary to appreciate the fauna assemblage in a project area fully. The EPA (2020) *Technical Guidance Terrestrial Fauna Surveys* suggested that many variables may limit fauna surveys. Limitations associated with each of these variables are assessed in Table 3.

Table 3. Fauna survey limitations and constraints

Possible limitations	Constraint	Comment
Availability of contextual information on the region	Yes, negligible	A reasonable amount of vertebrate fauna survey data is available for similar habitats near the project area.
Competency/experience of the survey team, including experience in the bioregion surveyed	No	The environmental scientists who undertook the fieldwork, habitat mapping, and reporting have appropriate qualifications, have undertaken multiple surveys and assessments in the Goldfields, published a book and multiple refereed journal articles based on fauna surveys in the region, and are familiar with the vertebrate fauna in this bioregion.
Scope of the survey, e.g. where faunal groups were excluded from the survey	N/A	
Timing, weather and season	No	The weather was suitable for a site visit.
Disturbances that may have affected assessment, e.g. fire, flood	No	Disturbances in the project area have been factored into this assessment.
The proportion of fauna identified, recorded or collected	N/A	
Adequacy of the survey intensity and proportion of survey achieved, e.g. the extent to which the area was surveyed	No	Basic assessments were met.
Access problems	No	The site was accessible
Problems with data and analysis, including sampling biases	N/A	

N/A = not applicable, Significant = major impact on outcomes of the survey and assessment, Moderate = impacted parts of the survey and assessment, Negligible = almost no impact on the survey or assessment.

4. RESULTS

4.1 FAUNA HABITAT

There are four broad fauna habitats in the project area:

- Chenopod and tecticornia samphire;
- Mixed Eucalypt woodland with shrubs on rocky hills;
- Mixed Eucalypt woodland with shrubs; and
- Mixed shrubland.

Plates 1–8 indicate the variation in fauna habitat. There are also areas devoid of vegetation from earlier exploration and mining activity (Plates 9-10) and a very small area recently rehabilitated that represents little value as a fauna habitat.

The density of trees and shrubs in the relatively undisturbed areas is highly variable across the project area. There are parts of the Eucalypt woodland that have an understorey of spinifex. The fauna habitat quality varies from highly degraded to very good, with the more degraded areas due to historical and recent exploration and mining activity. The area has a few access tracks and old exploration grid lines, but these are narrow and mostly only wheel tracks.

Plate 1. Chenopod and tecticornia samphire

Plate 2. Chenopod and tecticornia samphire

Plate 3. Mixed Eucalypt woodland with shrubs on rocky hills

Plate 4. Mixed Eucalypt woodland with shrubs on rocky hills

Plate 5. Mixed Eucalypt woodland with shrubs and spinifex

Plate 6. Mixed Eucalypt woodland with shrubs

Plate 7. Mixed shrubland

Plate 8. Mixed shrubland

Plate 9. Disturbed

Plate 10. Disturbed

Appendix D shows the results of the rapid fauna habitat assessment for the project area.

4.2 BIOREGIONAL VERTEBRATE FAUNA ASSEMBLAGE

Appendix B provides a summary of the fauna survey data available near the project area. There are appreciable differences in the recorded fauna assemblages within and among fauna surveys shown in Appendix B. These differences are partially due to the low survey effort the surveys deploy. They also reflect variations in soils and vegetation and temporal variations in the fauna assemblages.

Tables 4-7 provide a list of vertebrate species potentially found near the project area that have been compiled based on the fauna survey report results shown in Appendix B.

Table 4. Birds potentially found near the project area

Family	Species	Common Name
Casuariidae	*Dromaius novaehollandiae*	Emu
Anatidae	*Cygnus atratus*	Black Swan
	Tadorna tadornoides	Australian Shelduck
	Anas gracilis	Grey Teal
Megapodiidae	*Leipoa ocellata*	Malleefowl
Columbidae	*Phaps chalcoptera*	Common Bronzewing
	Phaps elegans	Brush Bronzewing
	Ocyphaps lophotes	Crested Pigeon
Cuculidae	*Chrysococcyx osculans*	Black-eared Cuckoo
	Chrysococcyx lucidus	Shining Bronze-Cuckoo
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar
Podargidae	*Podargus strigoides*	Tawny Frogmouth
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar
Recurvirostridae	*Recurvirostra novaehollandiae*	Red-necked Avocet
Charadriidae	*Vanellus tricolor*	Banded Lapwing
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper
	Tringa nebularia	Common Greenshank
Accipitridae	*Lophoictinia isura*	Square-tailed Kite
	Aquila audax	Wedge-tailed Eagle
Cuculidae	*Heteroscenes pallidus*	Pallid Cuckoo
Strigidae	*Ninox boobook*	Southern Boobook
Meropidae	*Merops ornatus*	Rainbow Bee-eater
Falconidae	*Falco cenchroides*	Nankeen Kestrel
	Falco longipennis	Australian Hobby
	Falco berigora	Brown Falcon
Cacatuidae	*Eolophus roseicapilla*	Galah
Psittaculidae	*Polytelis anthopeplus*	Regent Parrot
	Barnardius zonarius	Australian Ringneck
	Psephotus varius	Mulga Parrot
	Glossopsitta porphyrocephala	Purple-crowned Lorikeet
Ptilonorhynchidae	*Ptilonorhynchus maculata*	Spotted Bowerbird
Climacteridae	*Climacteris rufus*	Rufous Treecreeper
Maluridae	*Malurus pulcherrimus*	Blue-breasted Fairywren
	Malurus splendens	Splendid Fairywren
	Malurus leucopterus	White-winged Fairywren
Meliphagidae	*Purnella albifrons*	White-fronted Honeyeater
	Lichenostomus cratitius	Purple-gaped Honeyeater
	Manorina flavigula	Yellow-throated Miner
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater
	Anthochaera carunculata	Red Wattlebird
	Gavicalis virescens	Singing Honeyeater
	Ptilotula ornata	Yellow-plumed Honeyeater
	Ptilotula keartlandi	Grey-headed Honeyeater
	Epthianura albifrons	White-fronted Chat
	Sugomel nigrum	Black Honeyeater
	Lichmera indistincta	Brown Honeyeater

Family	Species	Common Name
	Phylidonyris niger	White-cheeked Honeyeater
	Nesoptilotis leucotis	White-eared Honeyeater
	Nesoptilotis flavicollis	Yellow-throated Honeyeater
	Melithreptus chloropsis	Gilbert's Honeyeater
	Melithreptus brevirostris	Brown-headed Honeyeater
Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote
	Pardalotus striatus	Striated Pardalote
Acanthizidae	*Sericornis frontalis*	White-browed Scrubwren
	Pyrrholaemus brunneus	Redthroat
	Calamanthus campestris	Rufous Fieldwren
	Hylacola cauta	Shy Heathwren
	Acanthiza iredalei	Slender-billed Thornbill
	Acanthiza apicalis	Inland Thornbill
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill
	Acanthiza uropygialis	Chestnut-rumped Thornbill
	Smicrornis brevirostris	Weebill
	Gerygone fusca	Western Gerygone
	Aphelocephala leucopsis	Southern Whiteface
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler
Cinclosomatidae	*Cinclosoma castanotum*	Chestnut Quail-thrush
Campephagidae	*Coracina maxima*	Ground Cuckooshrike
	Coracina novaehollandiae	Black-faced Cuckooshrike
	Lalage tricolor	White-winged Triller
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella
Oreoicidae	*Oreoica gutturalis*	Crested Bellbird
Pachycephalidae	*Colluricincla harmonica*	Grey Shrikethrush

Family	Species	Common Name
	Pachycephala inornata	Gilbert's Whistler
	Pachycephala pectoralis	Golden Whistler
	Pachycephala simplex	Grey Whistler
	Pachycephala rufiventris	Rufous Whistler
Artamidae	*Artamus personatus*	Masked Woodswallow
	Artamus cinereus	Black-faced Woodswallow
	Artamus cyanopterus	Dusky Woodswallow
	Cracticus torquatus	Grey Butcherbird
	Cracticus nigrogularis	Pied Butcherbird
	Gymnorhina tibicen	Australian Magpie
	Strepera versicolor	Grey Currawong
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail
Monarchidae	*Grallina cyanoleuca*	Magpie-lark
Corvidae	*Corvus orru*	Torresian Crow
	Corvus bennetti	Little Crow
	Corvus coronoides	Australian Raven
Petroicidae	*Microeca fascinans*	Jacky Winter
	Petroica goodenovii	Red-capped Robin
	Eopsaltria griseogularis	Western Yellow Robin
	Drymodes brunneopygia	Southern Scrub-Robin
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark
Hirundinidae	*Hirundo neoxena*	Welcome Swallow
	Petrochelidon ariel	Fairy Martin
	Petrochelidon nigricans	Tree Martin
	Cheramoeca leucosterna	White-backed Swallow
Zosteropidae	*Zosterops lateralis*	Silvereye
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird
Estrildidae	*Taeniopygia guttata*	Zebra Finch
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit

Table 5. Amphibians potentially found near the project area

Family	Species	Common Name
Limnodynastidae	*Neobatrachus kunapalari*	Wheatbelt Frog
	Neobatrachus pelobatoides	Humming Frog
	Neobatrachus sutor	Shoemaker Frog
Myobatrachidae	*Pseudophryne occidentalis*	Western Toadlet
Pelodryadidae	*Litoria moorei*	Motorbike Frog

Table 6. Mammals potentially found near the project area

Family	Species	Common Name
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna
Bovidae	*Capra hircus*	Goat
	Ovis aries	Sheep
Canidae	*Canis lupus*	Dingo
	Vulpes vulpes	Red Fox
Felidae	*Felis catus*	Cat
Molossidae	*Mormopterus planiceps*	Southern Free-tail Bat
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat
	Chalinolobus morio	Chocolate Wattled Bat
	Nyctophilus geoffroyi	Lesser Long-eared Bat
	Scotorepens balstoni	Inland Broad-nosed Bat
	Vespadelus regulus	Southern Forest Bat
Dasyuridae	*Ningaui ridei*	Wongai Ningaui
	Ningaui yvonneae	Mallee Ningaui
	Sminthopsis crassicaudata	Fat-tailed Dunnart
	Sminthopsis dolichura	Little Long-tailed Dunnart
	Sminthopsis gilberti	Gilbert's Dunnart
	Sminthopsis murina	Slender-tailed Dunnart
	Sminthopsis ooldea	Ooldea Dunnart
Myrmecobiidae	*Myrmecobius fasciatus*	Numbat
Burramyidae	*Cercartetus concinnus*	Southwestern Pygmy Possum
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo
	Osphranter robustus	Euro
	Osphranter rufus	Red Kangaroo
Potoroidae	*Bettongia gaimardi*	Bettong
Leporidae	*Oryctolagus cuniculus*	Rabbit
Thylacomyidae	*Macrotis lagotis*	Bilby
Muridae	*Mus musculus*	House Mouse
	Notomys mitchellii	Mitchell's Hopping Mouse
	Pseudomys hermannsburgensis	Sandy Inland Mouse

Table 7. Reptiles potentially found near the project area

Family	Species	Common Name
Agamidae	*Ctenophorus caudicinctus*	Ring-tailed Dragon
	Ctenophorus cristatus	Crested Dragon
	Ctenophorus fordi	Mallee Dragon
	Ctenophorus isolepis	Central Military Dragon
	Ctenophorus maculatus	Spotted Dragon
	Ctenophorus nuchalis	Central Netted Dragon
	Ctenophorus reticulatus	Western Netted Dragon
	Ctenophorus salinarum	Saltpan Dragon
	Ctenophorus scutulatus	Lozenge-marked Dragon
	Moloch horridus	Thorny Devil
	Pogona minor	Western Bearded Dragon
	Tympanocryptis cephalus	Pebble Dragon
	Tympanocryptis lineata	Lined Earless Dragon
Carphodactylidae	*Underwoodisaurus milii*	Barking Gecko
Diplodactylidae	*Amalosia reticulata*	Reticulated Velvet Gecko
	Crenadactylus ocellatus	Clawless Gecko
	Diplodactylus conspicillatus	Fat-tailed Gecko

Family	Species	Common Name
	Diplodactylus granariensis	Wheatbelt Stone Gecko
	Diplodactylus pulcher	Beautiful Gecko
	Hesperoedura reticulata	Reticulated Velvet Gecko
	Lucasium maini	Main's Ground Gecko
	Oedura marmorata	Marbled Velvet Gecko
	Rhynchoedura ornata	Beaked Gecko
	Strophurus assimilis	Goldfields Spiny-tailed Gecko
	Strophurus elderi	Jewelled Gecko
Elapidae	*Acanthophis pyrrhus*	Desert Death Adder
	Brachyurophis fasciolatus	Narrow-banded Burrowing Snake
	Brachyurophis semifasciata	Half-girdled Snake
	Demansia psammophis	Yellow-faced Whipsnake
	Furina ornata	Orange-naped Snake
	Narophis bimaculatus	Black-naped Burrowing Snake
	Suta gouldii	Gould's Snake
	Suta monachus	Hooded Snake
	Pseudechis australis	Mulga Snake
	Pseudonaja mengdeni	Western Brown Snake
	Pseudonaja modesta	Ringed Brown Snake
	Simoselaps bertholdi	Jan's Banded Snake
	Suta fasciata	Rosen's Snake
	Suta suta	Curl Snake
Gekkonidae	*Christinus marmoratus*	Marbled Gecko
	Gehyra purpurascens	Purplish Dtella
	Gehyra variegata	Variegated Gehyra
	Hemidactylus frenatus	Asian House Gecko
	Heteronotia binoei	Bynoe's Gecko
Pygopodidae	*Aprasia repens*	Southwest Sandplain Worm Lizard
	Delma australis	Marble-faced Delma
	Lialis burtonis	Burton's Legless Lizard

Family	Species	Common Name
	Pygopus lepidopodus	Common Scaly-foot
	Pygopus nigriceps	Western Hooded Scaly-foot
Pythonidae	*Morelia spilota*	Carpet Python
Scincidae	*Cryptoblepharus buchananii*	Buchanan's Snake-eyed Skink
	Cryptoblepharus plagiocephalus	Peron's Snake-eyed Skink
	Ctenotus atlas	Southern Mallee Ctenotus
	Ctenotus australis	Western Limestone Ctenotus
	Ctenotus schomburgkii	Barred Wedgesnout Ctenotus
	Ctenotus uber	Spotted Ctenotus
	Cyclodomorphus branchialis	Common Slender Bluetongue
	Cyclodomorphus melanops	Spinifex Slender Blue-tongue
	Egernia depressa	Southern Pygmy Spiny-tailed Skink
	Egernia formosa	Goldfields Crevice Skink
	Egernia richardi	Bright Crevice-skink
	Eremiascincus richardsonii	Broad-banded Sand-swimmer
	Hemiergis gracilipes	South-western Mulch-skink
	Hemiergis initialis	South-western Earless Skink
	Hemiergis peronii	Lowlands Earless Skink
	Lampropholis guichenoti	Pale-flecked Garden Skink
	Lerista kingi	King's Slider
	Lerista muelleri	Wood Mulch-slider
	Lerista picturata	Southern Robust Slider
	Lerista sp.	
	Lerista timida	Timid Slider
	Liopholis inornata	Desert Skink
	Menetia greyii	Common Dwarf Skink
	Morethia adelaidensis	Saltbush Morethia Skink

Family	Species	Common Name
	Morethia butleri	Woodland Morethia Skink
	Tiliqua occipitalis	Western Blue-tongued Lizard
	Tiliqua rugosa	Bobtail
Typhlopidae	*Anilios australis*	Austral Blind Snake
	Anilios bituberculatus	Prong-snouted Blind Snake

Family	Species	Common Name
Varanidae	*Varanus caudolineatus*	Stripe-tailed Monitor
	Varanus gouldii	Gould's Goanna
	Varanus tristis	Black-headed Monitor
Chelidae	*Chelodina oblonga*	South-western Snake-necked Turtle

4.3 SPECIES OF CONSERVATION SIGNIFICANCE

Species of conservation significance are protected by the Commonwealth *EPBC Act 1999*, and this list includes species covered by international treaties such as the Japan-Australia Migratory Bird Agreement (JAMBA) and China-Australia Migratory Bird Agreement (CAMBA) and the *BC Act 2016*. The *BC Act 2016* provides for publishing the *Wildlife Conservation (Specially Protected Fauna) Notice* that lists species under multiple categories. In addition, the DBCA maintains a list of fauna that require monitoring under four priorities based on the current knowledge of their distribution, abundance and threatening processes. The *EPBC Act 1999* and *BC Act 2016* imply legislative requirements for managing anthropogenic impacts to minimise the effects of disturbances on species and their habitats. Priority species have no statutory protection other than the DBCA wishes to monitor potential impacts on these species. Environmental consultants and proponents of developments are encouraged to avoid and minimise impacts on these species. Definitions of the significant fauna under the *BC Act 2016* are provided in Appendix C.

The fauna species that have a special status in either State or Commonwealth government legislation or are on the DBCA Priority species list, and are potentially present in the vicinity of the project area are listed in Table 8. The project area is north of Lake Lefroy, which occasionally contains water and is, therefore, intermittently utilised by wetlands and shorebirds. Although they were recorded in the search of the MNES online database, migratory species that typically would be found around the edges of salt lakes, clay pans, estuaries and marshes have been excluded from Table 8 as there is no suitable habitat nearby.

Four threatened species of fauna and three migratory bird species were identified under the *EPBC Act 1999* as potentially occurring in the project area or its surrounds. There is one Schedule 7 species listed under the *BC Act 2016* and three listed on the DBCA's Threatened and Priority Fauna List that potentially occur in the project area or the surrounding area. The following is an assessment of the likelihood of each species listed in Table 8 being found in the project area and their potential to be impacted by the vegetation clearing.

Five threatened species of fauna and three migratory/marine species of birds identified under the *EPBC Act 1999* potentially occur in the region. Six Scheduled species are listed under the *BC Act 2016*, and three are listed on DBCA's Priority Fauna List, which could occur in the project area. The following is an assessment of the likelihood of each of the species listed in Table 8 being found in the region.

Results of the Commonwealth *EPBC Act 1999* protected matters database search are provided in Appendix A

Table 8. Assessment of the potential presence of a species of conservation significance in the project area

Species	DBCA Schedule / Priority	Status under Commonwealth EPBC Act	Comment on the potential presence of a species
Night Parrot *Pezoporus occidentalis*	Critically Endangered	Endangered	Highly unlikely to occur in the project area due to a lack of suitable habitat.
Malleefowl *Leipoa ocellata*	Vulnerable	Vulnerable	No Malleefowl mounds or footprints were recorded in the project area.
Chuditch *Daysurus geoffroii*	Vulnerable	Vulnerable	This species is unlikely to occur in the project area due to a lack of recent records.
Grey Falcon *Falco hypolleucos*	Vulnerable	Vulnerable	This species is unlikely to occur in the project area due to a lack of recent records.
Southern Whiteface *Aphelocephala leucopsis*		Vulnerable	Likely to be in the project area.
Western Rosella *Platycercus icterotis xanthogenys*	Priority 4		Potentially in the region, but it will move if disturbed.
Central Long-eared Bat *Nyctophilus major tor*	Priority 4		Potentially in the project area.
Oriental Plover *Charadrius veredus*	Migratory	Migratory	It may infrequently be seen in the region and will move if disturbed.
Fork-tailed Swift *Apus pacificus*	Migratory	Migratory	It may infrequently be seen in the region.
Grey Wagtail *Motacilla cinereal*	Migratory	Migratory	Highly unlikely to be seen in the project area.

Night Parrot (*Pezoporus occidentalis*) - Critically Endangered under the *BC Act 2016* and Endangered under the *EPBC Act 1999*

The Night Parrot is a small, arid-adapted, nocturnal, ground-feeding parrot (Johnstone and Storr 1998, Threatened Species Scientific Committee 2016). Its length is 22-25cm with a body mass of approximately 104g (Threatened Species Scientific Committee 2016), although it was suggested that they were semi-nomadic, the Night Parrots in south-western Queensland appear to be sedentary (Murphy 2015).

The Night Parrot was probably distributed initially over much of semi-arid and arid Australia (Garnett et al. 1993, Threatened Species Scientific Committee 2016). Records in north-west and western Queensland in the early 1990-2000s were in a broad cross-section of the habitats available (Garnett et al. 1993, Cupitt and Cupitt 2008, Boles et al. 2016). There have been recent sightings in the Pilbara in 1980, 2005 and 2017, central WA in 1979, north-eastern South Australia in 1979, western Queensland (including Pullen-Pullen-Mt Windsor-Diamantina population) in 1980, 1990, 1993, 2006 and 2013-17 (Davis and Metcalf 2008, Garnett et al. 2011, Charalambous 2016, Pickrell 2016, AG staff 2017, Palaszxzuk and Miles 2017, Rykers 2017, AG staff 2018), Pilbara in 2017 (Jones 2017) and the northern Goldfields (Jackett et al. 2017). Garnett et al. (2011) suggested that 50-250 mature individuals were in less than 5% of its previous range.

Wilson's (1937) summary of observations provided information on the early records of Night Parrots' preferred habitat and breeding sites. Recent information indicates its preferred habitat appears to be in Triodia grasslands, chenopod shrublands, shrubby samphire and floristically diverse habitats dominated by large-seeded species (Threatened Species Scientific Committee 2016, McCarthy 2017, Murphy et al. 2017b). At Pullen Pullen Reserve it nests in large, more or less ring-shaped Triodia, and the nest consists of a tunnel (25-30° and 0° to the ground; 20-33cm long) through an apron of dead spinifex leaves that leads to a chamber under a live hummock, with a shallow depression (3-4cm) excavated into the gravelly/sandy soil (Murphy et al. 2017a). In the northern Goldfields the nest was again in a spinifex hummock; it was circular, with an excavated depression (~1.5-2.0cm) in sandy substrate (Hamilton et al. 2017, Jackett et al. 2017). The entrance tunnel was 62cm long, and was downward sloping (27°), with the entrance 28cm above the ground (Hamilton et al. 2017). It has clutches of two to four sub-elliptical, white eggs with a lustrous appearance (Murphy et al. 2017a). Breeding followed significant rains in March for the observations in Pullen-Pullen Reserve and in April in the northern Goldfields (Hamilton et al. 2017, Murphy et al. 2017a), but it is thought that breeding generally occurs between April and October (Murphy et al. 2017a).

Murphy et al. (2017b) placed a GPS tag on Night Parrots and reported that the two birds called at dusk from their diurnal roosts among spinifex hummocks. They then flew to more floristically diverse habitats dominated by large-seeded, prolifically seeding species to feed.

There are no large, mature ring-forming spinifex hummocks in the project area that are 40cm and higher and a reasonably high density of feral fauna. As the preferred roosting and nesting sites for Night Parrots are not present, there is a significant threatening process for the species in the area (i.e. feral cats), and the project area is >300km from the nearest records, Terrestrial Ecosystems assess that Night Parrots are not present in the project area and will therefore not be impacted by any proposed development.

Malleefowl (*Leipoa ocellata*) - Vulnerable under the *BC Act 2016* and the *EPBC Act 1999*

Malleefowl are large, ground-dwelling birds that rarely fly unless alarmed or are perching for the night. Historically, Malleefowl have been found in mallee regions of southern Australia from approximately the 26th parallel of latitude southwards. Before vegetation clearing for agriculture, Malleefowl were abundant in the WA Wheatbelt. Vegetation clearing for agriculture also opened adjacent bushland to predators, and in the southwest of WA, Malleefowl often only persist in isolated remnant patches of native vegetation. Sheep and other herbivores (e.g. goats, kangaroos) grazing in remnant vegetation removes or thins the undergrowth, and they also compete with Malleefowl for herbaceous foods and can cause changes to the structure and floristic diversity of foraging habitats (Benshemesh 2007).

With colonisation, the natural geographical range of the Malleefowl has contracted, and this contraction is predicted to continue (Parsons et al. 2008). This contraction is primarily attributed to the use of land for grazing and introduced predators (e.g. foxes: Benshemesh 2007, Parsons et al. 2008). Recent records of Malleefowl are shown in Plate 11.

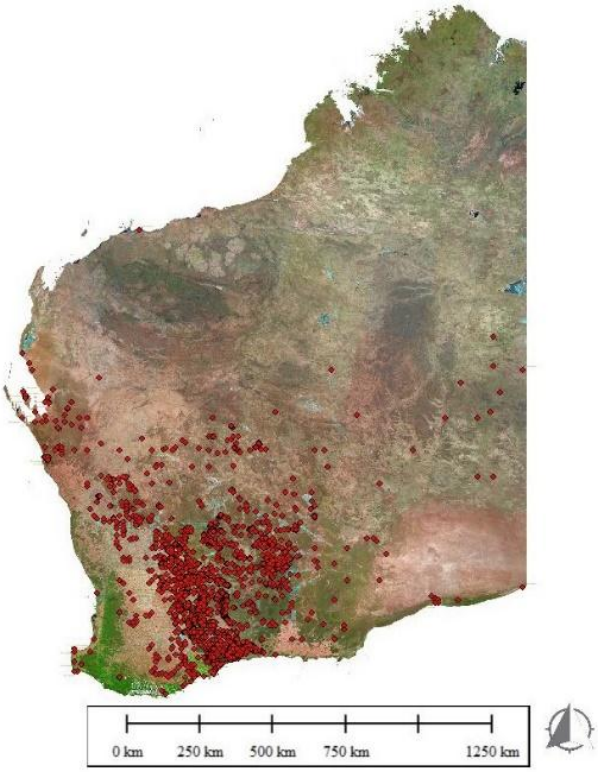

Plate 11. Malleefowl records in Terrestrial Ecosystems' threatened species database

Malleefowl and their eggs are vulnerable to predation by foxes, and newly hatched chicks are vulnerable to foxes, cats and raptors (Priddel and Wheeler 1990, Benshemesh and Burton 1999, Benshemesh 2007, Lewis and Hines 2014). Their abundance in the Goldfields is low and sparsely distributed, favouring more densely vegetated areas. Malleefowl build distinctive nests that comprise a large mound of soil/rock covering a central core of leaf litter. These nest mounds range in diameter but span more than five metres and may be up to one metre high. Malleefowl are generally monogamous; once breeding commences, they pair for life. The presence of nest mounds indicates Malleefowl in the area.

Malleefowl have been found in mallee regions of southern Australia from approximately the 26th parallel of latitude southwards. Malleefowl are now only found throughout these regions in fragmented patches due to clearing of habitat for agriculture, increased fire frequency, competition with exotic herbivores (sheep, rabbits, cattle, goats) and kangaroos, predation by foxes and cats, inbreeding because of fragmentation and possibly hunting for food.

The substrate was suitable for recording Malleefowl tracks, but none were found. Given the absence of Malleefowl mounds and tracks and the presence of feral cats and wild dogs, Terrestrial Ecosystems assesses that the Malleefowl is unlikely to reside in the area but may be observed as a transient moving through the project area.

Chuditch (*Dasyurus geoffroii*) – Vulnerable under the *BC Act 2016* and *EPBC Act 1999*.

The Chuditch is the largest extant carnivorous marsupial in WA. It is usually active from dusk to dawn. Formally known from over 70% of Australia, the Chuditch now has a patchy distribution throughout the Jarrah forest and mixed Karri/Marri/Jarrah forest of southwest WA and other isolated areas. Chuditch are solitary animals for most of their life and den in hollow logs, burrows, culverts, etc. and have also been recorded in tree hollows and rock cavities. Chuditch are opportunistic feeders, and forage primarily on the ground at night. Their diet can include other mammals, birds, lizards, and bird and reptile eggs, but the majority is a mixture of large invertebrates (e.g. spiders, scorpions and crickets).

How et al. (1988) reported Chuditch being found near the Norseman-Lake King Road and near Mount Holland. DBCA records show that one specimen was recorded in 1974 in Kambalda East. There are records south of Southern Cross and Marvel Loch and other reported sightings east of Kambalda and near Norseman. This species may be in the bioregion, which could only be verified with extensive trapping or a camera trapping program. As the project area is northeast of the known species distribution, it is unlikely that Chuditch will be found in the project area. Consequently, Terrestrial Ecosystems' assessment is that vegetation clearing in the project area is unlikely to impact this species significantly.

Grey Falcon (*Falco hypoleucos*) – Vulnerable under the *BC Act 2016* and *EPBC Act 1999*.

The Grey Falcon occurs in arid and semi-arid Australia, including the Murray-Darling Basin, Eyre Basin, central Australia and Western Australia (Threatened Species Scientific Committee 2020) where it frequents timbered lowland plains, particularly acacia shrublands that are crossed by tree-lined water courses, but has been seen in treeless areas and frequents tussock grassland and open woodland.

This species is sparsely recorded throughout much of arid, semi-arid Australia and inland Australia. Their range has been reduced to northern WA, with only rare occurrences south of 26°S (Schoenjahn et al. 2019, Threatened Species Scientific Committee 2020). When sighted, Grey Falcons have been in areas with less than 500mm annual rainfall, except when wet years are followed by drought, when the species can become marginally more widespread (Threatened Species Scientific Committee 2020). A map of recorded sightings in Western Australia is shown in Plate 12.

Plate 12. Grey Falcon records in Terrestrial Ecosystems' threatened species database

This species was not seen during the site visit, and if it were present, it would move away once disturbed.

Southern Whiteface (*Aphelocephala leucopsis*) - Vulnerable species under the *EPBC Act 1999*

The Southern Whiteface is a recent addition to the *EPBC Act* listing of vulnerable species. It is a small bird found in the arid and semi-arid interior from the WA coast near Hamelin Bay through the Great Victoria Desert into

the arid areas of South Australia, Victoria, NSW and Queensland (Johnstone and Storr 2004, Department of Climate Change Energy the Environment and Water 2023).

The Southern Whiteface occurs across an area of over 4,910,000km^2 across Australia. However, within this area, its area of occupancy is estimated to be 34.400-140,000km^2 (Ehmke et al. 2021). In Western Australia, it can be found as far north as Carnarvon down to the south coast and from the WA west coast near Hamelin Bay through the Great Victoria Desert into the arid areas of South Australia, see Plate 13.

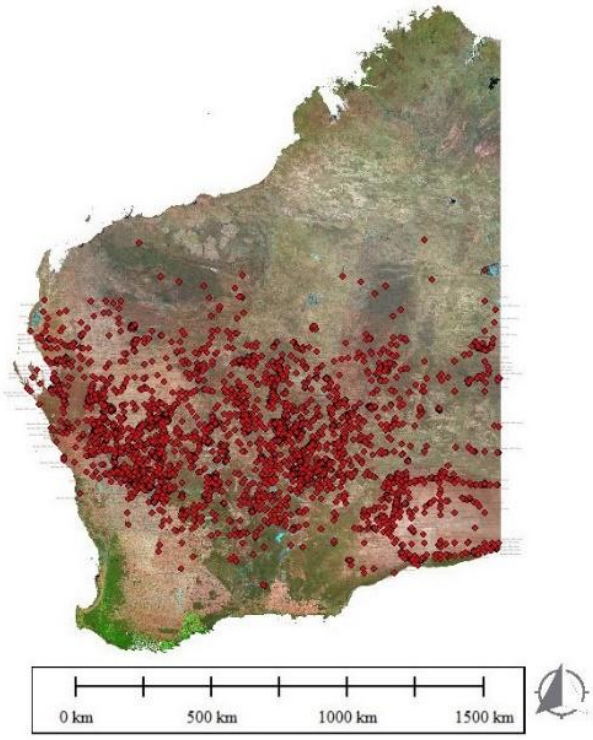

Plate 13. Southern Whiteface records in Terrestrial Ecosystems' threatened species database

In WA, the Southern Whiteface has been found in numerous IBRA's during surveys (Plate 13) including but not exclusive to the Pilbara, Carnarvon, Gascoyne, Yalgoo, Murchison, Coolgardie, Little Sandy Desert, Gibson Desert, Great Victoria Desert, Central Ranges, Geraldton Sand Plains, Avon Wheatbelt, Nullarbor, Mallee.

It is found in open woodlands and shrublands with an understorey of grasses and low shrubs (Department of Climate Change Energy the Environment and Water 2023). It forages on the ground, feeding on insects, spiders and seeds, mostly found in the leaf litter (Johnstone and Storr 2004, Department of Climate Change Energy the Environment and Water 2023).

The Southern Whiteface has been recorded in the region, so it is potentially in the project area. This small bird is relatively widespread and abundant in the Goldfields and Murchison areas, and will readily move if disturbed, so vegetation clearing and mining activity is unlikely to have a significant impact.

Western Rosella (*Platycercus icterotis xanthogenys*) – Priority 4 with the DBCA

The mallee form of the Western Rosella is found mainly in eucalypt and Casuarina woodland and shrublands, especially Wandoo, Flooded Gums and Salmon Gums. This species was sighted by Dames and Moore (1999) around Lake Lefroy, Outback Ecology Services (2009) at Randalls and Dell and How (1984) reported it in the biological survey of Widgiemooltha. A database search indicates that they have been recorded in the vicinity of Kalgoorlie.

It is possible that this species could be infrequently seen in the project area. However, given that the project area represents a very small fraction of similar habitats in adjacent areas, it is Terrestrial Ecosystems' assessment that vegetation clearing in the project area is unlikely to significantly impact this species.

Central Long-eared Bat (*Nyctophilus major tor*) – Priority 4 with the DBCA

Records in the Atlas of Living Australia indicate this species has been found west of Kalgoorlie and in other areas in the Goldfields and the Wheatbelt. It roosts in tree cavities, foliage and under loose bark.

Given that the project area represents a small fraction of similar habitat in the general area, it is Terrestrial Ecosystems' assessment that vegetation clearing in the project area is unlikely to impact this species significantly.

Oriental Plover (*Charadrius veredus*) - Migratory species under the *EPBC Act 1999* and *BC Act 2016*

A migrant species with patchy distribution in Australia, the Oriental Plover is sparsely distributed across arid and semi-arid Australia but avoids truly desert regions. Its preferred habitat is dry plains. The species is threatened by habitat reduction due to agriculture and changing fire regimes. The Oriental Plover has not been recorded in the general area during the other regional surveys.

Terrestrial Ecosystems assesses that the Oriental Plover is unlikely to be seen in the project area due to a lack of previous records in the general area.

Fork-tailed Swift (*Apus pacificus*) - Migratory species under the *EPBC Act 1999* and *BC Act 2016*

This species breeds in northeast and mid-east Asia and winters in Australia and southern New Guinea. It is a visitor to most parts of Western Australia, beginning to arrive in the Kimberley in late September, in the Pilbara in November and in the southwest land division in mid-December, and leaving by late April. The Fork-tailed swift is almost exclusively an aerial species, foraging and sleeping on the wing. It rarely comes to earth, usually only for breeding. It is common in the Kimberley, uncommon to moderately common near northwest, west and southeast coasts and rare to scarce elsewhere. It is rarely seen in the Goldfields (Plate 14).

Terrestrial Ecosystems assesses that the Fork-tailed Swift may infrequently be seen in the project area. However, the proposed vegetation clearing will unlikely significantly impact this species, as it will move away to other areas if disturbed. It is an aerial species and, therefore, unlikely to come to the ground in the project area.

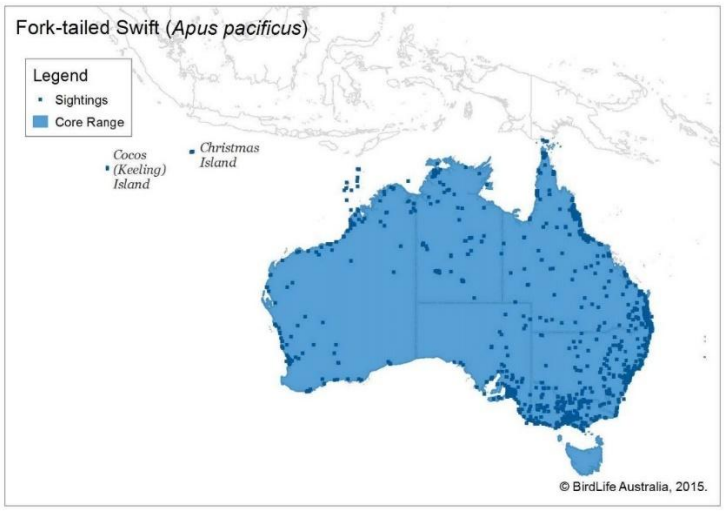

Plate 14. Range and actual reported sightings of the Fork-tailed Swift

(taken from http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds)

Grey Wagtail (*Motacilla cinerea*) - Migratory under the *EPBC Act 1999* and *BC Act 2016*

The Grey Wagtail is a small, yellow-breasted bird with a grey back and head. Johnstone and Storr (2004) reported this migratory species as breeding in the Palearctic from western Europe and north-west Africa to eastern Asia and wintering in Africa, south-east Asia, Indonesia, the Philippines, New Guinea and Australia. Its preferred habitat in Australia is banks and rocks in fast-running fresh water, including rivers, streams and creeks, where it feeds on insects.

The Atlas of Living Australia records two sightings on the south coast of Western Australia and none around the project area. It is highly unlikely to be seen in the project area due to a lack of records and suitable habitat (Plate 15) so it is unlikely to be impacted by the proposed development.

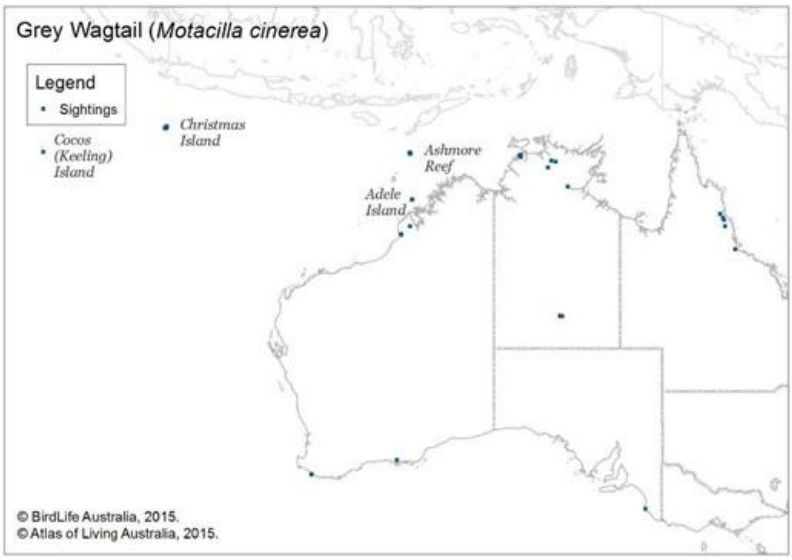

Plate 15. Reported sightings of the Grey Wagtail

(taken from http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds)

Peregrine Falcon (*Falco peregrinus*) - Otherwise specially protected under the *BC Act 2016*

The Peregrine Falcon is uncommon, although widespread throughout much of Australia excluding the extremely dry areas and has a wide and patchy distribution. It shows habitat preference for areas near cliffs along coastlines, rivers, and ranges, as well as within woodlands along watercourses and around lakes. Nesting sites include ledges along cliffs, granite outcrops and quarries, hollow trees near wetlands and old nests of other large bird species. There is no evidence to suggest any change in status in the last 50 years.

Terrestrial Ecosystems' assessment is that the Peregrine Falcon may infrequently be seen in the project area, however, development is unlikely to have a significant impact on this species as it will readily move away from disturbance and there are abundant areas of similar habitat in the region.

Migratory wetland and shorebirds

The search of the MNES online database indicated numerous wetland and shorebirds potentially in and near the project area, including Curlew Sandpiper (*Calidris ferruginea*), Common Greenshank (*Tringa nebularia*), Sharp-tailed Sandpiper (*Calidris acuminata*), Common Sandpiper (*Actitis hypoleucos*) and the Pectoral Sandpiper (*Calidris melanotos*). These birds breed and migrate from the northern hemisphere and are present from December to February (Bamford et al. 2008). Lake Lefroy is approximately 30km to the south of the project area. This is a much larger lake, with a greater range of foraging habitats and resources, so when it contains

water, it is preferentially foraged by migratory shorebirds compared with shallower lakes in the adjacent areas. Lake Cowan, which is south of Lake Lefroy is also very large and provides better foraging resources than the smaller shallower lakes in the general area.

Clearing vegetation and foraging habitat for migratory shorebirds is unlikely to significantly impact these birds, as the majority will have gone elsewhere, and any of these birds present during vegetation clearing will readily move to another lake system.

5. DISCUSSION

5.1 ADEQUACY OF THE FAUNA SURVEY DATA FOR FAUNA HABITATS REPRESENTED IN THE PROJECT AREA

The EPA's (2020) Technical Guidance on terrestrial fauna surveys indicated that the type of survey should be determined based on:

- level of existing regional knowledge;
- type and comprehensiveness of recent local surveys;
- degree of existing disturbance or fragmentation at the regional scale;
- extent, distribution and significance of habitats;
- significance of species likely to be present;
- sensitivity of the environment to the proposed activities; and
- scale and nature of impact.

Although the project area is large (~1098.4ha), given the fauna survey data that are available nearby and the level of existing disturbance in the project area, there is sufficient information on the fauna assemblages to enable potential impacts to be assessed and additional broadscale trapping surveys and assessments are not recommended. It is unlikely that further survey effort, or a detailed vertebrate fauna survey in the project area will provide new species not previously identified for this area, identify conservation significant fauna or provide additional information that would alter the assessment of potential impacts. However, as with all surveys, until it is completed the outcome is unknown.

5.1.1 Amphibians

Amphibians typically found in eucalypt woodlands in the Goldfields are listed in Table 5. Frogs are typically only detected immediately after rainfall or around semi-permanent pools. Likely, *Neobatrachus sutor*, *Pseudophryne occidentalis*, *Neobatrachus kunapalari* and *Neobatrachus wilsmorei* could be found in the general area. Other than *P. occidentalis*, these species burrow into the ground and aestivate between rainfall events. *Pseudophryne occidentalis* find shelter under rocks and crevices during the dry periods and enter temporary ponds to breed after major rainfall events. All four species have a wide-spread distribution and are abundant. Development of the project area is likely to result in a loss of individuals within the disturbed area; however, it is unlikely to have a significant impact on these species when assessed in a regional context.

There are no amphibians species of conservation significance in the Goldfields.

5.1.2 Reptiles

Reptile species richness in the project area will be comparable with similar eucalypt woodlands and mixed acacia shrublands elsewhere in the bioregion. The list provided in Appendix B represents species likely to be found over a large area of diverse habitat types. Eucalypt woodlands would typically support up to 40 species of reptiles, but many of these would be in low abundance (see Table 7). No characteristics of the reptile assemblage anticipated in the project area indicated that there are reptiles of conservation significance or different from those in the neighbouring areas. Given there were large expanses of similar habitats in adjacent areas, the development of the project area is unlikely to have a significant impact on reptiles when assessed in a regional context.

Fauna habitats in the project area are similar to adjacent areas, so the loss of reptiles during vegetation clearing is unlikely to be significant in a bioregional context.

Terrestrial Ecosystems' view is that the proposed development of the project area is unlikely to significantly impact on the reptile fauna of the bioregion.

5.1.3 Birds

Avian species richness in the Goldfields is influenced by rainfall (Craig and Chapman 2003) and is generally higher in woodlands than chenopod shrublands and more sparsely vegetated areas. The list provided in Table 4 represents species likely to be found over a large area of diverse habitat types. Eucalypt woodlands would typically support up to 50-70 species of birds, but many of these would be in very low numbers (see Appendix B) and are only present after significant rainfall. Birds typically move from an area once vegetation clearing commences, so the impact is relatively low if the area is small. However, eggs and chicks in nests are often lost during the clearing process.

Semi-arid and arid areas of inland Australia support a diverse range of transient and nomadic species that move through large areas in search of available resources. Heavy rain, followed by flowering and seeding of many plant species, is often sufficient to draw many nomadic species to the general area. These species move on to other areas once the resource is depleted or better resources are available in adjacent areas.

The project area is likely to support a similar assemblage to that present in the adjacent areas (McKenzie and Hall 1992, Ninox Wildlife Consulting 2004b, ATA Environmental 2006b, Western Wildlife 2006, Keith Lindbeck and Associates 2007, Bamford Consulting Ecologists 2010, Terrestrial Ecosystems 2012b, a, Western Wildlife 2013). No bird species of conservation significance are likely to be impacted in the project area, as the Southern Whiteface, Western Rosella and Peregrine Falcon, if present in the project area, would readily move to adjacent areas if disturbed. Many of the arid adapted birds are nomadic and move around the arid interior often in search of water and resources, and Peregrine Falcons will normally have a very large home range. Development of the project area, particularly when similar habitats exist in the adjacent areas, is unlikely to impact any bird species of conservation significance significantly. All birds will readily shift to other areas when there is a disturbance.

Predation by feral cats, foxes and wild dogs has significantly reduced the abundance of Malleefowl in the Goldfields, and there are only a few remaining small populations, mainly in areas of dense shrubland, as the dense vegetation provides the adult birds with some protection from predators. There are no active Malleefowl mounds or secondary evidence (i.e. tracks) of their presence in the project area.

Terrestrial Ecosystems believes the proposed development will not significantly impact the bioregion's avian fauna.

5.1.4 Mammals

The diversity of small terrestrial mammals potentially caught in the project area would be low due to the sparsely vegetated and degraded habitat and the presence of feral and pest fauna. Although, records of Numbats (*Myrmecobius fasciatus*), Burrowing Bettongs (*Bettongia lesueur*) and Bilbies (*Macrotis lagotis*) are shown in the Atlas of Living Australia and historical Western Australian Museum records (Appendix B), they are no longer present in this region, having been predated on by foxes, cats and dogs many years ago. None of the mammals potentially found in the project area are of conservation significance and therefore, the loss of small mammals during vegetation clearing is unlikely to be significant in a bioregional context.

Terrestrial Ecosystems believes that the development of the project area is unlikely to impact the mammal fauna of the bioregion significantly.

5.2 BIODIVERSITY VALUE

An ecological assessment of a site should consider its biodiversity value at the genetic, species, and ecosystem levels and its ecological functional value at the ecosystem level. Inadequate data exist to assess the ecological value at the genetic level, however, this is not an issue as there are no species of conservation significance in the project area that require this level of analysis.

The fauna habitats in the project area are abundant and in similar conditions to those in adjacent areas. Therefore, the fauna assemblage that is present in the project area will also be abundant in the adjacent areas. The available fauna survey data (Appendix B) provides a good indication of the potential vertebrate fauna in the project area.

5.2.1 Ecological functional value at the ecosystem level

A portion of the project area has been disturbed by exploration activity, which will result in a depleted vertebrate fauna assemblage. Feral cats and wild dogs will have the most significant impacts on vertebrate fauna in the project area and surrounding areas.

This site is unlikely to support species of conservation significance or a conservation significant ecosystem.

5.2.2 Maintenance of threatened ecological communities

No threatened ecological fauna communities were identified in the project area.

5.2.3 Condition of fauna habitat

Some of the project area has been disturbed due to historical development activity (i.e. tracks, exploration, etc). There is also evidence of disturbance by cattle and the presence of rabbits and feral cats. There is recent evidence of exploration activity (Plates 9-10). The uncleared fauna habitat present in the project area is like many square kilometres of adjacent habitat. The clearing of vegetation is, therefore, unlikely to have a significant impact on the vertebrate fauna when considered in a bioregional context.

5.2.4 Ecological linkages

The project area does not provide an important ecological linkage or fauna movement corridor.

5.2.5 Size and scale of the proposed disturbance

The project area is a small proportion of similar fauna habitats in the adjacent area and region. Given the available fauna survey data for these habitat types, no additional surveys are warranted.

5.2.6 Abundance and distribution of similar habitat in the adjacent areas

Fauna habitats present in the project area are abundant in adjacent areas. Therefore, the fauna assemblage in the project area is likely to be like the many square kilometres of similar habitats in adjacent areas and the bioregion.

5.2.7 Potential impacts on ecosystem function

Clearing native vegetation will likely result in losing small vertebrate fauna on-site that cannot move away during the clearing process. The few larger animals, such as kangaroos and large goannas, and most birds will move into adjacent areas once development commences. Shifting animals into adjacent areas will increase the pressure on resources in those areas, and there will likely be some disruption to the ecosystems in these areas for a short period until a balance is restored.

The impacts associated with clearing vegetation and development in the project area in a landscape or bioregional context on the vertebrate fauna are likely low, as the proposed disturbance area is very small relative to the quantity of similar habitat in the bioregion.

6. POTENTIAL ENVIRONMENTAL IMPACTS OF VEGETATION CLEARING

Clearing the area for mining activity will potentially affect vertebrate fauna in numerous ways, including the death or injury of fauna during vegetation clearing, impacts with vehicles, and the loss of habitat.

6.1.1 Animal deaths during the clearing process and displacement of fauna

Clearing vegetation and activities associated with the development will result in the loss of some small fauna that retreat to burrows, such as reptiles and mammals. Nocturnal species are unlikely to be active when most of the land clearing and construction work is taking place, which may result in these individuals being adversely impacted when they attempt to escape. This loss of vegetation is unlikely to have a significant impact when considered in a bioregional context. Larger terrestrial animals and avian species will most often move to adjacent areas. These species will be required to establish new activity areas and home ranges, which could result in the temporary displacement of resident species.

Clearing linear corridors and other large areas increases fauna habitat edges. Small mammals can respond both positively and negatively to edges depending on their ecological traits (Laurance 1991, 1994, Goosem and Marsh 1997, Goosem 2000). Edge and disturbance effects can lead to altered and most often higher levels of predation, restricting or increasing fauna movements and altering assemblage structure (Oxley et al. 1974, Paton 1994, Baker et al. 1998, Temple 1998, Luck et al. 1999, Goosem et al. 2001). Goldingay and Whelan (1997) and Clarke and Oldland (2007) reported that edge effects can extend up to 150-200m from the edge for some species, meaning the impact area on vertebrate fauna is likely to be larger than the cleared footprint.

6.1.2 Reduction or loss of activity areas and closure of burrows

Clearing vegetation and associated development activities will likely destroy reptile and mammal burrows or foraging habitats that are currently in use or could be used again. Clearing vegetation that forms part of an individual's activity area has the potential to force these animals into adjacent areas. These areas may offer fewer resources, placing individuals under survival pressure. It could also cause individuals to move into the territories of other individuals, increasing competition for resources. Forced relocations could increase the possibility of predation.

6.1.3 Habitat fragmentation

In addition to the direct impacts of vegetation clearing, infrastructure, including tracks, has the potential to fragment habitat. Cleared linear tracks of land are 'unnatural' in much of the habitat. These linear structures partition existing activity areas, isolate sections of established communities and may alter long and medium-term movement patterns around established home ranges, particularly for small mammals and reptiles. A reduction in the population because of this development would be difficult to detect, given our current knowledge of the spatial ecology of most small mammals in the area.

The sparseness of the vegetation in most of the project area will mean that the effect of habitat fragmentation is likely to be low.

6.1.4 Introduced fauna and weeds

Increased habitat fragmentation and human activity often increase the abundance of introduced species, such as house mice (*Mus musculus*), feral cats (*Felis catus*), and wild dogs (*Canis lupus*). This increase may be due to a decline in habitat health, increased road kills, poor waste disposal, and easier access to areas via tracks.

House mice, cats and wild dogs are known to be established in the area. In many situations, they have become a 'naturalised' species in the Australian bush. Increases in dog or cat numbers can harm native fauna because they predate on and compete with native species, severely disrupting the natural balance. The feral cat is a particularly damaging predator of native fauna, and any increase in their numbers could have a detrimental effect on local native fauna (Kinnear 1993, Bamford 1995, Woinarski et al. 2017, Woinarski et al. 2018, Murphy et al. 2019); hence it is important to ensure that populations of feral predators, such as cats, are under control.

Infrastructure known to support feral species, such as rubbish disposal sites and bins, and permanent water should be managed to minimise population increases.

Introduced plant species can successfully and rapidly invade areas of cleared native vegetation or otherwise disturbed by humans. Introduced plant species may replace native species that provide shelter or foraging areas for native fauna. Major changes to vegetation structure will alter the fauna habitat and consequently may influence fauna species composition. Preparing and implementing a weed management plan will reduce their threat to native fauna species.

6.1.5 Road fauna deaths

An increase in road fauna deaths is likely to occur where new roads / tracks are constructed or upgraded, affecting kangaroos, nocturnal birds and ground dwelling large carnivorous predators. Species such as goannas and raptors are attracted to carrion on road verges and therefore, there is an increased propensity for these species to be killed by vehicles. Given the size of the project area, the impact of road fauna deaths is likely to be low.

6.1.6 Fire

Increased human activity is often associated with an altered fire regime, which leads to a degradation of natural ecosystems. Fire has been identified as one of the threatening processes for some species of conservation significance as numerous small mammal and bird species rely on long, unburnt vegetation.

Due to the sparse vegetation, large and widespread fires are unlikely to significantly threaten native fauna species in the project or adjacent areas.

6.1.7 Anthropogenic activity

Unnatural noises, vibrations, artificial light sources, and vehicle and human movement in an area may be sufficient to force individuals or fauna species to move from adjacent areas or alter their activity periods. This disturbance is likely to occur during the initial vegetation clearing and when development activity commences. The overall impact is likely confined to a relatively small area and is unlikely to be significant.

6.1.8 Dust

Dust generated from shifting topsoil and increased vehicle traffic can degrade surrounding vegetation, reducing its ability to absorb sunlight and influencing photosynthetic rates. Degradation of these areas may potentially render the habitat unsuitable for fauna. Dust suppression and management programs are essential to minimising impacts on fauna in areas adjacent to the operations. An effective dust management and monitoring program is required.

7. VERTEBRATE FAUNA RISK ASSESSMENT

7.1 RISK ASSESSMENT

Fauna surveys to support Environmental Impact Assessments (EIA) are part of the environmental risk assessment undertaken to consider what potential impacts a development might have on the biodiversity of a particular area and region. Potential impacts on fauna from the proposed development are identified and briefly described above. Tables 9, 10 and 11 summarise the risk assessment associated with this project.

Any risk assessment is a product of the likelihood of an impact occurring and the consequences of that impact. Likelihood and consequences are categorised and described below. The assessed risk level (likelihood x consequences) is then calculated as the overall risk for the development. This is followed by an assessment of the acceptability of the risk associated with each of the impacts. Disturbances and vegetation clearing impact the fauna on multiple scales – site, local, landscape, and regional. Each of these is considered in the risk assessment. This assessment should be considered in the context of the summary in Table 11.

Table 9. Fauna risk assessment descriptors

Likelihood		
Level	Description	Criteria
A	Rare	The environmental event may occur, or one or more conservation significant species may be present in exceptional circumstances.
B	Unlikely	The environmental event could occur, or one or more conservation significant species could be present at some time.
C	Moderate	The environmental event should occur, or one or more conservation significant species should be present at some time.
D	Likely	The environmental event will probably occur, or one or more conservation significant species will be present in most circumstances.
E	Almost certain	The environmental event is expected to occur, or one or more conservation significant species is expected be present in most circumstances.
Consequences		
Level	Description	Criteria
1	Insignificant	Insignificant impact on fauna of conservation significance or regional biodiversity, and the loss of individuals will be insignificant in the context of the availability of similar fauna or fauna assemblages in the area.
2	Minor	Impact on fauna localised and no significant impact on species of conservation significance in the project area. Loss of species at the local scale.
3	Moderate	An appreciable loss of fauna in a regional context or a limited impact on species of conservation significance in the project area.
4	Major	Significant impact on conservation significant fauna or their habitat in the project area and/or regional biodiversity and/or a significant loss in the biodiversity at the landscape scale.
5	Catastrophic	Loss of species at the regional scale and/or a significant loss of species categorised as 'vulnerable' or 'endangered' under the EPBC Act (1999) at a regional scale.
Acceptability of Risk		
Level of risk	Management Action Required	
Low	No action required.	
Moderate	Avoid if possible, routine management with internal audit and review of monitoring results annually.	
High	Externally approved management plan to reduce risks, monitor major risks annually with external audit and review of management plan outcomes annually. May a referral to the Commonwealth under the EPBC Act 1999.	
Extreme	Unacceptable, project should be redesigned or not proceed.	

Table 10. Levels of acceptable risk

		Likelihood				
		Rare or very low (A)	Unlikely or low (B)	Moderate (C)	Likely (D)	Almost certain (E)
Consequence	Insignificant (1)	Low	Low	Low	Low	Low
	Minor (2)	Low	Low	Low	Moderate	Moderate
	Moderate (3)	Low	Moderate	Moderate	High	High
	Major (4)	Moderate	Moderate	High	High	Extreme
	Catastrophic (5)	Moderate	High	High	Extreme	Extreme

Table 11. A risk assessment of the impact of ground disturbance activity on fauna

			Before management				With management		
	Potential impacts		Inherent risk			Risk controls	Residual risk		
Factor			Likelihood	Consequence	Significance		Likelihood	Consequence	Significance
Fauna survey data	Inadequate survey data to adequately assess the risks	Unknown loss of fauna, fauna of conservation significance, and fauna assemblages, and an incomplete fauna assessment.	B	2	Low				
	Inadequacy of comparative data	Limits on the availability of comparative data reduced the capacity to assess the uniqueness of the fauna assemblages in the project area.	B	2	Low				
Clearing vegetation	Loss of fauna habitat – local scale	Loss of terrestrial fauna in the project area.	E	2	Mod				
	Loss of fauna habitat – landscape scale	Loss of some fauna during vegetation clearing.	B	1	Low				
	Loss of fauna habitat – regional scale	Small loss of some fauna from the region.	B	1	Low				
	Loss of a threatened ecological fauna community	Loss of an undetected threatened ecological fauna community.	A	3	Low				
	Habitat fragmentation	Fauna movement is restricted, resulting in the death of fauna and a loss of biodiversity.	A	2	Low				
Death or loss of conservation significant fauna	Loss of a unique terrestrial fauna ecosystem	Loss of an ecosystem containing fauna with high species richness, high abundance and numerous top of the food chain predators.	A	2	Low				
	Night Parrot	Loss of a Night Parrot or small population of Night Parrots	A	3	Low				
	Southern Whiteface	Loss of a Southern Whiteface or small population of Southern Whiteface	A	2	Low				
	Malleefowl	Loss of a Malleefowl or small population of Malleefowl	A	2	Low				
	Chuditch	Loss of a Chuditch or small population of Chuditch	A	2	Low				

			Before management				With management		
	Grey Falcon	Loss of a Grey Falcon or small population of Grey Falcon	A	2	Low				
	Western Rosella	Loss of a Western Rosella or small population of Western Rosella	A	2	Low				
	Central Long-eared Bat	Loss of a Central Long-eared Bat or small population of Central Long-eared Bat	A	2	Low				
	Oriental Plover	Loss of an Oriental Plover or small population of Oriental Plover	A	2	Low				
	Fork-tailed Swift	Loss of a Fork-tailed Swift or small population of Fork-tailed Swift	A	2	Low				
	Grey Wagtail	Loss of a Grey Wagtail or small population of Grey Wagtail	A	2	Low				
	Peregrine Falcon	Loss of a Peregrine Falcon or small population of Peregrine Falcon	A	2	Low				
Human impacts	Increase or spread of weeds	Changed vegetation and a resulting loss of fauna habitat.	E	2	Mod	Implementation of a weed management plan.	D	2	Low
	Road kills	Animals being killed by vehicles as they cross roads	E	1	Low	Limiting speeds	E	1	Low
	Increase in feral mammals, specifically the dog and cat	Increased predation on the native fauna	C	2	Low				

7.2 NATIVE VEGETATION CLEARING PRINCIPLES AS THEY PERTAIN TO VERTEBRATE FAUNA

The *Environmental Protection Act (1986)* outlines 10 principles that are to be used in the assessment of native vegetation clearing permit applications, which are also applicable for other assessments and approvals (Table 12). Where possible, native vegetation should not be cleared if the following principles are compromised.

Table 12. Assessment of impact using the native vegetation clearing principles

Principle	Response
It comprises a high level of biological diversity.	Clearing vegetation will not compromise a high level of biodiversity. The fauna assemblage in the project area would be like that in the many square kilometres of undisturbed habitat in adjacent areas. Most of the fauna habitats in the project area are in good condition, but feral cats would have impacted the vertebrate fauna assemblage over many years. There is a possibility that the project area supports a small population of Southern Whiteface, but these bush birds will readily move if disturbed, so any impacts would not be significant. The inland form of the Western Rosella and the Peregrine Falcon could potentially be present in the project area, but these species will readily move if disturbed, and any impacts would not be significant.
It comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.	Although vegetation clearing for exploration and subsequent mining operations would result in the loss of fauna habitat, this loss would not be significant in a bioregional context because of its abundance in adjacent areas.
It includes, or is necessary for the continued existence or, rare flora.	N/A
It comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.	The area does not contain a threatened ecological fauna community.
It is significant as a remnant of native vegetation in an area that has been extensively cleared.	The area is not a remnant.
It is growing in, or in association with, an environment associated with a watercourses or wetland.	The area does contain a natural wetland or salt lake. After heavy rain, this area is likely to contain water. However, given the high evaporation rate in the Goldfields, the presence of surface water would be for a short period.
The clearing of the vegetation is likely to cause appreciable land degradation.	N/A
The clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	Clearing vegetation is unlikely to impact the environmental values of the bioregion.
The clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	N/A
The clearing of the vegetation is likely to cause, or exacerbate the incidence of flooding.	N/A

7.3 CRITERIA FOR ASSESSING POTENTIAL IMPACTS ON VULNERABLE SPECIES

No Malleefowl were recorded, and they are not expected to be impacted by the further development of the project area. Therefore, the assessment for potential impacts on Vulnerable fauna is only relevant for the Southern Whiteface. The significance of the potential impacts of vegetation clearing in the project area is assessed per the criteria in the Commonwealth Government's significant impact assessment criteria (Department of the Environment 2013) in Table 13.

Table 13. Criteria for assessing the potential impacts on Southern Whiteface
(taken from: Department of the Environment 2013)

Vulnerable Species	Southern Whiteface
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
• lead to a long-term decrease in the size of an important population of a species	No
• reduce the area of occupancy of an important population	No
• fragment an existing important population into two or more populations	No
• adversely affect habitat critical to the survival of a species	No
• disrupt the breeding cycle of an important population	No
• modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No
• result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	No
• introduce disease that may cause the species to decline, or	No
• interfere substantially with the recovery of the species.	No
• modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No

An important population is defined (Department of the Environment 2013) as:

- key source populations either for breeding or dispersal;
- populations that are necessary for maintaining genetic diversity; and/or
- populations that are near the limit of the species range.

There are ~60 records of Southern Whiteface within 100km of the project area, so the number of individuals that are periodically onsite does not constitute an 'important population'. In addition, any Southern Whiteface living in the project area immediately before it is cleared will readily move to surrounding areas. The answer to Criteria 1 is 'No'.

Southern Whiteface records indicate this small bush bird is widespread in the bioregion. Had the Southern Whiteface occupancy area in Western Australia been randomly surveyed instead of survey sites being selected (i.e. mining locations and places where there is vehicle access), then it would have been evident that this bird is geographically widely distributed in Western Australia. No evidence indicates that the number of Southern Whiteface recorded in and around the project area represents an important population. Therefore, the loss of a small quantity of vegetation in the project area will not reduce its area of occupancy or displace an important population. The answer to Criteria 2 is 'No'.

The Southern Whitefaces' geographic distribution includes the entire width of southern Western Australia, extending into South Australia and the Northern Territory. The loss of a very small part of these many thousands of square kilometres of similar habitat, particularly when the bird is mobile, probably has a shifting activity area and will readily move if disturbed, will not fragment an existing population into two or more populations to the extent that it will impact on the species. There is no evidence that the very small number of Southern Whiteface recorded in and around the project area represents an important population.

There is no evidence to suggest that the small population of Southern Whiteface in and near the project area is a key source population, a population necessary to maintain genetic diversity, or is near the limit of its geographic range. The answer to Criteria 3 is 'No'.

Habitat that is critical to the survival of Southern Whiteface is described in the Commonwealth Conservation Advice as:

- relatively undisturbed open woodlands and shrublands with an understorey of grasses or shrubs, or both;
- habitat with low tree densities and an herbaceous understory litter cover which provides an essential foraging habitat; and
- living and dead trees with hollows and crevices which are essential for roosting and nesting.

This critical habitat description is vague and applies to thousands of square kilometres of inland Western Australia in the Midwest, Murchison, Goldfields, and elsewhere. The loss of a very small part of these many thousands of square kilometres of similar habitat, particularly when the bird is mobile, probably has a shifting activity area, and will readily move if disturbed, will not adversely affect habitat critical to the survival of the species to the extent of adversely impacting on the survival of the species. The answer to Criteria 4 is 'No'.

Johnstone and Storr (2004) reported that the Southern Whiteface builds a dome-shaped nest with a side entrance mainly in a hollow branch, a tree trunk, a crevice between branches, a stump, a fence post, or a recumbent log entrance through a knot-hole or crack. Nests are made with grass, bark, rootlets, feathers and wool and lined with feathers, wool, fur and soft plant down (Johnstone and Storr 2004). Such habitats and materials are widely available in the Midwest, Murchison and Goldfields of Western Australia. Based on the geographic records, this small bush bird very obviously breeds in thousands of locations in the semi-arid areas of Western Australia. There is no evidence that the very small number of Southern Whiteface recorded near the project area represents an important population. The answer to Criteria 5 is 'No'.

Quality habitat is not defined for the Southern Whiteface, but presumably, it is areas with a high abundance of this species concentrated in a particular area. Even the defined 'habitat critical to its survival' (Department of Climate Change Energy the Environment and Water 2023) is very widely available in the Goldfields, Murchison, and Midwest of Western Australia. Although the Southern Whiteface has been recorded in the project area, there is no evidence to suggest or indicate that it is a 'quality habitat', and it does not differ appreciably from the habitat in the many square kilometres of surrounding habitat in which the Southern Whiteface has been recorded. The answer to Criteria 6 is 'No'.

The proposed action will not result in an invasive species harmful to the Southern Whiteface (e.g. cats) becoming established in the species habitat, as these invasive species are already present in the area. The answer to Criteria 7 is 'No'.

There is no suggestion or evidence to indicate that the proposed action will introduce disease into the Southern Whiteface habitats that would adversely significantly impact this small bush bird. The answer to Criteria 8 is 'No'.

There is no recovery plan for Southern Whiteface, and it is highly improbable that the proposed action will significantly and detrimentally impact the overall Southern Whiteface population or the bioregional Southern Whiteface population. The answer to Criteria 9 is 'No'.

Based on an assessment using criteria in the Commonwealth Government's (Department of the Environment 2013) significant impact assessment criteria, the proposed action will not significantly impact this species.

The Department of Climate Change, Energy, the Environment and Water's (2023) conservation advice listed the issues shown in Table 14 as threats to the Southern Whiteface. Against each threat is a comment on whether the proposed action will significantly increase this threat.

Table 14. Threats to Southern Whiteface as described in the Conservation Advice to the Commonwealth Government Minister

Threat	Response
Habitat loss caused by clearing for agriculture	The proposed action is not clearing land for agriculture.
Habitat degradation caused by domestic livestock grazing	The cattle on the pastoral stations nearby were present long before the exploration and mining activity was undertaken.
Increased frequency or length of droughts	The mining operations cannot influence the frequency or length of droughts in the Goldfields.
Increased likelihood of extreme events (i.e., wildfire, drought and heatwaves)	The mining operations cannot influence the likelihood of extreme events in the Goldfields.

Mitigation

The following two mitigation measures will reduce the potential impact of vegetation clearing on the Southern Whiteface:

- Clearing vegetation outside the breeding season of April to September (Johnstone and Storr 1998), and having a zoologist search each area for Southern Whiteface active nests before vegetation clearing will reduce the probability of disturbing an active Southern Whiteface nest. If an active nest(s) is found, then a 250m buffer is implemented around the nest site until all chicks have fledged; and
- Minimising vegetation clearing by redesigning the infrastructure location to avoid the more densely vegetated areas.

7.4 REFERRAL UNDER THE EPBC ACT

As discussed above, the project area does not support old-growth spinifex with a structure used as both retreat and nesting sites by the Night Parrot, so it is highly improbable that this species is present. No Malleefowl, tracks or mounds were recorded in the project area, so they are unlikely to be present. Southern Whiteface is widespread and relatively abundant in the Goldfields and Midwest of Western Australia. They will readily move if disturbed, so clearing vegetation in the project area is unlikely to have a significant impact if an active nest is not disturbed.

Based on the available information, the proposed project is unlikely to significantly impact a vertebrate fauna species of conservation significance, so a referral under the *EPBC Act 1999* is not recommended.

8. SUMMARY

Astral is planning to undertake additional exploration and development of the Feysville project ('project area'), which is ~20km south of Kalgoorlie, 30km north of Kambalda and east of the Goldfields Highway (Figure 1). To facilitate the environmental impact assessment, Astral requested a Basic vertebrate fauna survey and assessment to determine the potential impacts on vertebrate fauna. The assessed project area was ~1098.4ha, but only a portion will be disturbed.

There are four broad fauna habitats in the project area: chenopod and tecticornia samphire; mixed Eucalypt woodland with shrubs on rocky hills; mixed Eucalypt woodland with shrubs; and mixed shrubland plus disturbed areas where there will be almost no vertebrate fauna.

The site investigation recorded no evidence (e.g. mounds or tracks) of Malleefowl (listed as Vulnerable) in the area. There is a possibility that the Southern Whiteface (listed as Vulnerable) may be resident. Peregrine Falcon (listed as other specially protected fauna), the mallee form of the Western Rosella (Listed as Priority 4) and the Central Long-eared Bat (Listed as Priority 4) may infrequently be seen in the project area. Vegetation clearing and mining activities are unlikely to significantly impact these species as they will readily move once vegetation clearing commences.

The project area has a substantial wetland and samphire area that could support migratory shorebirds. Lake Lefroy is approximately 30km to the south of the project area and is a much larger lake with a greater range of foraging habitats and resources, so when it contains water, it will be preferentially foraged by migratory shorebirds compared with shallower areas in the region. Clearing vegetation and foraging habitat for migratory shorebirds in the project area is unlikely to significantly impact these birds, as most will have gone elsewhere, and any of these birds present during vegetation clearing will readily move to another lake system.

Clearing native vegetation in the project area is likely to result in the loss of small vertebrate fauna on-site that cannot move away during the clearing process, however, this loss is not expected to be significant when viewed in a bioregional context. The few larger animals, such as kangaroos, large goannas and snakes, and most birds will move into adjacent areas once vegetation clearing commences so that potential impacts will be low. There may be an ongoing loss of small native fauna to vehicle strikes on access tracks, but overall, this impact will be very low. Forced fauna migrants, because of vegetation clearing, increase competition for resources, which may result in the subsequent loss of migrants or local individuals. Individuals who shifted out of their established activity areas are also vulnerable to predation until they have become established in their new areas.

Impacts on vertebrate fauna associated with clearing vegetation in the project area in a landscape or bioregional context are likely low as there are vast tracts of similar fauna habitat in adjacent areas.

Feral predators such as cats are likely to have a much larger impact on the vertebrate fauna in a landscape context than clearing the vegetation and developing exploration and mining operations at this location.

9. MANAGEMENT STRATEGIES

The purpose of this section is to identify management and mitigation strategies to address the potential impacts of development in the project area.

9.1 INDUCTION AND AWARENESS

The induction process informs all contractors and staff involved in vegetation clearing, development, and ongoing operations in the project area of the possible presence and issues associated with terrestrial fauna.

Recommendation 1: An induction program that includes a component on managing vertebrate fauna is mandatory for staff working in the project area.

Recommendation 2: The induction program will incorporate information on protecting fauna and reporting deaths and sightings of Malleefowl and other species of conservation significance.

9.2 DUST

Dust generated from vegetation clearing and development could potentially degrade surrounding vegetation, reducing its ability to absorb sunlight and influencing photosynthetic rates. Degradation of these areas will potentially render habitats unsuitable for fauna. Dust suppression and management programs are essential to minimising mining impacts on fauna during the construction program.

Recommendation 3: The impact of dust on adjacent vegetation and fauna habitat is managed against appropriate KPIs and following the clients' site processes.

9.3 MINIMISING HABITAT FRAGMENTATION

Loss of vegetation and habitat may contribute to declining fauna in and around the project area. Where practicable, access routes are aligned to existing tracks and other barriers or follow the boundaries of broad-scale vegetation associations to minimise the impact on terrestrial fauna, which are often dependent upon specific habitat types. Where practicable, clearing is minimised and fragmentation of remnant vegetation is avoided. Once areas are no longer required, they are rehabilitated.

Recommendation 4: All areas disturbed during exploration or mining are rehabilitated as soon as practical after they are no longer required.

Recommendation 5: Where possible, access routes are aligned to existing roads, tracks and other barriers or follow the boundaries of broad-scale vegetation associations in the area.

9.4 MINIMISING SECONDARY IMPACTS TO FAUNA AND FAUNA HABITAT

Pets and feral animals have the potential to impact fauna. Pets should not be permitted on site, and feral and pest fauna numbers should be monitored and controlled. All rubbish likely to attract animals should be suitably contained and disposed of so as not to encourage the feeding of fauna around the site.

Based on feral cat tracks and scats recorded in the region, it is highly probable that the project area currently supports a population of feral cats. Reducing the impacts of feral cats will reduce the stress on fauna and fauna assemblages in the area. Increased activity will increase traffic and consequently increase fauna deaths on tracks. Limiting vehicle speed on mine roads can reduce collisions with fauna, particularly larger animals such

as kangaroos, emus and goannas. Dead animals on the road also tend to attract raptors, goannas and even cattle, which are likely to be killed.

Recommendation 6: Pets are not permitted in the project area.

Recommendation 7: All waste and rubbish is contained in bins, regularly removed from the project or placed in an approved landfill and suitably covered to exclude access to predator species.

Recommendation 8: Feeding of native fauna is prohibited.

Recommendation 9: A feral cat control program is implemented in the project area and surroundings.

Recommendation 10: Management of wild dogs and goats is done cooperatively with neighbouring mining, pastoralists, and the regional biosecurity group (RBG).

9.5 UNCAPPED DRILL HOLES

Uncapped drill holes can seriously threaten small animals, including ground-dwelling reptiles, frogs and mammals. A log of all on-site drill holes is maintained, detailing when they were capped, how and by whom. All drill holes are temporarily capped on completion of drilling and permanently capped or closed as soon as possible after exploration activities have ceased.

Recommendation 11: A log of all on-site drill holes is maintained detailing when, how, and by whom they were capped.

9.6 SOUTHERN WHITEFACE

Clearing vegetation in the project area may remove habitat that the Southern Whiteface has used and could use in the future. These impacts are unlikely to be significant in a regional context, however, mitigation can further reduce potential impacts.

Recommendation 12: Clearing vegetation is undertaken outside the Southern Whiteface breeding season of April to September, acknowledging that rainfall events can influence the breeding season.

Recommendation 13: If clearing is to occur in the Southern Whiteface breeding season, a zoologist familiar with the species will search the area for active nests before vegetation clearing is undertaken.

Recommendation 14: If an active Southern Whiteface nest(s) is found, a 250m buffer is implemented around the nest site until all chicks have fledged.

9.7 MATURE EUCALYPT TREES WITH HOLLOWS

Mature Salmon Gums with hollows provide nesting opportunities for various birds (e.g. parrots and owls) and diurnal retreat sites for mammals and reptiles (e.g. carpet python) and are therefore ecologically important in the landscape. These mature Salmon Gums are avoided in the vegetation clearing where practicable.

Recommendation 15: Where practicable, mature Eucalypt trees with hollows are avoided.

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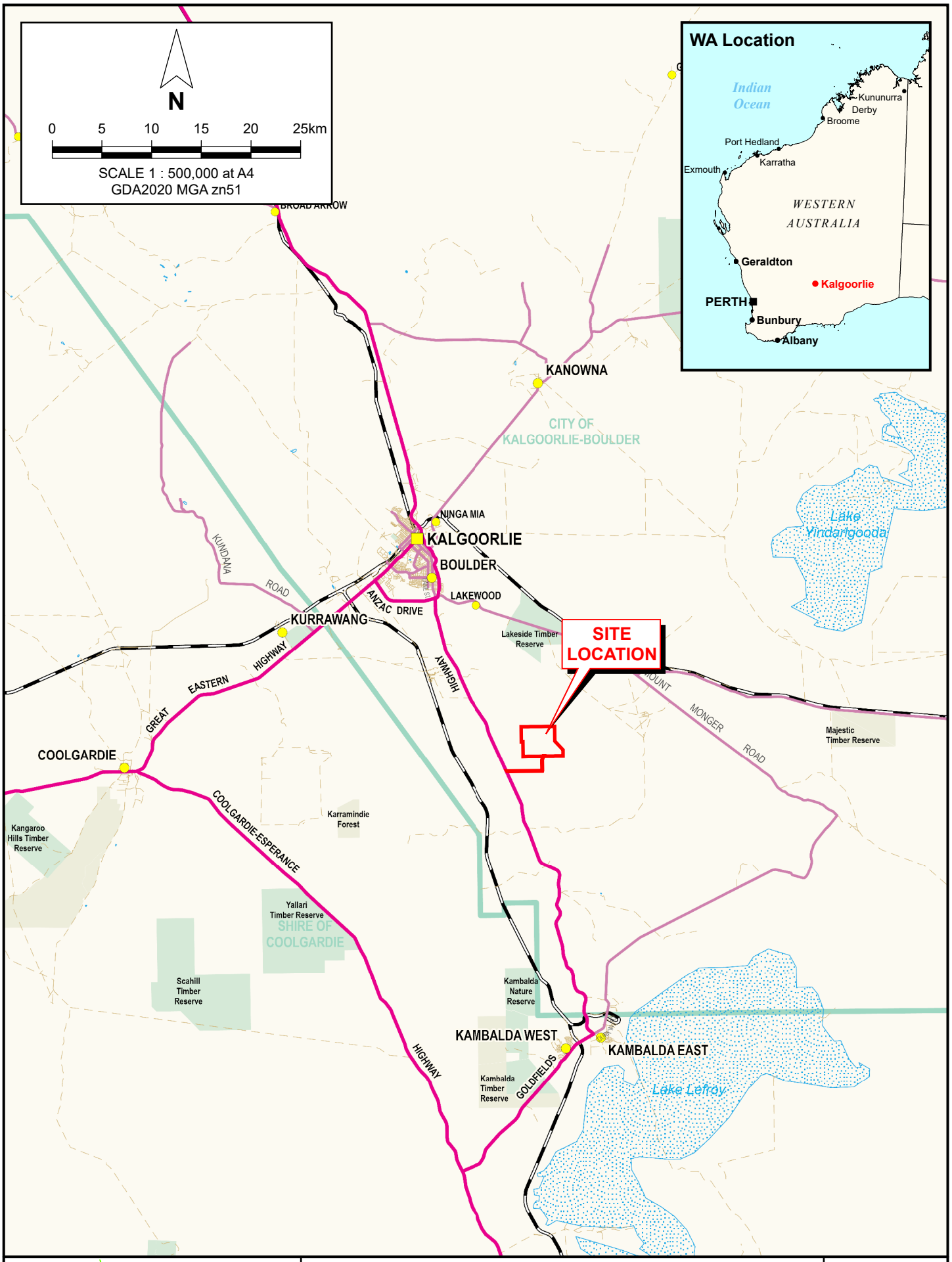
Figures

Basic Vertebrate Fauna Survey and Assessment
Feysville project



TERRESTRIAL ECOSYSTEMS

Astral Resources
BASIC VERTEBRATE FAUNA SURVEY AND ASSESSMENT
FEYSVILLE PROJECT

Figure 1

REGIONAL LOCATION

Drawn: S. Thompson | Date: 4 Dec 2024 | Job: 2024-0050

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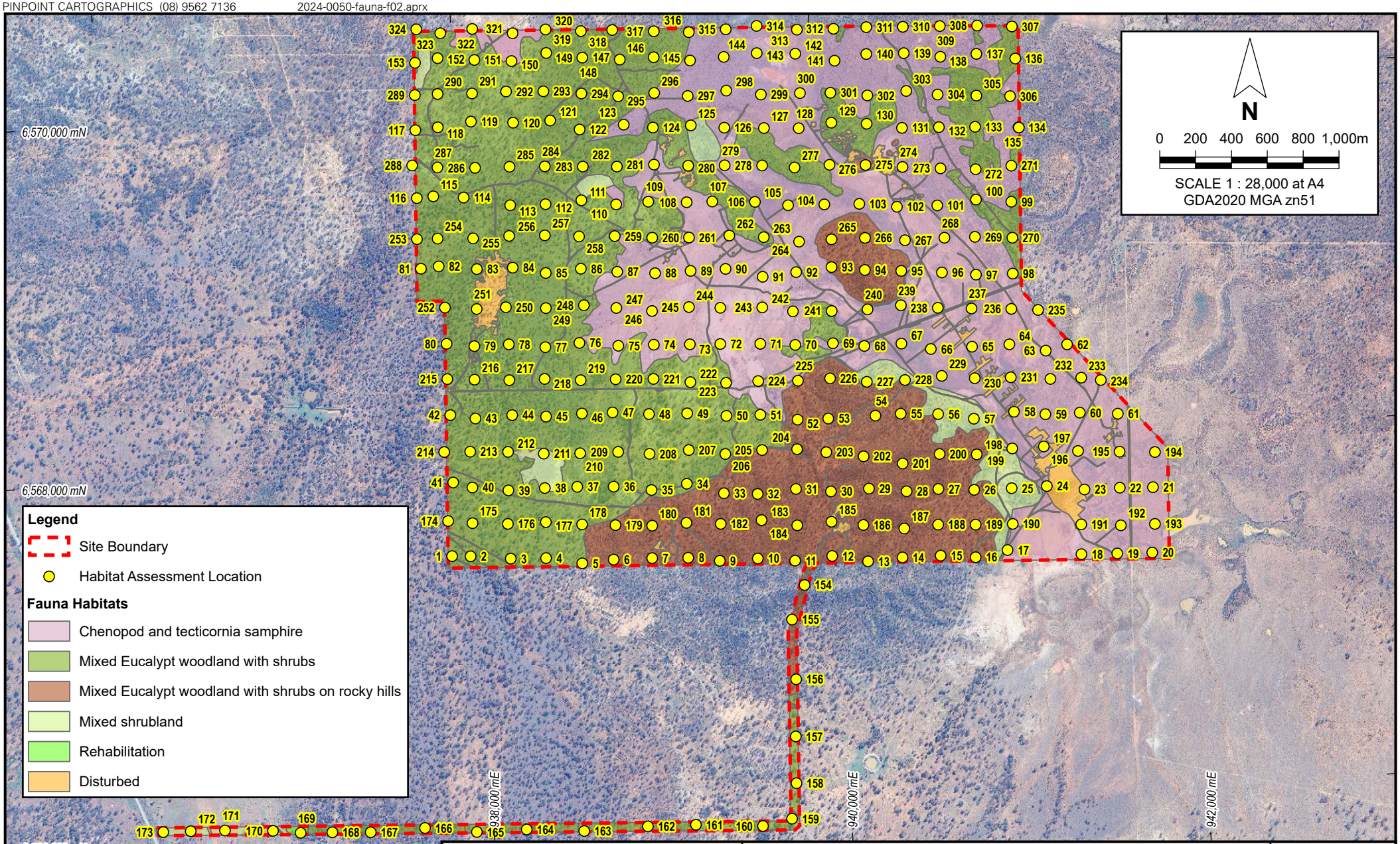

TERRESTRIAL ECOSYSTEMS

Drawn: S. Thompson

Date: 4 Dec 2024

Astral Resources
BASIC VERTEBRATE FAUNA SURVEY AND ASSESSMENT
FEYSVILLE PROJECT

FAUNA HABITAT TYPES AND HABITAT ASSESSMENT LOCATIONS

Figure 2

Job: 2024-0050

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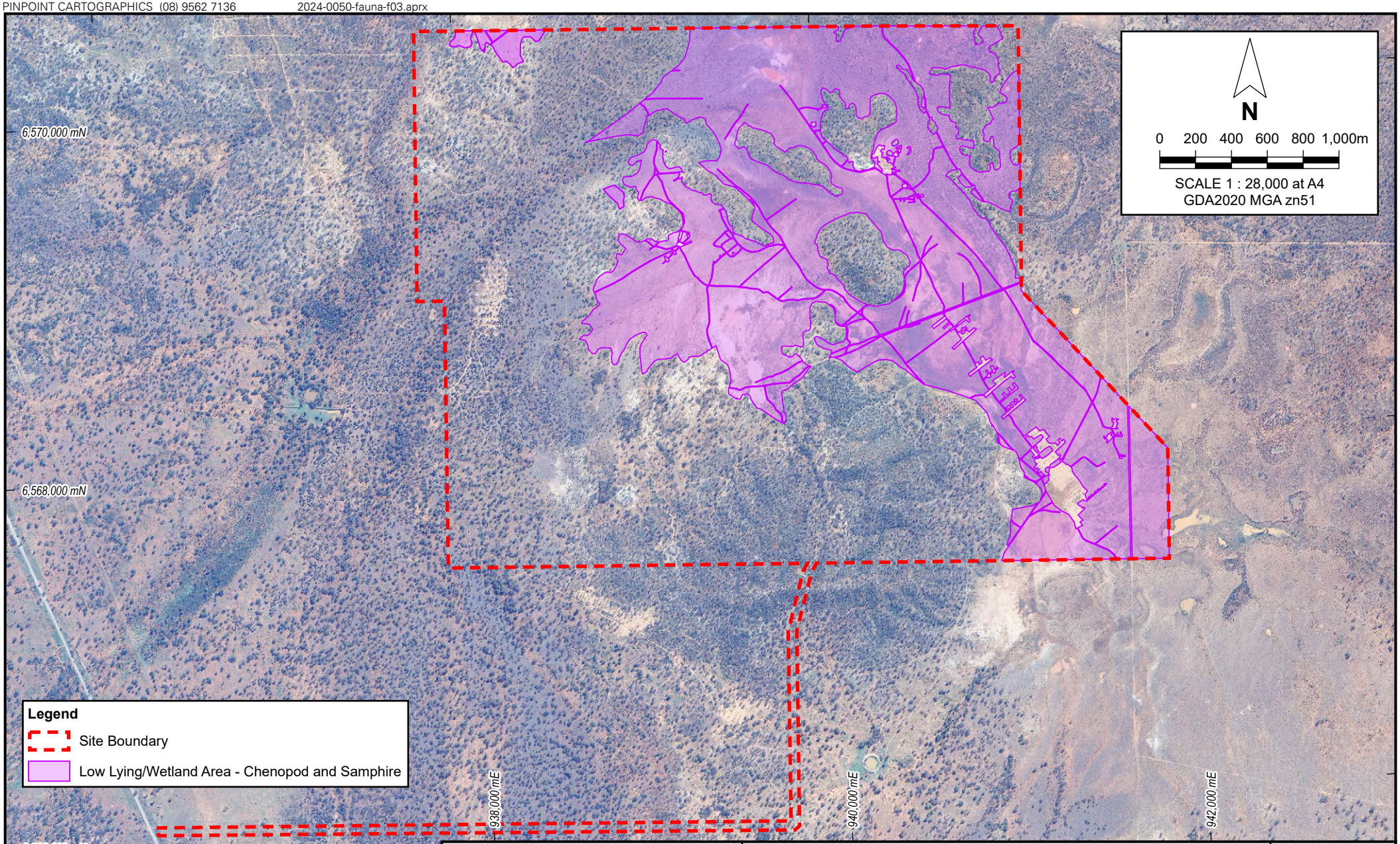

TERRESTRIAL ECOSYSTEMS

Drawn: S. Thompson

Date: 27 Jan 2025

Astral Resources
BASIC VERTEBRATE FAUNA SURVEY AND ASSESSMENT
FEYSVILLE PROJECT

LOW LYING AREAS - CHENOPOD & SAMPHIRE

Figure 3

Job: 2024-0050

Appendix A.
Results of the EPBC Act Protected Matters Search

Basic Vertebrate Fauna Survey and Assessment
Feysville project

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: 11-Nov-2024

- 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:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	10
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:	1
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:	4
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	3
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

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
BIRD		
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to 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 known to occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat may occur within area
INSECT		
Ogyris subterrestris petrina Arid Bronze Azure [77743]	Critically Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
MAMMAL		
Dasyurus geoffroii		
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area
PLANT		
Tecticornia flabelliformis		
Bead Glasswort, Bead Samphire [82664]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species

[Resource Information]

Scientific Name	Threatened Category	Presence Text
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]	Vulnerable	Species or species habitat likely to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat may occur within area

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
Unknown	
Commonwealth Land - [52233]	WA

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Bird		
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 overfly marine area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area
Thinornis cucullatus as Thinornis rubricollis Hooded Plover, Hooded Dotterel [87735]		Species or species habitat likely to occur within area overfly marine area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat may occur within area overfly marine area

Extra Information

State and Territory Reserves		[Resource Information]
Protected Area Name	Reserve Type	State
Kambalda	Nature Reserve	WA
Lakeside Timber Reserve	5(1)(g) Reserve	WA
Ngadju	Indigenous Protected Area	WA
Yallari Timber Reserve	5(1)(h) Reserve	WA

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Nava-1 Cable System	2001/510	Controlled Action	Completed
Not controlled action			
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed
Lynas Kalgoorlie Rare Earths Processing Facility	2020/8719	Not Controlled Action	Completed

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
-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 B.
Vertebrate Fauna Recorded in Biological Surveys in the Region

Basic Vertebrate Fauna Survey and Assessment
Feysville project

B.1 VERTEBRATE FAUNA RECORDED IN BIOLOGICAL SURVEYS IN THE REGION

		Surveys	A	B	C											D	E							F	G
Family	Species	Common name			Site 1	Site 10	Site 2	Site 6	Site 9	Site 12	Site 3	Site 8	Site 7	Site 11	Site 13	White Foil	Kurrawang NR #6	Kurrawang NR #4	Kurrawang NR #7	Kurrawang NR #2	Kurrawang NR #1	Kurrawang NR #5	Kurrawang NR #3	White Foil	
Amphibians																									
Limnodynastidae	*Neobatrachus kunapalari*	Wheatbelt Frog	X	X	8	1	1	1	1																
	Neobatrachus pelobatoides	Humming Frog	X																						
	Neobatrachus sutor	Shoemaker Frog	X																						
Myobatrachidae	*Pseudophryne occidentalis*	Western Toadlet	X																						
Pelodryadidae	*Litoria moorei*	Motorbike Frog	X																						
Reptiles																									
Agamidae	*Ctenophorus caudicinctus*	Ring-tailed Dragon	X																						
	Ctenophorus cristatus	Crested Dragon	X		1	1				1	1	1				1	1								
	Ctenophorus fordi	Mallee Dragon																1							
	Ctenophorus isolepis	Central Military Dragon	X																						
	Ctenophorus maculatus	Spotted Dragon	X																						
	Ctenophorus nuchalis	Central Netted Dragon	X																						
	Ctenophorus reticulatus	Western Netted Dragon	X	X					1															1	
	Ctenophorus salinarum	Saltpan Dragon	X	X																					
	Ctenophorus scutulatus	Lozenge-marked Dragon	X													1									
	Moloch horridus	Thorny Devil	X		1					1									1						
	Pogona minor	Western Bearded Dragon	X	X												1									
	Tympanocryptis cephalus	Pebble Dragon	X										1											1	
	Tympanocryptis lineata	Lined Earless Dragon	X																						
Carphodactylidae	*Underwoodisaurus milii*	Barking Gecko	X	X		1		2	2		1		2	1	2					1					
Diplodactylidae	*Amalosia reticulata*	Reticulated Velvet Gecko	X																						
	Crenadactylus ocellatus	Clawless Gecko	X																						
	Diplodactylus conspicillatus	Fat-tailed Gecko	X																						
	Diplodactylus granariensis	Wheatbelt Stone Gecko	X					1			3	1		1	1										
	Diplodactylus pulcher	Beautiful Gecko	X			1		1	2					2					1						
	Hesperoedura reticulata	Reticulated Velvet Gecko	X																						
	Lucasium maini	Main's Ground Gecko	X									2								1	1				
	Oedura marmorata	Marbled Velvet Gecko	X																						

		Surveys	A	B	C											D	E							F	G
Family	Species	Common name			Site 1	Site 10	Site 2	Site 6	Site 9	Site 12	Site 3	Site 8	Site 7	Site 11	Site 13	White Foil	Kurrawang NR #6	Kurrawang NR #4	Kurrawang NR #7	Kurrawang NR #2	Kurrawang NR #1	Kurrawang NR #5	Kurrawang NR #3	White Foil	
	Rhynchoedura ornata	Beaked Gecko	X		1																				
	Strophurus assimilis	Goldfields Spiny-tailed Gecko	X		5															2					
	Strophurus elderi	Jewelled Gecko	X																						
Elapidae	*Acanthophis pyrrhus*	Desert Death Adder	X																						
	Brachyurophis fasciolatus	Narrow-banded Burrowing Snake	X																						
	Brachyurophis semifasciata	Half-girdled Snake	X																						
	Demansia psammophis	Yellow-faced Whipsnake	X			1																			
	Furina ornata	Orange-naped Snake	X																						
	Narophis bimaculatus	Black-naped Burrowing Snake	X																						
	Suta gouldii	Gould's Snake	X																						
	Suta monachus	Hooded Snake	X																						
	Pseudechis australis	Mulga Snake	X	X									1												
	Pseudonaja mengdeni	Western Brown Snake	X																						
	Pseudonaja modesta	Ringed Brown Snake	X																						
	Simoselaps bertholdi	Jan's Banded Snake	X																						
	Suta fasciata	Rosen's Snake	X																						
	Suta suta	Curl Snake	X																						
Gekkonidae	*Christinus marmoratus*	Marbled Gecko	X																						
	Gehyra purpurascens	Purplish Dtella	X							1															
	Gehyra variegata	Variegated Gehyra	X	X	1	2	1									1				1					
	Hemidactylus frenatus	Asian House Gecko	X																						
	Heteronotia binoei	Bynoe's Gecko	X	X					1							1			1						
Pygopodidae	*Aprasia repens*	Southwest Sandplain Worm Lizard	X																						
	Delma australis	Marble-faced Delma	X	X	1		1																		
	Lialis burtonis	Burton's Legless Lizard	X				1																		
	Pygopus lepidopodus	Common Scaly-foot	X			1																			
	Pygopus nigriceps	Western Hooded Scaly-foot	X																						
Pythonidae	*Morelia spilota*	Carpet Python	X																						
Scincidae	*Cryptoblepharus buchananii*	Buchanan's Snake-eyed Skink	X			1			1							1									
	Cryptoblepharus plagiocephalus	Peron's Snake-eyed Skink	X																						
	Ctenotus atlas	Southern Mallee Ctenotus	X		1													1							
	Ctenotus australis	Western Limestone Ctenotus	X																						

		Surveys	A	B	C											D	E							F	G
Family	Species	Common name			Site 1	Site 10	Site 2	Site 6	Site 9	Site 12	Site 3	Site 8	Site 7	Site 11	Site 13	White Foil	Kurrawang NR #6	Kurrawang NR #4	Kurrawang NR #7	Kurrawang NR #2	Kurrawang NR #1	Kurrawang NR #5	Kurrawang NR #3	White Foil	
	Ctenotus schomburgkii	Barred Wedgesnout Ctenotus	X															1							
	Ctenotus uber	Spotted Ctenotus	X								1	1													
	Cyclodomorphus branchialis	Common Slender Bluetongue																		1					
	Cyclodomorphus melanops	Spinifex Slender Blue-tongue	X																						
	Egernia depressa	Southern Pygmy Spiny-tailed Skink	X													1								1	
	Egernia formosa	Goldfields Crevice Skink	X																						
	Egernia richardi	Bright Crevice-skink	X																						
	Eremiascincus richardsonii	Broad-banded Sand-swimmer	X																						
	Hemiergis gracilipes	South-western Mulch-skink		X																					
	Hemiergis initialis	South-western Earless Skink	X																						
	Hemiergis peronii	Lowlands Earless Skink	X																						
	Lampropholis guichenoti	Pale-flecked Garden Skink	X																						
	Lerista kingi	King's Slider		X																					
	Lerista muelleri	Wood Mulch-slider	X																						
	Lerista picturata	Southern Robust Slider	X								1		1			1									
	Lerista sp.							1	1	1	1				1										
	Lerista timida	Timid Slider	X																						
	Liopholis inornata	Desert Skink	X	X																					
	Menetia greyii	Common Dwarf Skink	X	X			3			1	1	1	2		1				1						
	Morethia adelaidensis	Saltbush Morethia Skink	X																						
	Morethia butleri	Woodland Morethia Skink	X																						
	Tiliqua occipitalis	Western Blue-tongued Lizard	X		2														1						
	Tiliqua rugosa	Bobtail	X	X									1	1					1						
Typhlopidae	*Anilios australis*	Austral Blind Snake	X			1						1													
	Anilios bituberculatus	Prong-snouted Blind Snake	X																						
Varanidae	*Varanus caudolineatus*	Stripe-tailed Monitor	X																						
	Varanus gouldii	Gould's Goanna	X				2					1	1			1									
	Varanus tristis	Black-headed Monitor	X										3												
Chelidae	*Chelodina oblonga*	South-western Snake-necked Turtle	X																						
Birds																									
Casuariidae	*Dromaius novaehollandiae*	Emu		X		2		2						1		1			1					1	
Anatidae	*Cygnus atratus*	Black Swan		X																					

		Surveys	A	B	C											D	E							F	G
Family	Species	Common name			Site 1	Site 10	Site 2	Site 6	Site 9	Site 12	Site 3	Site 8	Site 7	Site 11	Site 13	White Foil	Kurrawang NR #6	Kurrawang NR #4	Kurrawang NR #7	Kurrawang NR #2	Kurrawang NR #1	Kurrawang NR #5	Kurrawang NR #3	White Foil	
	Tadorna tadornoides	Australian Shelduck		X																					
	Anas gracilis	Grey Teal		X																					
Megapodiidae	*Leipoa ocellata*	Malleefowl		X			1																		8
Columbidae	*Phaps chalcoptera*	Common Bronzewing		X		5		2		2						1									
	Phaps elegans	Brush Bronzewing											2												
	Ocyphaps lophotes	Crested Pigeon		X						2						1			1					1	
Cuculidae	*Chrysococcyx osculans*	Black-eared Cuckoo						1	1		3	1	2	1											
	Chrysococcyx lucidus	Shining Bronze-Cuckoo														1									
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar															1								
Podargidae	*Podargus strigoides*	Tawny Frogmouth		X						2			1			1	1								
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar					1																		
Recurvirostridae	*Recurvirostra novaehollandiae*	Red-necked Avocet		X																					
Charadriidae	*Vanellus tricolor*	Banded Lapwing								1															
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper																							3
	Tringa nebularia	Common Greenshank																							1
Accipitridae	*Lophoictinia isura*	Square-tailed Kite				2					1			1			1							1	
	Aquila audax	Wedge-tailed Eagle		X									1												
Cuculidae	*Heteroscenes pallidus*	Pallid Cuckoo							2	1	1														
Strigidae	*Ninox boobook*	Southern Boobook					1																		
Meropidae	*Merops ornatus*	Rainbow Bee-eater				1			1	6		1				1		1				1	1		
Falconidae	*Falco cenchroides*	Nankeen Kestrel		X												1			1						
	Falco longipennis	Australian Hobby		X																					
	Falco berigora	Brown Falcon		X				1			1	1													
Cacatuidae	*Eolophus roseicapilla*	Galah									1								1		1			1	
Psittaculidae	*Polytelis anthopeplus*	Regent Parrot					2					8							1	1			1		
	Barnardius zonarius	Australian Ringneck		X		2		6	6	2	6	3	31	3		1								1	
	Psephotus varius	Mulga Parrot		X				5											1						
	Glossopsitta porphyrocephala	Purple-crowned Lorikeet		X				10			31	4	13	6										1	
Ptilonorhynchidae	*Ptilonorhynchus maculata*	Spotted Bowerbird														1									
Climacteridae	*Climacteris rufus*	Rufous Treecreeper	X								26	4													
Maluridae	*Malurus pulcherrimus*	Blue-breasted Fairywren	X			2							5												
	Malurus splendens	Splendid Fairywren	X			5													1					1	

		Surveys	A	B	C											D	E							F	G
Family	Species	Common name			Site 1	Site 10	Site 2	Site 6	Site 9	Site 12	Site 3	Site 8	Site 7	Site 11	Site 13	White Foil	Kurrawang NR #6	Kurrawang NR #4	Kurrawang NR #7	Kurrawang NR #2	Kurrawang NR #1	Kurrawang NR #5	Kurrawang NR #3	White Foil	
	Malurus leucopterus	White-winged Fairywren	X	X												1								1	
Meliphagidae	*Purnella albifrons*	White-fronted Honeyeater	X			25	8	6	5	28	21		12	28		1								1	
	Lichenostomus cratitius	Purple-gaped Honeyeater	X																						
	Manorina flavigula	Yellow-throated Miner	X	X					8	11	2	6	8			1	1		1	1					
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater	X			7	1	3	2	4	5		2	4		1				1			1	1	
	Anthochaera carunculata	Red Wattlebird	X	X		1		3	4	8	3	2	14	10		1			1	1	1	1	1		
	Gavicalis virescens	Singing Honeyeater	X	X												1								1	
	Ptilotula ornata	Yellow-plumed Honeyeater	X			2	1	30	19	6	52	94	14	16				1	1	1	1	1		1	
	Ptilotula keartlandi	Grey-headed Honeyeater		X																					
	Epthianura albifrons	White-fronted Chat	X																						
	Sugomel nigrum	Black Honeyeater	X																						
	Lichmera indistincta	Brown Honeyeater	X	X		1			2				1	5		1						1		1	
	Phylidonyris niger	White-cheeked Honeyeater	X																						
	Nesoptilotis leucotis	White-eared Honeyeater	X			4	6	3	4	16	2	3	1	14		1						1		1	
	Nesoptilotis flavicollis	Yellow-throated Honeyeater																						1	
	Melithreptus chloropsis	Gilbert's Honeyeater		X																					
	Melithreptus brevirostris	Brown-headed Honeyeater	X			2		1		4	1		5	4											
Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote	X																						
	Pardalotus striatus	Striated Pardalote	X	X		1		5	1	2	1	1	9	1		1		1		1	1		1	1	
Acanthizidae	*Sericornis frontalis*	White-browed Scrubwren	X																						
	Pyrrholaemus brunneus	Redthroat	X			9		11	6		1		5	6		1									
	Calamanthus campestris	Rufous Fieldwren	X																						
	Hylacola cauta	Shy Heathwren	X			2																			
	Acanthiza iredalei	Slender-billed Thornbill	X																						
	Acanthiza apicalis	Inland Thornbill	X			4		2	2		3		6	5		1	1							1	
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill	X			5		5	2							1		1				1			
	Acanthiza uropygialis	Chestnut-rumped Thornbill	X			45		41	35	1	1		23	8		1		1				1		1	
	Smicrornis brevirostris	Weebill	X	X		19	1	30	24	23	8		40	57				1		1	1	1	1	1	
	Gerygone fusca	Western Gerygone	X					1																	
	Aphelocephala leucopsis	Southern Whiteface	X					1																	
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler	X	X			6	15								1								1	
Cinclosomatidae	*Cinclosoma castanotum*	Chestnut Quail-thrush	X			1		4	1	1		1					1					1			

		Surveys	A	B	C											D	E							F	G
Family	Species	Common name			Site 1	Site 10	Site 2	Site 6	Site 9	Site 12	Site 3	Site 8	Site 7	Site 11	Site 13	White Foil	Kurrawang NR #6	Kurrawang NR #4	Kurrawang NR #7	Kurrawang NR #2	Kurrawang NR #1	Kurrawang NR #5	Kurrawang NR #3	White Foil	
Campephagidae	*Coracina maxima*	Ground Cuckooshrike																	1						
	Coracina novaehollandiae	Black-faced Cuckooshrike	X	X		3		1			6	7	2	2		1			1		1			1	
	Lalage tricolor	White-winged Triller	X							1															
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella											7											1	
Oreoicidae	*Oreoica gutturalis*	Crested Bellbird	X	X		2	2	6	2	2	5	4	2	2		1		1	1			1	1		
Pachycephalidae	*Colluricincla harmonica*	Grey Shrikethrush	X	X		3	3	2	1	1	1	3	1	1		1			1			1		1	
	Pachycephala inornata	Gilbert's Whistler	X					1			1														
	Pachycephala pectoralis	Golden Whistler					1		1																
	Pachycephala simplex	Grey Whistler							1																
	Pachycephala rufiventris	Rufous Whistler	X			2																			
Artamidae	*Artamus personatus*	Masked Woodswallow	X	X																					
	Artamus cinereus	Black-faced Woodswallow	X	X			1			1												1			
	Artamus cyanopterus	Dusky Woodswallow	X					2				6													
	Cracticus torquatus	Grey Butcherbird	X	X		1		3		2	4	2	3	1		1		1	1	1			1		
	Cracticus nigrogularis	Pied Butcherbird	X	X					1		3	1		1		1		1	1	1			1	1	
	Gymnorhina tibicen	Australian Magpie	X	X						2	2	1		1		1			1					1	
	Strepera versicolor	Grey Currawong	X	X		4	1	4	2	1	2	3	3	5		1	1		1					1	
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail	X	X				1			4					1								1	
Monarchidae	*Grallina cyanoleuca*	Magpie-lark	X	X												1			1						
Corvidae	*Corvus orru*	Torresian Crow	X																						
	Corvus bennetti	Little Crow	X				1	1			3	1				1			1						
	Corvus coronoides	Australian Raven	X	X		1		4	6	1	1	8	1	3		1								1	
Petroicidae	*Microeca fascinans*	Jacky Winter	X	X						11											1	1		1	
	Petroica goodenovii	Red-capped Robin	X			16			8				1						1					1	
	Eopsaltria griseogularis	Western Yellow Robin				2																			
	Drymodes brunneopygia	Southern Scrub-Robin	X																						
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark	X																						
Hirundinidae	*Hirundo neoxena*	Welcome Swallow	X	X									2												
	Petrochelidon ariel	Fairy Martin																						1	
	Petrochelidon nigricans	Tree Martin	X	X																					
	Cheramoeca leucosterna	White-backed Swallow	X							1															
Zosteropidae	*Zosterops lateralis*	Silvereye	X																						

		Surveys	A	B	C											D	E								F	G
Family	Species	Common name			Site 1	Site 10	Site 2	Site 6	Site 9	Site 12	Site 3	Site 8	Site 7	Site 11	Site 13	White Foil	Kurrawang NR #6	Kurrawang NR #4	Kurrawang NR #7	Kurrawang NR #2	Kurrawang NR #1	Kurrawang NR #5	Kurrawang NR #3	White Foil	
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird	X							1						1									
Estrildidae	*Taeniopygia guttata*	Zebra Finch	X																						
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit	X																1						
Mammals																									
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna	X	X												1		1					1		
Bovidae	*Capra hircus*	Goat		X												1								1	
	Ovis aries	Sheep														1								1	
Canidae	*Canis lupus*	Dingo	X																						
	Vulpes vulpes	Red Fox		X												1								1	
Felidae	*Felis catus*	Cat	X	X																					
Molossidae	*Mormopterus planiceps*	Southern Free-tail Bat	X																						
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat	X																						
	Chalinolobus morio	Chocolate Wattled Bat	X																						
	Nyctophilus geoffroyi	Lesser Long-eared Bat	X																						
	Scotorepens balstoni	Inland Broad-nosed Bat	X																						
	Vespadelus regulus	Southern Forest Bat	X																						
Dasyuridae	*Ningaui ridei*	Wongai Ningaui								1															
	Ningaui yvonneae	Mallee Ningaui	X																	1					
	Sminthopsis crassicaudata	Fat-tailed Dunnart	X																				2		
	Sminthopsis dolichura	Little Long-tailed Dunnart	X		1	13	4	1				1	15	1											
	Sminthopsis gilberti	Gilbert's Dunnart	X																						
	Sminthopsis murina	Slender-tailed Dunnart	X																						
	Sminthopsis ooldea	Ooldea Dunnart	X																						
Myrmecobiidae	*Myrmecobius fasciatus*	Numbat	X																						
Burramyidae	*Cercartetus concinnus*	Southwestern Pygmy Possum	X			1	2		1	2	1		4	1	3						2				
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo	X	X															1					1	
	Osphranter robustus	Euro	X																1						
	Osphranter rufus	Red Kangaroo														1									
Potoroidae	*Bettongia gaimardi*	Bettong	X																						
Leporidae	*Oryctolagus cuniculus*	Rabbit	X	X												1								1	
Thylacomyidae	*Macrotis lagotis*	Bilby	X																						
Muridae	*Mus musculus*	House Mouse	X					4							9			1							

		Surveys	A	B	C											D	E							F	G
Family	**Species**	**Common name**			**Site 1**	**Site 10**	**Site 2**	**Site 6**	**Site 9**	**Site 12**	**Site 3**	**Site 8**	**Site 7**	**Site 11**	**Site 13**	**White Foil**	**Kurrawang NR #6**	**Kurrawang NR #4**	**Kurrawang NR #7**	**Kurrawang NR #2**	**Kurrawang NR #1**	**Kurrawang NR #5**	**Kurrawang NR #3**	**White Foil**	
	Notomys mitchellii	Mitchell's Hopping Mouse	X		42	1	29			2												1			
	Pseudomys hermannsburgensis	Sandy Inland Mouse	X									1	13	2						1					

A Atlas of Living Australia

B Eco Logical Australia (2016) *Biological Assessment - Binduli Expansion Project. Level 1 vertebrate fauna and Short-range Endemic invertebrate survey.* Unpublished report for Norton Gold Fields Limited, Perth.

C Bamford, M.J., Davies, S.J.J. F. and Ladd, P.G. (1990) *Biological Survey of the Kangaroo Hills and Calooli Timber Reserves, Coolgardie, Western Australia*. Unpublished report.

D Ninox Wildlife Consulting (1999) *Fauna Survey for the White Foil Gold Project*. Unpublished report for Mines and Resources Australia Pty Ltd, Perth.

E Chapman A., Kealley I., McMillan D., McMillan P. and Rolland G. (1991) Biological Surveys of Four Goldfields Reserves. *Landnote* 1/91; 1-26.

F Ninox Wildlife Consulting (2002) *A Vertebrate Fauna Assessment of the Proposed White Foil Haul Road Route Near Kalgoorlie, Western Australia*. Unpublished report for Mines and Resources Pty Ltd, Perth.

G DBCA threatened species database

Appendix C. Definitions of Significant Fauna under the WA Biodiversity Conservation Act 2016 and Priority Species

Basic Vertebrate Fauna Survey and Assessment
Feysville project

C.1 DEFINITIONS OF SIGNIFICANT FAUNA UNDER THE WA BIODIVERSITY CONSERVATION ACT 2016

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.

[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).

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 birds protected under an international agreement

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 dependant 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

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 in urgent 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 adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent 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 adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of 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.

Appendix D.
Fauna habitat assessment results

Basic Vertebrate Fauna Survey and Assessment
Feysville project

Date: 10/09/2024 Habitat Assessment #: 1 Observer: Tom Raymond

GDA94 ; 364494 mE 6575648 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 2 Observer: Tom Raymond

GDA94 ; 364597 mE 6575647 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 3 Observer: Tom Raymond

GDA94 ; 364821 mE 6575634 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

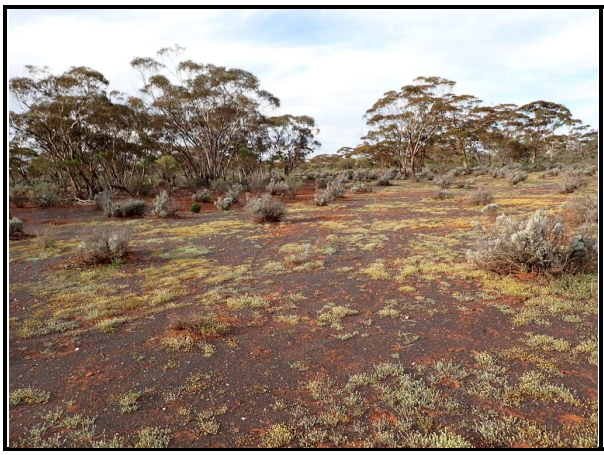
Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

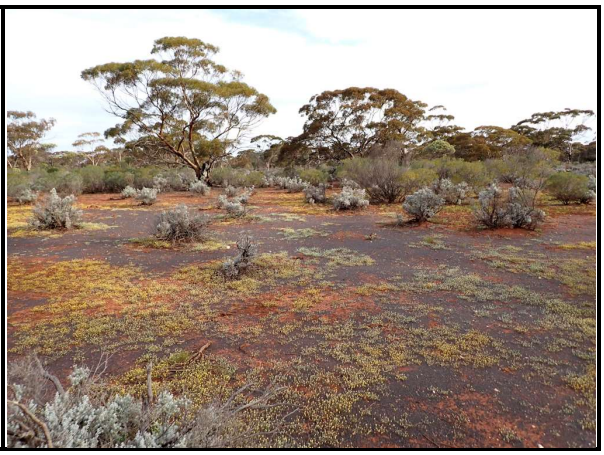
Date: 10/09/2024 Habitat Assessment #: 4 Observer: Tom Raymond

GDA94 ; 365018 mE 6575637 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands





TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 5 Observer: Tom Raymond

GDA94 ; 365220 mE 6575608 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 6 Observer: Tom Raymond

GDA94 ; 365395 mE 6575629 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 7 Observer: Tom Raymond

GDA94 ; 365610 mE 6575637 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 8 Observer: Tom Raymond

GDA94 ; 365811 mE 6575639 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 9 Observer: Tom Raymond

GDA94 ; 365987 mE 6575622 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 10 Observer: Tom Raymond

GDA94 ; 366199 mE 6575635 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 11 Observer: Tom Raymond

GDA94 ; 366407 mE 6575623 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 12 Observer: Tom Raymond

GDA94 ; 366614 mE 6575649 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 13 Observer: Tom Raymond

GDA94 ; 366814 mE 6575619 mN Fire History: 5+ Years Landform: Rocky Ridge

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 14 Observer: Tom Raymond

GDA94 ; 367006 mE 6575641 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 15 Observer: Tom Raymond

GDA94 ; 367219 mE 6575651 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

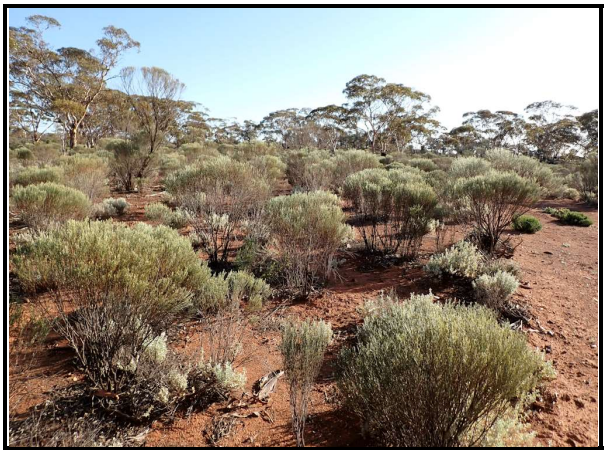
Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 16 Observer: Tom Raymond

GDA94 ; 367414 mE 6575642 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill



TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 17 Observer: Tom Raymond

GDA94 ; 367592 mE 6575682 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 18 Observer: Tom Raymond

GDA94 ; 368004 mE 6575659 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 19 Observer: Tom Raymond

GDA94 ; 368204 mE 6575663 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 20 Observer: Tom Raymond

GDA94 ; 368399 mE 6575668 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand, Pebbles

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 21 Observer: Tom Raymond

GDA94 ; 368403 mE 6576033 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand, Pebbles

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 22 Observer: Tom Raymond

GDA94 ; 368218 mE 6576030 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand, Pebbles

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 23 Observer: Tom Raymond

GDA94 ; 368021 mE 6576020 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand, Pebbles

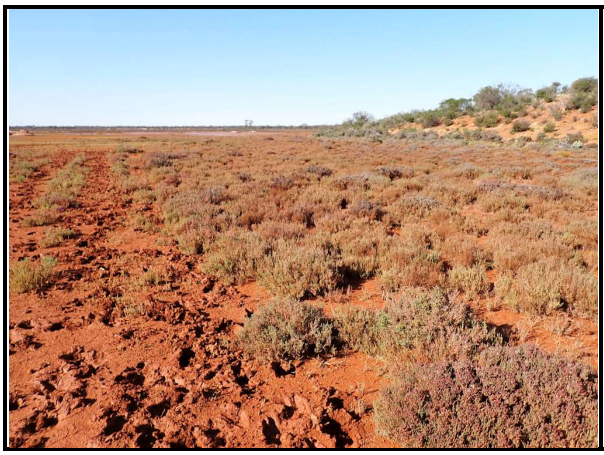
Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 24 Observer: Tom Raymond

GDA94 ; 367811 mE 6576039 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand, Pebbles

Habitat Type: Marsh



Date: 10/09/2024 Habitat Assessment #: 25 Observer: Tom Raymond

GDA94 ; 367615 mE 6576027 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Mixed Shrubland on rocky hill

Date: 10/09/2024 Habitat Assessment #: 26 Observer: Tom Raymond

GDA94 ; 367406 mE 6576018 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 27 Observer: Tom Raymond

GDA94 ; 367206 mE 6576023 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 28 Observer: Tom Raymond

GDA94 ; 367029 mE 6576010 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 29 Observer: Tom Raymond

GDA94 ; 366819 mE 6576025 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 30 Observer: Tom Raymond

GDA94 ; 366607 mE 6576009 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 31 Observer: Tom Raymond

GDA94 ; 366412 mE 6576023 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 32 Observer: Tom Raymond

GDA94 ; 366198 mE 6575995 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 33 Observer: Tom Raymond

GDA94 ; 366010 mE 6575999 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 34 Observer: Tom Raymond

GDA94 ; 365803 mE 6576052 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 35 Observer: Tom Raymond

GDA94 ; 365606 mE 6576017 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 36 Observer: Tom Raymond

GDA94 ; 365395 mE 6576036 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 37 Observer: Tom Raymond

GDA94 ; 365192 mE 6576035 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 38 Observer: Tom Raymond

GDA94 ; 365011 mE 6576028 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Mixed Shrubland

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 39 Observer: Tom Raymond

GDA94 ; 364808 mE 6576015 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 40 Observer: Tom Raymond

GDA94 ; 364607 mE 6576031 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 41 Observer: Tom Raymond

GDA94 ; 364500 mE 6576059 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 42 Observer: Tom Raymond

GDA94 ; 364484 mE 6576435 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 43 Observer: Tom Raymond

GDA94 ; 364624 mE 6576416 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

Date: 10/09/2024 Habitat Assessment #: 44 Observer: Tom Raymond

GDA94 ; 364829 mE 6576435 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 45 Observer: Tom Raymond

GDA94 ; 365018 mE 6576427 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 46 Observer: Tom Raymond

GDA94 ; 365218 mE 6576444 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 47 Observer: Tom Raymond

GDA94 ; 365389 mE 6576450 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 48 Observer: Tom Raymond

GDA94 ; 365592 mE 6576441 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 49 Observer: Tom Raymond

GDA94 ; 365805 mE 6576445 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 50 Observer: Tom Raymond

GDA94 ; 366024 mE 6576431 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 51 Observer: Tom Raymond

GDA94 ; 366213 mE 6576437 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 52 Observer: Tom Raymond

GDA94 ; 366421 mE 6576410 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Cobbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 53 Observer: Tom Raymond

GDA94 ; 366592 mE 6576416 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Cobbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 54 Observer: Tom Raymond

GDA94 ; 366855 mE 6576432 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Cobbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 55 Observer: Tom Raymond

GDA94 ; 366996 mE 6576443 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Cobbles

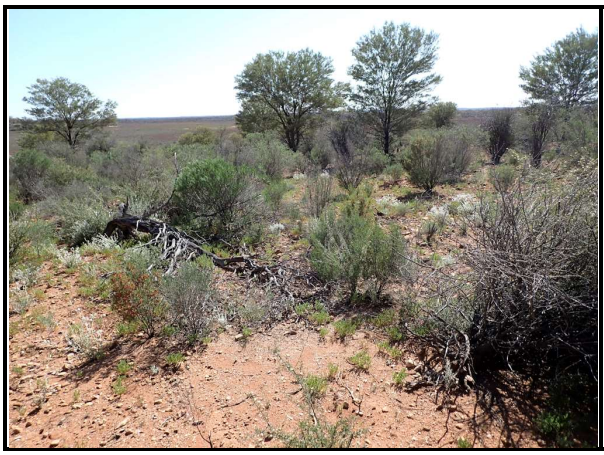
Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

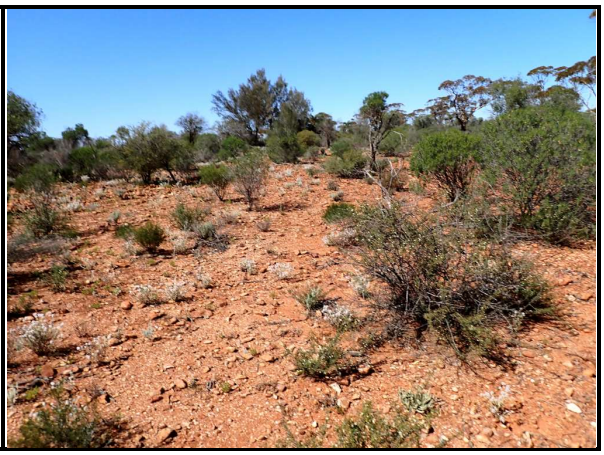
Date: 10/09/2024 Habitat Assessment #: 56 Observer: Tom Raymond

GDA94 ; 367205 mE 6576441 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Cobbles

Habitat Type: Mixed Shrubland on rocky hill





TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 57 Observer: Tom Raymond

GDA94 ; 367404 mE 6576415 mN Fire History: 5+ Years Landform: Rocky Ridge

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Cobbles

Habitat Type: Mixed Shrubland on rocky hill

Date: 10/09/2024 Habitat Assessment #: 58 Observer: Tom Raymond

GDA94 ; 367628 mE 6576454 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 59 Observer: Tom Raymond

GDA94 ; 367803 mE 6576440 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

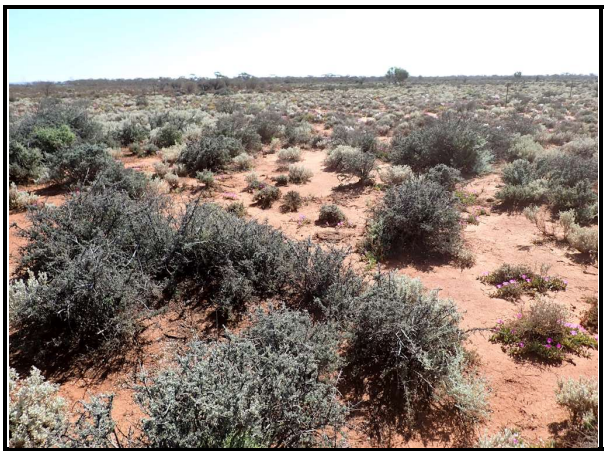
Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 60 Observer: Tom Raymond

GDA94 ; 367995 mE 6576449 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh



TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 61 Observer: Tom Raymond

GDA94 ; 368207 mE 6576443 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 62 Observer: Tom Raymond

GDA94 ; 367924 mE 6576830 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 63 Observer: Tom Raymond

GDA94 ; 367805 mE 6576795 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 64 Observer: Tom Raymond

GDA94 ; 367602 mE 6576830 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 65 Observer: Tom Raymond

GDA94 ; 367394 mE 6576817 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 66 Observer: Tom Raymond

GDA94 ; 367164 mE 6576804 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 67 Observer: Tom Raymond

GDA94 ; 367000 mE 6576834 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 68 Observer: Tom Raymond

GDA94 ; 366793 mE 6576821 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 69 Observer: Tom Raymond

GDA94 ; 366618 mE 6576836 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

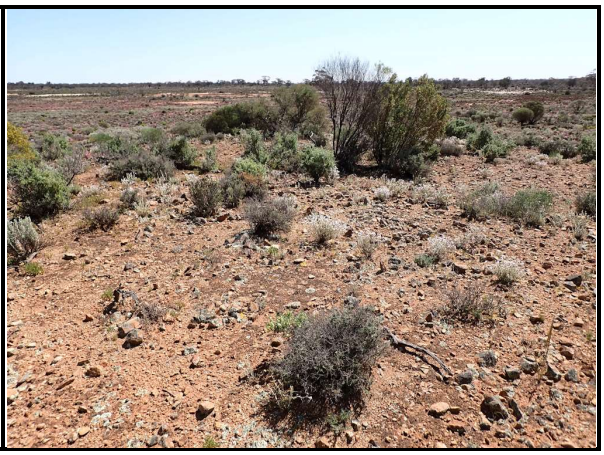
Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 70 Observer: Tom Raymond

GDA94 ; 366408 mE 6576827 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands



TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 71 Observer: Tom Raymond

GDA94 ; 366213 mE 6576833 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 72 Observer: Tom Raymond

GDA94 ; 365990 mE 6576832 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 73 Observer: Tom Raymond

GDA94 ; 365820 mE 6576830 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 74 Observer: Tom Raymond

GDA94 ; 365619 mE 6576828 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 75 Observer: Tom Raymond

GDA94 ; 365421 mE 6576822 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 76 Observer: Tom Raymond

GDA94 ; 365204 mE 6576838 mN Fire History: 5+ Years Landform: Rocky Ridge

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 77 Observer: Tom Raymond

GDA94 ; 365014 mE 6576814 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 78 Observer: Tom Raymond

GDA94 ; 364810 mE 6576830 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 79 Observer: Tom Raymond

GDA94 ; 364618 mE 6576820 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

Date: 10/09/2024 Habitat Assessment #: 80 Observer: Tom Raymond

GDA94 ; 364463 mE 6576833 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on drainage

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 81 Observer: Tom Raymond

GDA94 ; 364320 mE 6577252 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on drainage

Date: 10/09/2024 Habitat Assessment #: 82 Observer: Tom Raymond

GDA94 ; 364419 mE 6577265 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on drainage

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 83 Observer: Tom Raymond

GDA94 ; 364632 mE 6577250 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on drainage

Date: 10/09/2024 Habitat Assessment #: 84 Observer: Tom Raymond

GDA94 ; 364832 mE 6577258 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 85 Observer: Tom Raymond

GDA94 ; 365016 mE 6577228 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

Date: 10/09/2024 Habitat Assessment #: 86 Observer: Tom Raymond

GDA94 ; 365212 mE 6577252 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

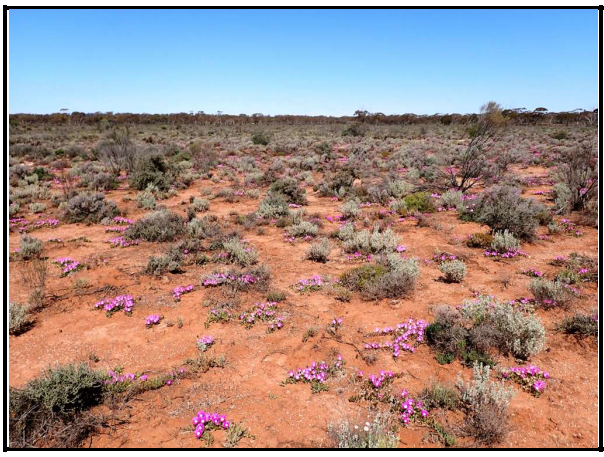
TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 87 Observer: Tom Raymond

GDA94 ; 365415 mE 6577235 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Marsh



Date: 10/09/2024 Habitat Assessment #: 88 Observer: Tom Raymond

GDA94 ; 365626 mE 6577227 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 89 Observer: Tom Raymond

GDA94 ; 365824 mE 6577240 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 90 Observer: Tom Raymond

GDA94 ; 366019 mE 6577251 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 91 Observer: Tom Raymond

GDA94 ; 366226 mE 6577207 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

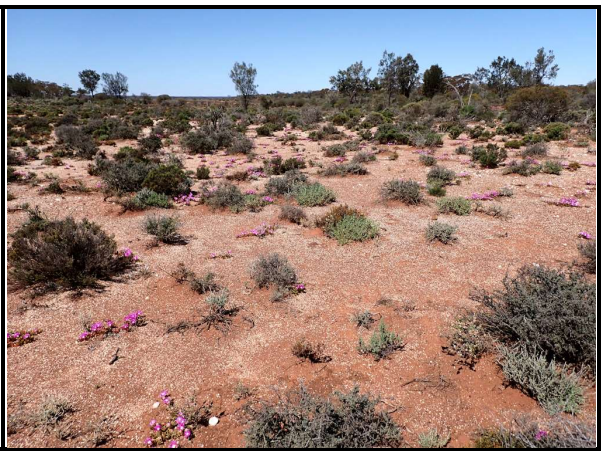
Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 92 Observer: Tom Raymond

GDA94 ; 366413 mE 6577233 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh



TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 93 Observer: Tom Raymond

GDA94 ; 366610 mE 6577261 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 94 Observer: Tom Raymond

GDA94 ; 366796 mE 6577245 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 95 Observer: Tom Raymond

GDA94 ; 366999 mE 6577240 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 96 Observer: Tom Raymond

GDA94 ; 367226 mE 6577231 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 97 Observer: Tom Raymond

GDA94 ; 367416 mE 6577219 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 98 Observer: Tom Raymond

GDA94 ; 367621 mE 6577225 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 99 Observer: Tom Raymond

GDA94 ; 367613 mE 6577626 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 100 Observer: Tom Raymond

GDA94 ; 367416 mE 6577638 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 101 Observer: Tom Raymond

GDA94 ; 367200 mE 6577605 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 102 Observer: Tom Raymond

GDA94 ; 366975 mE 6577598 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 103 Observer: Tom Raymond

GDA94 ; 366765 mE 6577614 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

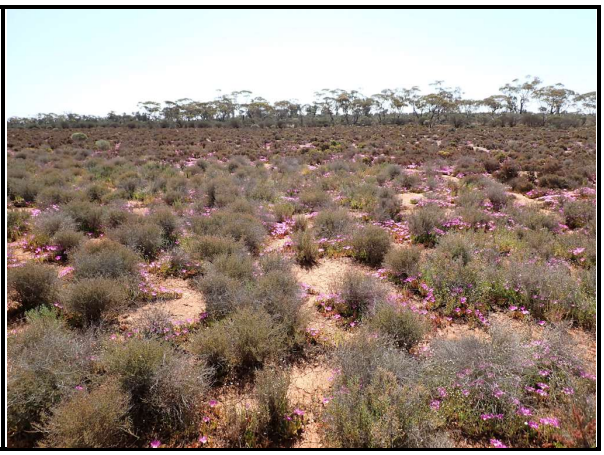
Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 104 Observer: Tom Raymond

GDA94 ; 366570 mE 6577611 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh on drainage



TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 105 Observer: Tom Raymond

GDA94 ; 366368 mE 6577606 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh on drainage

Date: 10/09/2024 Habitat Assessment #: 106 Observer: Tom Raymond

GDA94 ; 366183 mE 6577625 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh on drainage

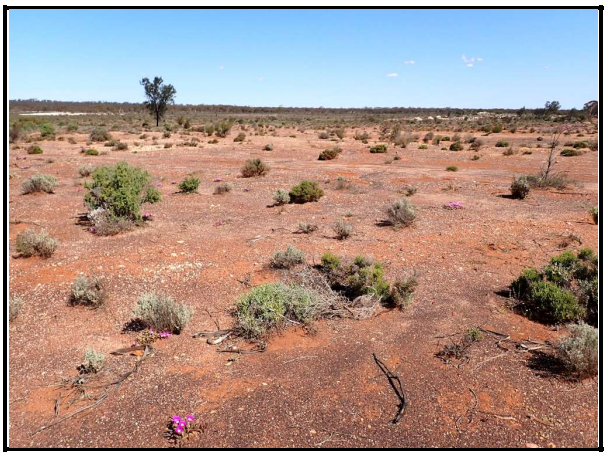
TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 107 Observer: Tom Raymond

GDA94 ; 365945 mE 6577627 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands



Date: 10/09/2024 Habitat Assessment #: 108 Observer: Tom Raymond

GDA94 ; 365802 mE 6577623 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 109 Observer: Tom Raymond

GDA94 ; 365588 mE 6577626 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Mixed Woodland over Mixed shrubs

Date: 10/09/2024 Habitat Assessment #: 110 Observer: Tom Raymond

GDA94 ; 365409 mE 6577611 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 111 Observer: Tom Raymond

GDA94 ; 365215 mE 6577634 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

Date: 10/09/2024 Habitat Assessment #: 112 Observer: Tom Raymond

GDA94 ; 365015 mE 6577612 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on drainage

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 113 Observer: Tom Raymond

GDA94 ; 364818 mE 6577606 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on drainage

Date: 10/09/2024 Habitat Assessment #: 114 Observer: Tom Raymond

GDA94 ; 364558 mE 6577649 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on drainage

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 115 Observer: Tom Raymond

GDA94 ; 364389 mE 6577656 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

Date: 10/09/2024 Habitat Assessment #: 116 Observer: Tom Raymond

GDA94 ; 364297 mE 6577646 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 117 Observer: Tom Raymond

GDA94 ; 364289 mE 6578025 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

Date: 10/09/2024 Habitat Assessment #: 118 Observer: Tom Raymond

GDA94 ; 364414 mE 6578041 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 119 Observer: Tom Raymond

GDA94 ; 364599 mE 6578073 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

Date: 10/09/2024 Habitat Assessment #: 120 Observer: Tom Raymond

GDA94 ; 364834 mE 6578067 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 121 Observer: Tom Raymond

GDA94 ; 365041 mE 6578079 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 122 Observer: Tom Raymond

GDA94 ; 365205 mE 6578029 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 123 Observer: Tom Raymond

GDA94 ; 365451 mE 6578056 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Marsh on drainage

Date: 10/09/2024 Habitat Assessment #: 124 Observer: Tom Raymond

GDA94 ; 365614 mE 6578040 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on drainage

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 125 Observer: Tom Raymond

GDA94 ; 365825 mE 6578052 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

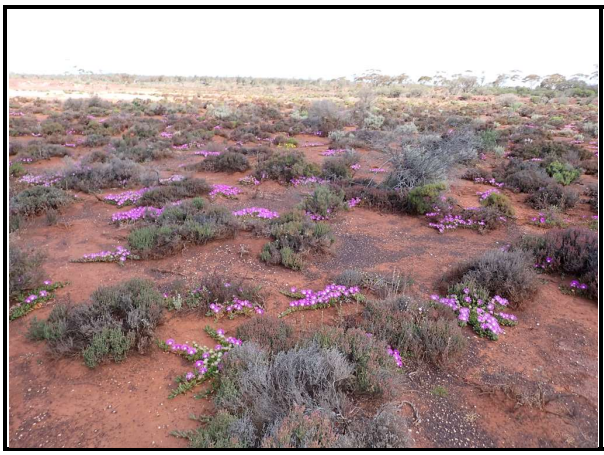
Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

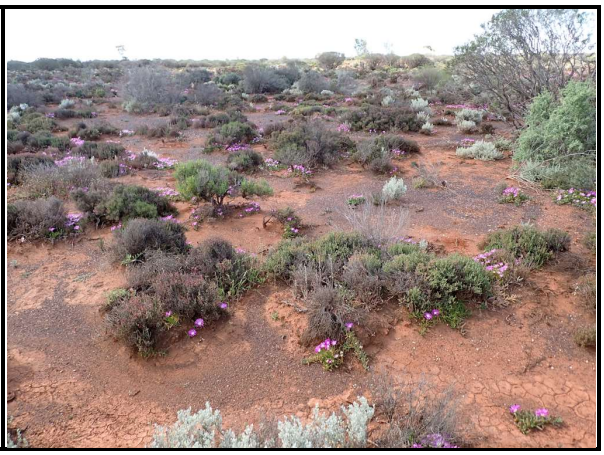
Date: 10/09/2024 Habitat Assessment #: 126 Observer: Tom Raymond

GDA94 ; 366012 mE 6578039 mN Fire History: 5+ Years Landform: Drainage

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Marsh on drainage





TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 127 Observer: Tom Raymond

GDA94 ; 366233 mE 6578037 mN Fire History: 5+ Years Landform: Drainage

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 128 Observer: Tom Raymond

GDA94 ; 366427 mE 6578036 mN Fire History: 5+ Years Landform: Drainage

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 129 Observer: Tom Raymond

GDA94 ; 366609 mE 6578067 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 130 Observer: Tom Raymond

GDA94 ; 366806 mE 6578061 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 131 Observer: Tom Raymond

GDA94 ; 367003 mE 6578038 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 132 Observer: Tom Raymond

GDA94 ; 367209 mE 6578042 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 133 Observer: Tom Raymond

GDA94 ; 367411 mE 6578044 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 134 Observer: Tom Raymond

GDA94 ; 367653 mE 6578041 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 135 Observer: Tom Raymond

GDA94 ; 367655 mE 6578040 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 136 Observer: Tom Raymond

GDA94 ; 367635 mE 6578425 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 137 Observer: Tom Raymond

GDA94 ; 367418 mE 6578451 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Mixed Shrubland

Date: 10/09/2024 Habitat Assessment #: 138 Observer: Tom Raymond

GDA94 ; 367217 mE 6578435 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Mixed Shrubland

Date: 10/09/2024 Habitat Assessment #: 139 Observer: Tom Raymond

GDA94 ; 367013 mE 6578455 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

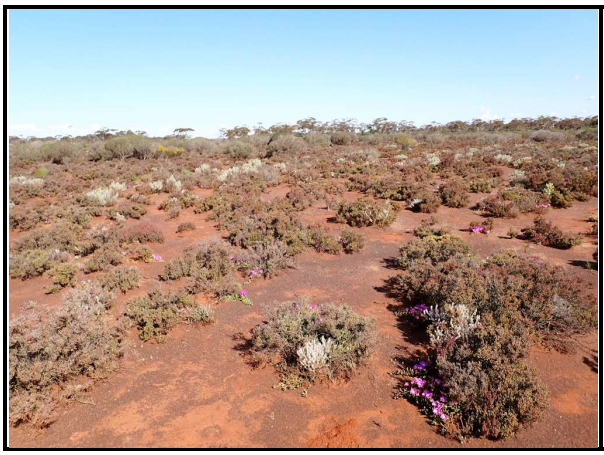
Habitat Type: Mixed Shrubland

Date: 10/09/2024 Habitat Assessment #: 140 Observer: Tom Raymond

GDA94 ; 366804 mE 6578450 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh



TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 141 Observer: Tom Raymond

GDA94 ; 366627 mE 6578413 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

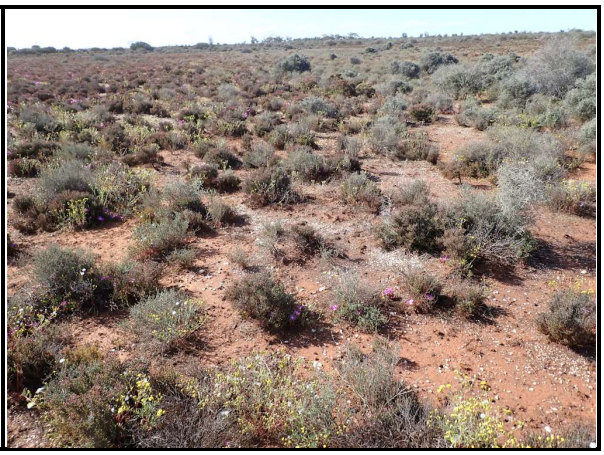
Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 142 Observer: Tom Raymond

GDA94 ; 366408 mE 6578452 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh



TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 143 Observer: Tom Raymond

GDA94 ; 366193 mE 6578455 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

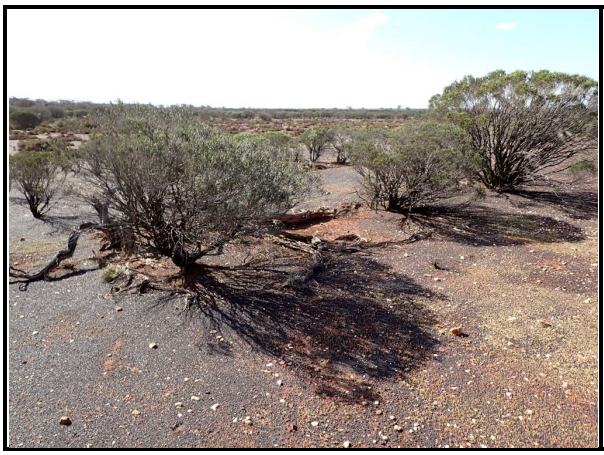
Habitat Type: Marsh on drainage

Date: 10/09/2024 Habitat Assessment #: 144 Observer: Tom Raymond

GDA94 ; 366009 mE 6578434 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh on drainage



TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 145 Observer: Tom Raymond

GDA94 ; 365821 mE 6578414 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh on drainage

Date: 10/09/2024 Habitat Assessment #: 146 Observer: Tom Raymond

GDA94 ; 365618 mE 6578432 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 147 Observer: Tom Raymond

GDA94 ; 365429 mE 6578419 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 148 Observer: Tom Raymond

GDA94 ; 365220 mE 6578430 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 149 Observer: Tom Raymond

GDA94 ; 365019 mE 6578456 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 150 Observer: Tom Raymond

GDA94 ; 364825 mE 6578411 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 151 Observer: Tom Raymond

GDA94 ; 364618 mE 6578417 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 152 Observer: Tom Raymond

GDA94 ; 364413 mE 6578427 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 153 Observer: Tom Raymond

GDA94 ; 364287 mE 6578401 mN Fire History: 5+ Years Landform: Drainage

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on drainage

Date: 10/09/2024 Habitat Assessment #: 154 Observer: Tom Raymond

GDA94 ; 366460 mE 6575487 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 155 Observer: Tom Raymond

GDA94 ; 366390 mE 6575294 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 156 Observer: Tom Raymond

GDA94 ; 366413 mE 6574961 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 157 Observer: Tom Raymond

GDA94 ; 366411 mE 6574642 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 158 Observer: Tom Raymond

GDA94 ; 366415 mE 6574381 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 159 Observer: Tom Raymond

GDA94 ; 366390 mE 6574183 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 160 Observer: Tom Raymond

GDA94 ; 366228 mE 6574142 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 161 Observer: Tom Raymond

GDA94 ; 365854 mE 6574149 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 162 Observer: Tom Raymond

GDA94 ; 365586 mE 6574140 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 163 Observer: Tom Raymond

GDA94 ; 365231 mE 6574114 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 164 Observer: Tom Raymond

GDA94 ; 364910 mE 6574123 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on drainage

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 165 Observer: Tom Raymond

GDA94 ; 364632 mE 6574109 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 166 Observer: Tom Raymond

GDA94 ; 364343 mE 6574131 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on drainage

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 167 Observer: Tom Raymond

GDA94 ; 364040 mE 6574107 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on drainage

Date: 10/09/2024 Habitat Assessment #: 168 Observer: Tom Raymond

GDA94 ; 363826 mE 6574107 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 169 Observer: Tom Raymond

GDA94 ; 363649 mE 6574104 mN Fire History: 5+ Years Landform: Rehabilitation

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Rehab

Date: 10/09/2024 Habitat Assessment #: 170 Observer: Tom Raymond

GDA94 ; 363495 mE 6574115 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Mixed Shrubland

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 171 Observer: Tom Raymond

GDA94 ; 363227 mE 6574117 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Mixed Shrubland

Date: 10/09/2024 Habitat Assessment #: 172 Observer: Tom Raymond

GDA94 ; 363036 mE 6574113 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Mixed Shrubland

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 173 Observer: Tom Raymond

GDA94 ; 362883 mE 6574108 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Mixed Shrubland

Date: 10/09/2024 Habitat Assessment #: 174 Observer: Isaac Cable

GDA94 ; 364472 mE 6575844 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 175 Observer: Isaac Cable

GDA94 ; 364608 mE 6575832 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 176 Observer: Isaac Cable

GDA94 ; 364805 mE 6575828 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 177 Observer: Isaac Cable

GDA94 ; 365017 mE 6575838 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 178 Observer: Isaac Cable

GDA94 ; 365219 mE 6575825 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 179 Observer: Isaac Cable

GDA94 ; 365405 mE 6575821 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand, Cobbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 180 Observer: Isaac Cable

GDA94 ; 365610 mE 6575818 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand, Cobbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 181 Observer: Isaac Cable

GDA94 ; 365801 mE 6575834 mN Fire History: 5+ Years Landform: Drainage

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand, Cobbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 182 Observer: Isaac Cable

GDA94 ; 365992 mE 6575828 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand, Pebbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 183 Observer: Isaac Cable

GDA94 ; 366220 mE 6575849 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 184 Observer: Isaac Cable

GDA94 ; 366419 mE 6575820 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand, Pebbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 185 Observer: Isaac Cable

GDA94 ; 366610 mE 6575840 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand, Pebbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 186 Observer: Isaac Cable

GDA94 ; 366788 mE 6575822 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 187 Observer: Isaac Cable

GDA94 ; 367016 mE 6575802 mN Fire History: 5+ Years Landform: Drainage

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 188 Observer: Isaac Cable

GDA94 ; 367205 mE 6575824 mN Fire History: 5+ Years Landform: Drainage

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 189 Observer: Isaac Cable

GDA94 ; 367414 mE 6575824 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

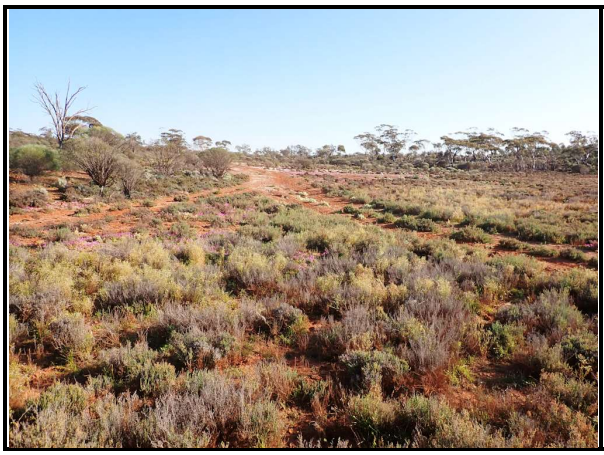
Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

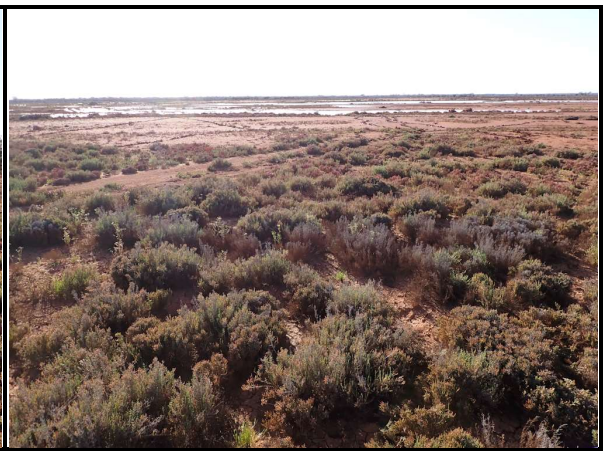
Date: 10/09/2024 Habitat Assessment #: 190 Observer: Isaac Cable

GDA94 ; 367621 mE 6575828 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand, Pebbles, Cobbles

Habitat Type: Marsh





TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 191 Observer: Isaac Cable

GDA94 ; 368003 mE 6575825 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 192 Observer: Isaac Cable

GDA94 ; 368224 mE 6575820 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 193 Observer: Isaac Cable

GDA94 ; 368414 mE 6575828 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 194 Observer: Isaac Cable

GDA94 ; 368414 mE 6576229 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 195 Observer: Isaac Cable

GDA94 ; 368217 mE 6576231 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 196 Observer: Isaac Cable

GDA94 ; 367985 mE 6576235 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 197 Observer: Isaac Cable

GDA94 ; 367794 mE 6576260 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 198 Observer: Isaac Cable

GDA94 ; 367618 mE 6576249 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 199 Observer: Isaac Cable

GDA94 ; 367420 mE 6576216 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 200 Observer: Isaac Cable

GDA94 ; 367213 mE 6576218 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 201 Observer: Isaac Cable

GDA94 ; 367007 mE 6576165 mN Fire History: 5+ Years Landform: Drainage

Soil Type: Sandy Clay Habitat Quality: Pristine Surface: Sand, Pebbles

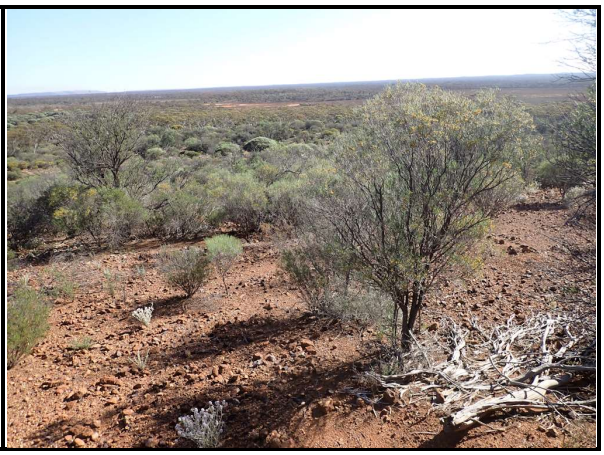
Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 202 Observer: Isaac Cable

GDA94 ; 366789 mE 6576205 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Pristine Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill



TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 203 Observer: Isaac Cable

GDA94 ; 366581 mE 6576228 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Disturbed Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 204 Observer: Isaac Cable

GDA94 ; 366418 mE 6576245 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 205 Observer: Isaac Cable

GDA94 ; 366223 mE 6576240 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand, Pebbles

Habitat Type: Mixed Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 206 Observer: Isaac Cable

GDA94 ; 366018 mE 6576218 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 207 Observer: Isaac Cable

GDA94 ; 365814 mE 6576240 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 208 Observer: Isaac Cable

GDA94 ; 365595 mE 6576219 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 209 Observer: Isaac Cable

GDA94 ; 365420 mE 6576230 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 210 Observer: Isaac Cable

GDA94 ; 365208 mE 6576222 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 211 Observer: Isaac Cable

GDA94 ; 365005 mE 6576220 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Mixed Shrubland

Date: 10/09/2024 Habitat Assessment #: 212 Observer: Isaac Cable

GDA94 ; 364806 mE 6576230 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 213 Observer: Isaac Cable

GDA94 ; 364595 mE 6576231 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 214 Observer: Isaac Cable

GDA94 ; 364450 mE 6576229 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 215 Observer: Isaac Cable

GDA94 ; 364467 mE 6576636 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Mixed Woodland over Mixed shrubs

Date: 10/09/2024 Habitat Assessment #: 216 Observer: Isaac Cable

GDA94 ; 364619 mE 6576633 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 217 Observer: Isaac Cable

GDA94 ; 364813 mE 6576630 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

Date: 10/09/2024 Habitat Assessment #: 218 Observer: Isaac Cable

GDA94 ; 365010 mE 6576637 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 219 Observer: Isaac Cable

GDA94 ; 365211 mE 6576630 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 220 Observer: Isaac Cable

GDA94 ; 365406 mE 6576635 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 221 Observer: Isaac Cable

GDA94 ; 365617 mE 6576637 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface:

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 222 Observer: Isaac Cable

GDA94 ; 365823 mE 6576619 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 223 Observer: Isaac Cable

GDA94 ; 366022 mE 6576615 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 224 Observer: Isaac Cable

GDA94 ; 366201 mE 6576625 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Disturbed Surface: Sand, Pebbles, Cobbles, Stone

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 225 Observer: Isaac Cable

GDA94 ; 366423 mE 6576627 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand, Pebbles

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 226 Observer: Isaac Cable

GDA94 ; 366602 mE 6576640 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 227 Observer: Isaac Cable

GDA94 ; 366807 mE 6576621 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

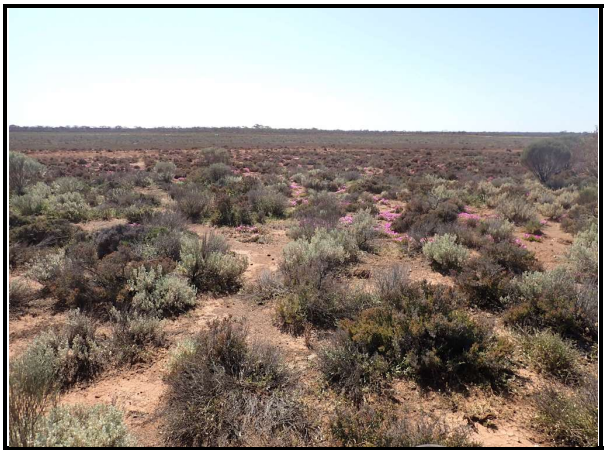
Habitat Type: Mixed Shrubland on rocky hill

Date: 10/09/2024 Habitat Assessment #: 228 Observer: Isaac Cable

GDA94 ; 367020 mE 6576631 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand

Habitat Type: Mixed Shrubland on rocky hill



TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 229 Observer: Isaac Cable

GDA94 ; 367225 mE 6576654 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 230 Observer: Isaac Cable

GDA94 ; 367409 mE 6576641 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 231 Observer: Isaac Cable

GDA94 ; 367610 mE 6576646 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 232 Observer: Isaac Cable

GDA94 ; 367831 mE 6576637 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 233 Observer: Isaac Cable

GDA94 ; 368003 mE 6576644 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 234 Observer: Isaac Cable

GDA94 ; 368112 mE 6576631 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 235 Observer: Isaac Cable

GDA94 ; 367762 mE 6577022 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 236 Observer: Isaac Cable

GDA94 ; 367613 mE 6577028 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 237 Observer: Isaac Cable

GDA94 ; 367391 mE 6577030 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 238 Observer: Isaac Cable

GDA94 ; 367203 mE 6577034 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 239 Observer: Isaac Cable

GDA94 ; 366997 mE 6577048 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 240 Observer: Isaac Cable

GDA94 ; 366811 mE 6577025 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 241 Observer: Isaac Cable

GDA94 ; 366611 mE 6577016 mN Fire History: 5+ Years Landform: Rocky Ridge

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 242 Observer: Isaac Cable

GDA94 ; 366395 mE 6577014 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 243 Observer: Isaac Cable

GDA94 ; 366224 mE 6577036 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 244 Observer: Isaac Cable

GDA94 ; 365990 mE 6577034 mN Fire History: 5+ Years Landform: Undulating plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand, Pebbles

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 245 Observer: Isaac Cable

GDA94 ; 365815 mE 6577038 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 246 Observer: Isaac Cable

GDA94 ; 365609 mE 6577016 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 247 Observer: Isaac Cable

GDA94 ; 365410 mE 6577033 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 248 Observer: Isaac Cable

GDA94 ; 365229 mE 6577048 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 249 Observer: Isaac Cable

GDA94 ; 365017 mE 6577032 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 250 Observer: Isaac Cable

GDA94 ; 364794 mE 6577037 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 251 Observer: Isaac Cable

GDA94 ; 364631 mE 6577027 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

Date: 10/09/2024 Habitat Assessment #: 252 Observer: Isaac Cable

GDA94 ; 364454 mE 6577035 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Disturbed Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 253 Observer: Isaac Cable

GDA94 ; 364298 mE 6577417 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on drainage

Date: 10/09/2024 Habitat Assessment #: 254 Observer: Isaac Cable

GDA94 ; 364413 mE 6577420 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on drainage

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 255 Observer: Isaac Cable

GDA94 ; 364611 mE 6577421 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on drainage

Date: 10/09/2024 Habitat Assessment #: 256 Observer: Isaac Cable

GDA94 ; 364812 mE 6577435 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on drainage

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 257 Observer: Isaac Cable

GDA94 ; 365011 mE 6577438 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Disturbed Surface: Sand

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

Date: 10/09/2024 Habitat Assessment #: 258 Observer: Isaac Cable

GDA94 ; 365202 mE 6577432 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 259 Observer: Isaac Cable

GDA94 ; 365401 mE 6577434 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

Date: 10/09/2024 Habitat Assessment #: 260 Observer: Isaac Cable

GDA94 ; 365610 mE 6577425 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

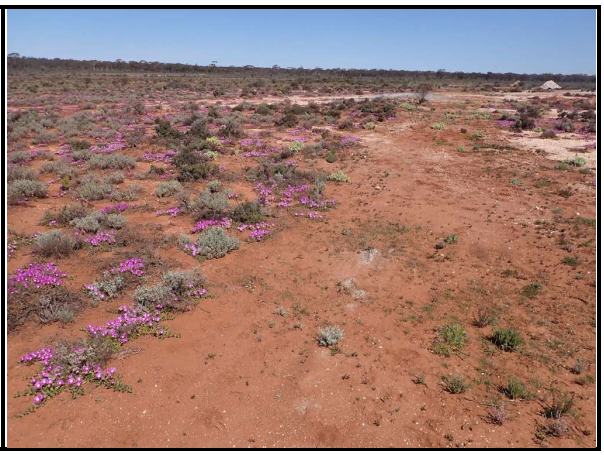
TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 261 Observer: Isaac Cable

GDA94 ; 365815 mE 6577426 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand, Pebbles, Cobbles

Habitat Type: Marsh



Date: 10/09/2024 Habitat Assessment #: 262 Observer: Isaac Cable

GDA94 ; 366040 mE 6577437 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Disturbed Surface: Sand, Pebbles

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 263 Observer: Isaac Cable

GDA94 ; 366232 mE 6577428 mN Fire History: 5+ Years Landform: Rocky Ridge

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 264 Observer: Isaac Cable

GDA94 ; 366429 mE 6577403 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 265 Observer: Isaac Cable

GDA94 ; 366610 mE 6577416 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

Date: 10/09/2024 Habitat Assessment #: 266 Observer: Isaac Cable

GDA94 ; 366797 mE 6577424 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles, Cobbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 267 Observer: Isaac Cable

GDA94 ; 367020 mE 6577411 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 268 Observer: Isaac Cable

GDA94 ; 367240 mE 6577425 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 269 Observer: Isaac Cable

GDA94 ; 367410 mE 6577430 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 270 Observer: Isaac Cable

GDA94 ; 367619 mE 6577425 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 271 Observer: Isaac Cable

GDA94 ; 367613 mE 6577827 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 272 Observer: Isaac Cable

GDA94 ; 367414 mE 6577807 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 273 Observer: Isaac Cable

GDA94 ; 367218 mE 6577812 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 274 Observer: Isaac Cable

GDA94 ; 367006 mE 6577820 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand

Habitat Type: Marsh

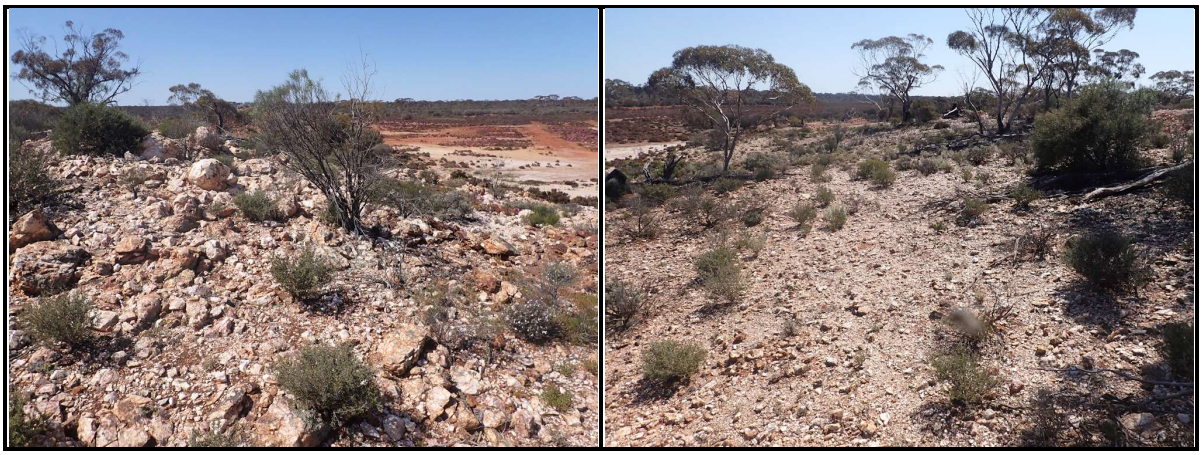
TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 275 Observer: Isaac Cable

GDA94 ; 366800 mE 6577831 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand, Pebbles, Cobbles, Stone

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on rocky hill



Date: 10/09/2024 Habitat Assessment #: 276 Observer: Isaac Cable

GDA94 ; 366599 mE 6577832 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 277 Observer: Isaac Cable

GDA94 ; 366404 mE 6577817 mN Fire History: 5+ Years Landform: Gentle slope

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 278 Observer: Isaac Cable

GDA94 ; 366223 mE 6577828 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand, Pebbles, Cobbles

Habitat Type: Marsh on drainage

Date: 10/09/2024 Habitat Assessment #: 279 Observer: Isaac Cable

GDA94 ; 366014 mE 6577829 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand

Habitat Type: Marsh on drainage

Date: 10/09/2024 Habitat Assessment #: 280 Observer: Isaac Cable

GDA94 ; 365811 mE 6577827 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand, Pebbles, Stone

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 281 Observer: Isaac Cable

GDA94 ; 365620 mE 6577833 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand, Pebbles

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 282 Observer: Isaac Cable

GDA94 ; 365413 mE 6577822 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on drainage

Date: 10/09/2024 Habitat Assessment #: 283 Observer: Isaac Cable

GDA94 ; 365223 mE 6577822 mN Fire History: 5+ Years Landform: Drainage

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on drainage

Date: 10/09/2024 Habitat Assessment #: 284 Observer: Isaac Cable

GDA94 ; 365011 mE 6577823 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Eucalyptus Woodland over Acacia Shrubs on drainage

Date: 10/09/2024 Habitat Assessment #: 285 Observer: Isaac Cable

GDA94 ; 364814 mE 6577821 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

Date: 10/09/2024 Habitat Assessment #: 286 Observer: Isaac Cable

GDA94 ; 364622 mE 6577815 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

Date: 10/09/2024 Habitat Assessment #: 287 Observer: Isaac Cable

GDA94 ; 364412 mE 6577817 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

Date: 10/09/2024 Habitat Assessment #: 288 Observer: Isaac Cable

GDA94 ; 364271 mE 6577828 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

Date: 10/09/2024 Habitat Assessment #: 289 Observer: Isaac Cable

GDA94 ; 364286 mE 6578221 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

Date: 10/09/2024 Habitat Assessment #: 290 Observer: Isaac Cable

GDA94 ; 364413 mE 6578227 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

Date: 10/09/2024 Habitat Assessment #: 291 Observer: Isaac Cable

GDA94 ; 364605 mE 6578230 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

Date: 10/09/2024 Habitat Assessment #: 292 Observer: Isaac Cable

GDA94 ; 364795 mE 6578241 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland over Acacia Shrubland

Date: 10/09/2024 Habitat Assessment #: 293 Observer: Isaac Cable

GDA94 ; 365003 mE 6578242 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 294 Observer: Isaac Cable

GDA94 ; 365215 mE 6578230 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 295 Observer: Isaac Cable

GDA94 ; 365420 mE 6578214 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 296 Observer: Isaac Cable

GDA94 ; 365621 mE 6578233 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Marsh on drainage

Date: 10/09/2024 Habitat Assessment #: 297 Observer: Isaac Cable

GDA94 ; 365808 mE 6578216 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Marsh on drainage

Date: 10/09/2024 Habitat Assessment #: 298 Observer: Isaac Cable

GDA94 ; 366023 mE 6578246 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand, Pebbles, Cobbles

Habitat Type: Marsh on drainage

Date: 10/09/2024 Habitat Assessment #: 299 Observer: Isaac Cable

GDA94 ; 366216 mE 6578224 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Poor Surface: Sand

Habitat Type: Marsh on drainage

Date: 10/09/2024 Habitat Assessment #: 300 Observer: Isaac Cable

GDA94 ; 366434 mE 6578232 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 301 Observer: Isaac Cable

GDA94 ; 366604 mE 6578234 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand

Habitat Type: Mixed Shrubland

Date: 10/09/2024 Habitat Assessment #: 302 Observer: Isaac Cable

GDA94 ; 366810 mE 6578219 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand

Habitat Type: Mixed Shrubland

Date: 10/09/2024 Habitat Assessment #: 303 Observer: Isaac Cable

GDA94 ; 367027 mE 6578244 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 304 Observer: Isaac Cable

GDA94 ; 367202 mE 6578224 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 305 Observer: Isaac Cable

GDA94 ; 367418 mE 6578218 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 306 Observer: Isaac Cable

GDA94 ; 367606 mE 6578215 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 307 Observer: Isaac Cable

GDA94 ; 367616 mE 6578604 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 308 Observer: Isaac Cable

GDA94 ; 367422 mE 6578609 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 309 Observer: Isaac Cable

GDA94 ; 367214 mE 6578606 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand

Habitat Type: Mixed Shrubland

Date: 10/09/2024 Habitat Assessment #: 310 Observer: Isaac Cable

GDA94 ; 367008 mE 6578602 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand

Habitat Type: Mixed Shrubland

Date: 10/09/2024 Habitat Assessment #: 311 Observer: Isaac Cable

GDA94 ; 366804 mE 6578600 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand

Habitat Type: Mixed Shrubland

Date: 10/09/2024 Habitat Assessment #: 312 Observer: Isaac Cable

GDA94 ; 366621 mE 6578591 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Mixed Shrubland

TERRESTRIAL ECOSYSTEMS

Date: 10/09/2024 Habitat Assessment #: 313 Observer: Isaac Cable

GDA94 ; 366417 mE 6578586 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand, Pebbles

Habitat Type: Marsh on drainage

Date: 10/09/2024 Habitat Assessment #: 314 Observer: Isaac Cable

GDA94 ; 366192 mE 6578607 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

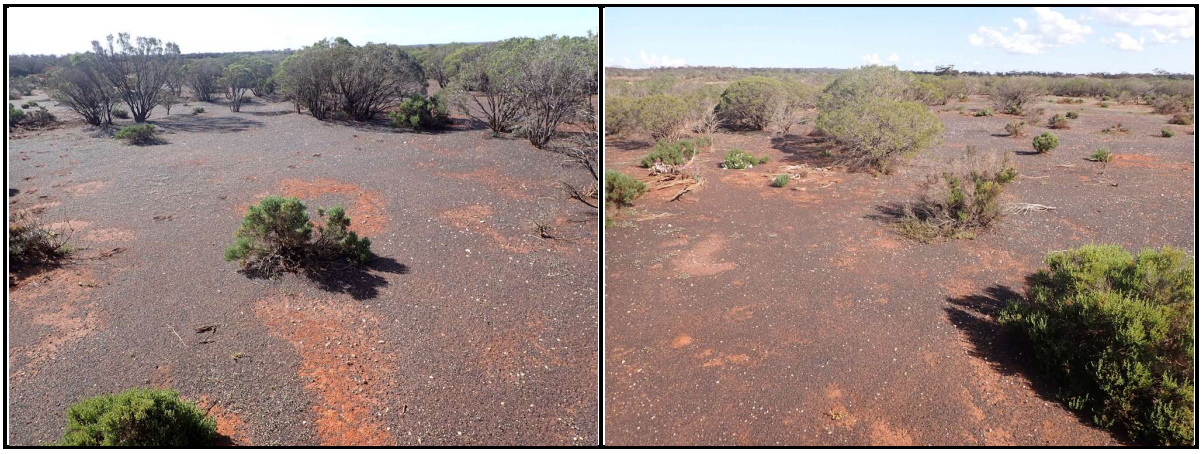
Habitat Type: Marsh on drainage

Date: 10/09/2024 Habitat Assessment #: 315 Observer: Isaac Cable

GDA94 ; 366020 mE 6578588 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand

Habitat Type: Marsh on drainage



Date: 10/09/2024 Habitat Assessment #: 316 Observer: Isaac Cable

GDA94 ; 365814 mE 6578572 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 317 Observer: Isaac Cable

GDA94 ; 365619 mE 6578577 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 318 Observer: Isaac Cable

GDA94 ; 365387 mE 6578584 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 319 Observer: Isaac Cable

GDA94 ; 365212 mE 6578578 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 320 Observer: Isaac Cable

GDA94 ; 365015 mE 6578587 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Eucalyptus Woodland Over Mixed Shrublands

Date: 10/09/2024 Habitat Assessment #: 321 Observer: Isaac Cable

GDA94 ; 364831 mE 6578566 mN Fire History: 5+ Years Landform: Drainage

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 322 Observer: Isaac Cable

GDA94 ; 364606 mE 6578590 mN Fire History: 5+ Years Landform: Flat plain

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 323 Observer: Isaac Cable

GDA94 ; 364428 mE 6578566 mN Fire History: 5+ Years Landform: Rocky Ridge

Soil Type: Sandy Clay Habitat Quality: Very Good Surface: Sand, Pebbles

Habitat Type: Marsh

Date: 10/09/2024 Habitat Assessment #: 324 Observer: Isaac Cable

GDA94 ; 364294 mE 6578588 mN Fire History: 5+ Years Landform: Drainage

Soil Type: Sandy Clay Habitat Quality: Good Surface: Sand, Pebbles

Habitat Type: Mixed shrubland

TERRESTRIAL ECOSYSTEMS

DETECTION DOG

Appendix D: Arid Bronze Azure Butterfly Survey (Terrestrial Ecosystems, 2025)

Ref: 2024-0050-003-st

20 November 2024

Steve Lampron
Technical Services Manager
Astral Resources
Suite 2, Lyall Street
East Perth, WA 6151

Re: Arid Bronze Azure Butterfly survey for the Feysville project

Dear Steve

Terrestrial Ecosystems is pleased to provide the outcomes of a targeted survey for the Arid Bronze Azure Butterfly for the Feysvile project area (i.e. project area: Figure 1).

Arid Bronze Azure Butterfly

The Arid Bronze Azure Butterfly (ABAB) is associated with colonies of the ant *Camponotus terebrans* in mallee vegetation on sandy soil, often near flood plains, and the ant typically digs its nest at the base of eucalypts (Threatened Species Scientific Committee 2014). Butterfly larvae hatching from eggs laid near an ant nest entrance (often near the bases of various mallee eucalypts) are carried, by the ants, into their nest. Details of *C. terebrans* biology and any form of herbivory by the larvae are unknown; however, the larvae are likely to be myrmecophagous. These butterflies fly close to the ground and have been observed flying over agricultural lands near presumed breeding colonies (Williams and Williams 2008). The goldfields population was originally known from Lake Douglas, about 12km south-west of Kalgoorlie (Field 1999), however, this population is reported to have become extinct (Williams et al. 2008, Williams and Williams 2008, Williams et al. 2018). There is an extant population in the Barbalin Nature Reserve (~11km west of Mukinbudin) in the Avon Wheatbelt (Threatened Species Scientific Committee 2014) and a more recently discovered population 40-60km north of Kalgoorlie (M. Byrne, DBCA pers comm.). There is also an additional extant population 100km from Barbalin Nature Reserve, but the DBCA has not provided its location nor direction from Barbalin Nature Reserve. There are some more recently discovered populations ~50km north of Kalgoorlie and ~20km north of Kalgoorlie near the Gidji Roaster.

Camponotus terebrans is typically only found in areas with smooth bark Eucalypts including Gimlet (*Eucalyptus salubris*) and Lake Grace Gum (*Eucalyptus loxophleba* ssp. *gratiae*), but also Wheatbelt Wandoo (*E. capillosa*) and Salmon Gum (*E. salmonophloia*). At Lake Douglas, the host tree was *Eucalyptus concinna* (Field 1999, Threatened Species Scientific Committee 2014). The ants typically form a crescent-shaped nest at the base of eucalypts. Some of these tree species are present in the project area.

Williams and Williams (2008; p.8) commented that 'Over 30 surveys have been conducted in the region by DEC staff and experienced volunteers between 1992 and 2008' and 'include extensive surveys between Payne's Find and Kalgoorlie, including most of the major conservation reserves. The surveys have covered extensive parts of the region in which *O. s. petrina* might occur, but have not detected any individuals or additional populations of the butterfly' (Williams and Williams 2008; p.8). The fact that further populations have not been located, despite the species being conspicuous, demonstrates the rarity of this butterfly and the significance of the Barbalin site.' (Williams and Williams 2008; p.9).

Due to the presence of smooth-barked Eucalypt trees and proximity to the extinct population at Lake Douglas and a recently discovered population north of Kalgoorlie, a targeted survey was undertaken. Due to the obligate association of the ABAB with the host ant, surveys to detect this species need to consider both species. The habitat critical for the ABAB is the optimal habitat for the host ant. If the ant does not occur in a survey area, then ABAB will be absent. However, ant presence does not guarantee the ABAB is present, given that only the larger colonies will support a butterfly population. A large ant colony is a strong indicator of the potential presence of the Arid Bronze Azure Butterfly.

Terrestrial Ecosystems visited the Barbalin Nature Reserve in September 2024 to confirm that the host ants were active.

Targeted ant survey

Ant surveys can be conducted at any time of year, although lower ant activity in winter may result in lower activity levels and may reduce the chances of detection, which increases the risks of regulators not approving the methods. The optimal time to conduct ant surveys is when the ABAB is active from mid-September to late October, however, the ABAB is still active in lower numbers between late October and late April. The field survey was completed on 17 September 2024 with additional fauna habitat assessments completed on 9-10 September 2024. The field was undertaken by Dr Scott Thompson, Tom Raymond and Isaac Cable. The field survey was therefore completed during an appropriate season.

Using Formulae 1 and 2, the number of mature trees required to adequately sample the area and their approximate spacing was calculated (Department of Biodiversity Conservation and Attractions 2020).

Formula 1. Number of sample trees = 10 x √ (site area in hectares)

Formula 2. Spacing of tree sampling = √ [(site area in hectares x 10,000) / No. sample trees]

The ant survey comprised the following technique:

- After selecting a sample tree, we used a pick to disturb the soil/bark/detritus at the base of the tree to a depth of ~10cm; and
- Observed for about 20-30 seconds to see if any host ants appear.

There is ~537ha of Eucalypt woodland in the project area. Terrestrial Ecosystems therefore calculated that 231 trees with an approximate spacing of 152m between trees needed to be sampled. Terrestrial Ecosystems sampled 319 trees at a spacing of 150m and included all habitat areas with smooth-barked eucalypt trees and mallee (Figure 2).

The following details were recorded for each tree:

- Tree type (smooth-bark or rough bark);
- GPS location;
- Tree diameter at ~1.5m height; and
- Ant and leafhopper presence/absence.

All the tree data is shown in Appendix 1 and images in Appendix 3.

The targeted ant survey was undertaken per the DBCA guidelines (2020) for the survey of Arid Bronze Azure Butterfly in Western Australia.

Results

Although ants were present in the project area, no *Camponotus terebrans* were recorded.

Butterfly survey

Due to their dependence on the host ant, adult ABABs will always be found close to the breeding areas. As such, areas within and around places that have high densities of ants are a priority for surveys. Male ABABs are territorial, and they often establish small territories in open areas or along tracks so any tracks near the ant occurrences should be included in the survey area.

Surveys to detect the ABABs follow the standard butterfly walk transect method. Once the route of the transects is determined, it is investigated at a steady pace by one or more observers. Any ABABs seen to each side and ahead of the observers are recorded.

ABABs are only active in fine, warm weather and prefer sunny days with temperatures >23ºC and light winds. The optimal time of day to observe them is between 10am and 3pm. Before commencing each transect survey the following details were recorded:

- site name;
- date of survey;
- number and identity of observers;
- weather conditions – air temperature, wind speed and direction, estimate of cloudiness (% cloud cover); and
- the start and end time of the transect which can be used to quantify survey effort.

After the survey, the temperature, wind speed and direction, and cloud cover were recorded again. These data are provided in Appendix 2.

The length of the butterfly search transect is determined using Formula 3.

Formula 3. Transect length = 0.7 x √ (ant habitat area in hectares) km.

Terrestrial Ecosystems calculated that 16.2km of butterfly search transect was required to adequately survey the project area. Terrestrial Ecosystems completed 91.3km of transect searching in the project area, but it is acknowledged that some of this track survey was along the same transect multiple times. The entire project area was surveyed (Figure 2).

The butterfly survey was undertaken per the DBCA guidelines (2020) for the survey of Arid Bronze Azure Butterfly in Western Australia.

Results

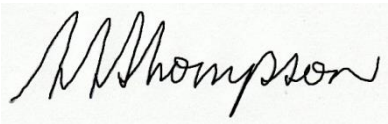
No Arid Bronze Azure Butterflies were recorded.

Conclusion

There was no evidence to indicate that the Arid Bronze Azure Butterfly or its host ant are present in the Feysville project area.

Please do not hesitate to contact the undersigned (0407 385 239), if you require any further information regarding this report.

Yours sincerely



Dr Scott Thompson
Partner and Principal Zoologist

References

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Threatened Species Scientific Committee. 2014. Conservation Advice *Ogyris subterrestris petrina* Arid bronze azure (a butterfly). Canberra.

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Williams, A. A. E., M. Williams, and R. A. Coppen. 2018. Conservation of the Arid Bronze Azure Butterfly (*Ogyris subterrestris petrina*) and host sugar ant (*Camponotus terebrans*). Survey results from *Camponotus terebrans* sites GIM 01, GIM 03, GIM 09, GIM 10, GIM 11, GIM 13, GIM 14, GIM 51, GIM 63, GIM 66, and GIM 68 south of Southern Cross (2014), and from *C. terebrans* site east of Merredin., Perth.

Williams, M. R., and A. A. E. Williams. 2008. Threats to the critically endangered Arid Bronze Azure butterfly (*Ogyris subterrestris petrina*) by proposed vegetation clearing. Perth.

Disclaimer

This document is prepared in accordance with and subject to an agreement between Terrestrial Ecosystems and the client, Astral Resources. It has been prepared and is restricted to those issues that have been raised by the client in its engagement of Terrestrial Ecosystems and prepared using the standard of skill and care ordinarily exercised by environmental scientists in the preparation of such reports.

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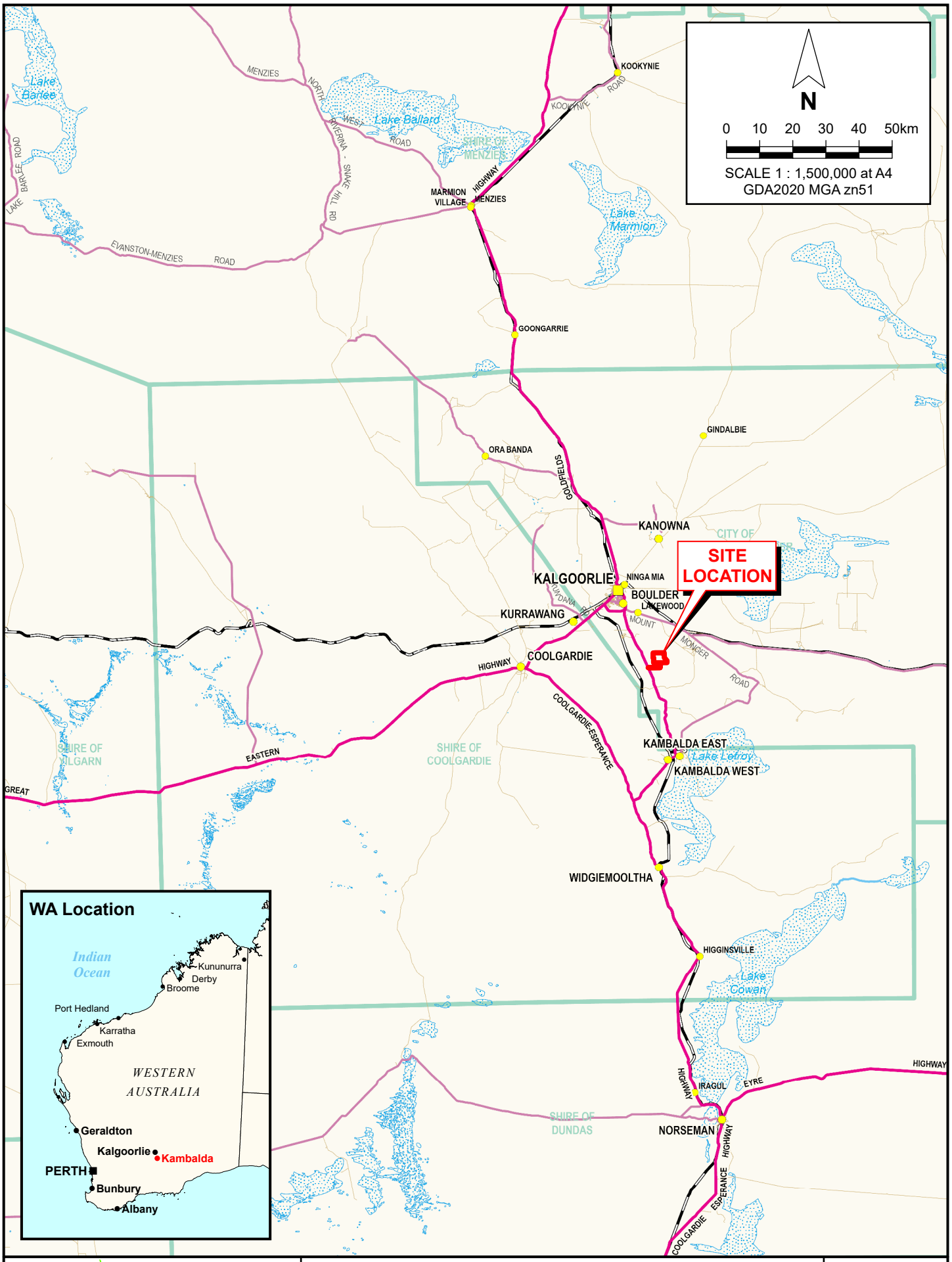

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PINPOINT CARTOGRAPHICS (08) 9562 7136

TERRESTRIAL ECOSYSTEMS

Astral Resources NL
ARID BRONZE AZURE BUTTERFLY SURVEY
FEYSVILLE PROJECT AREA

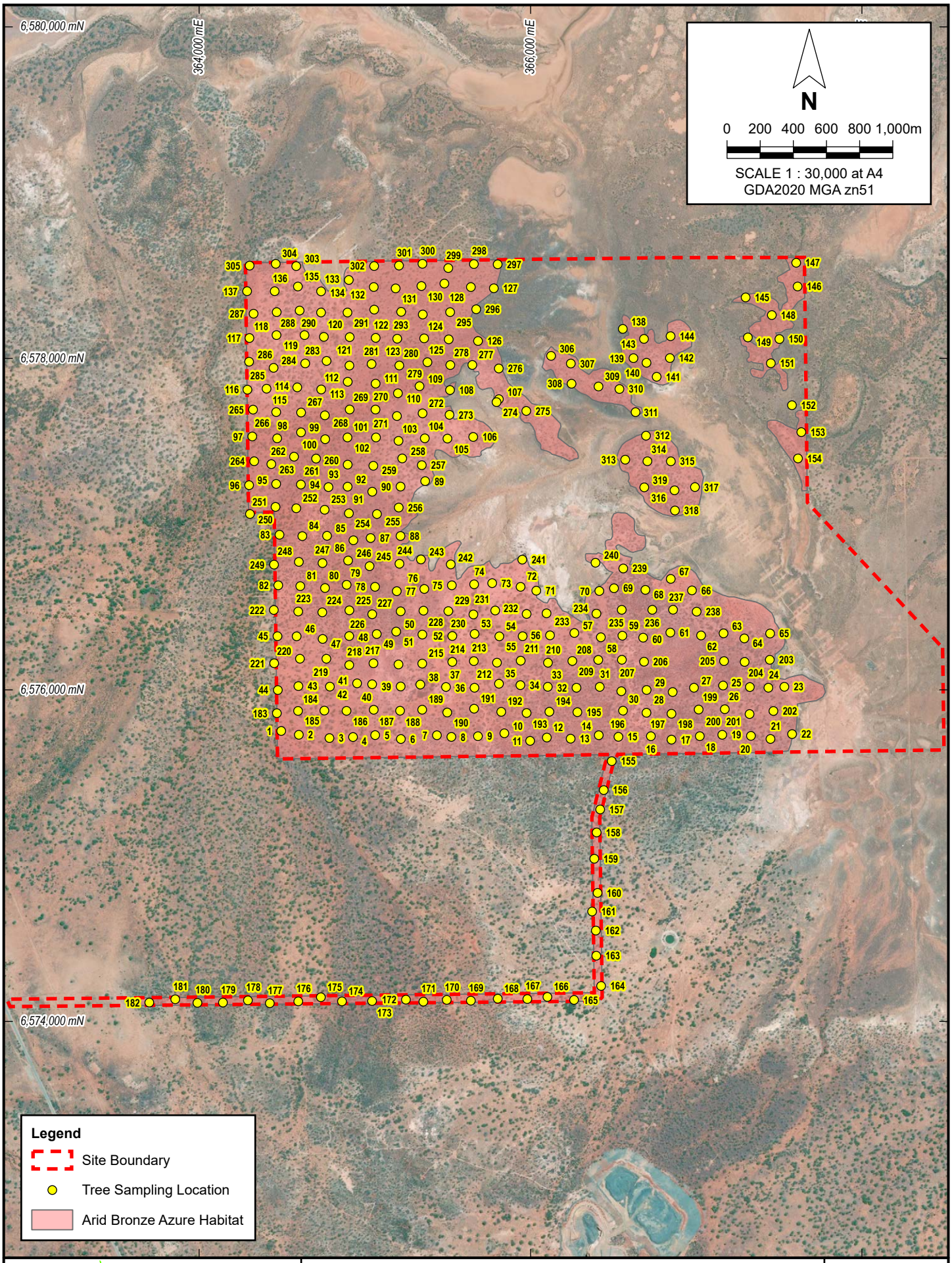
Figure 1

REGIONAL LOCATION

Drawn: S. Thompson

Date: 15 Oct 2024

Job: 2024-0050



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TERRESTRIAL ECOSYSTEMS

Drawn: S. Thompson

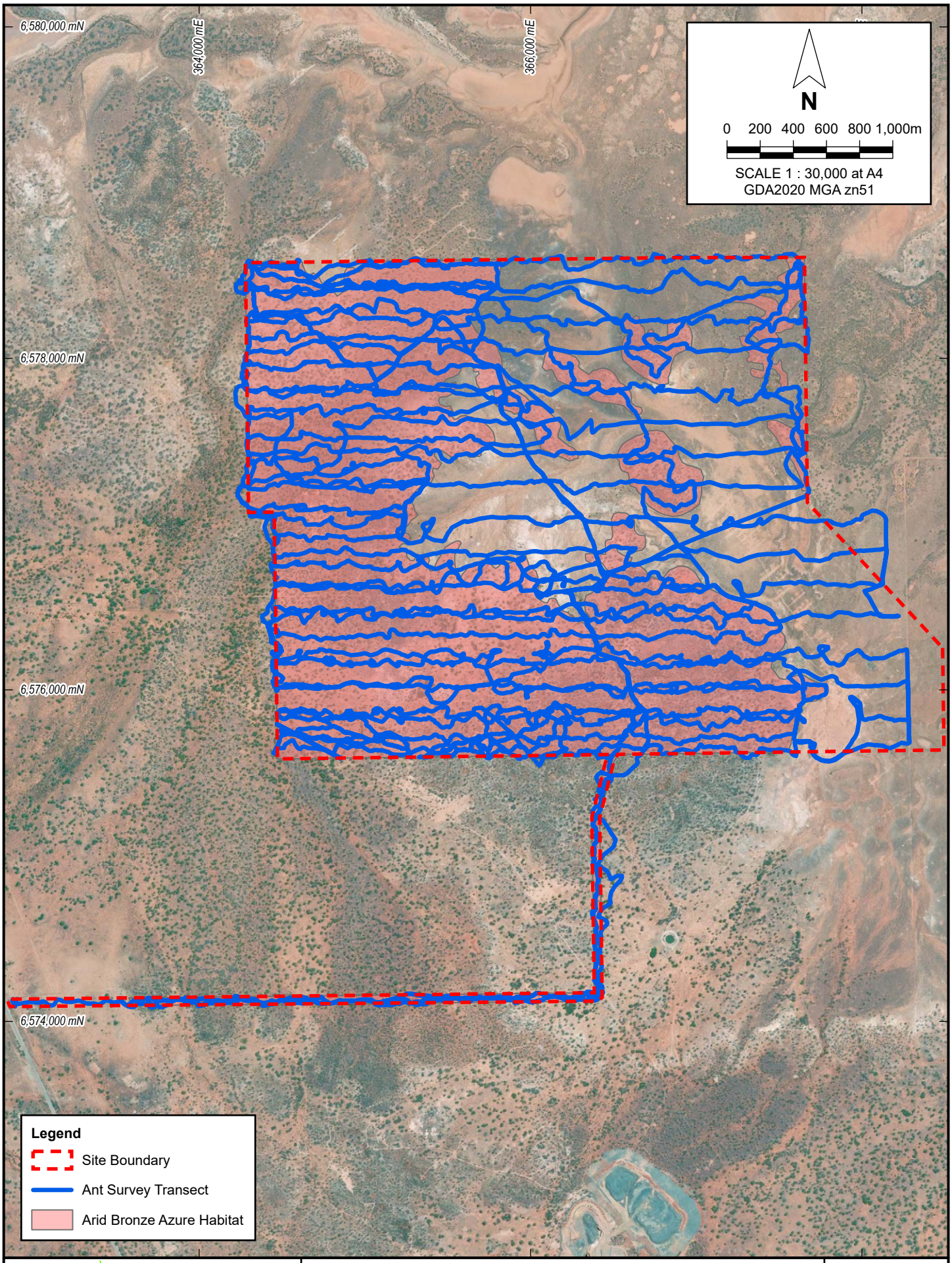
Date: 16 Oct 2024

Astral Resources NL
ARID BRONZE AZURE BUTTERFLY SURVEY
FEYSVILLE PROJECT AREA

ARID BRONZE AZURE HABITAT WITH TREE SAMPLING LOCATIONS

Figure 2

Job: 2024-0050



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PINPOINT CARTOGRAPHICS (08) 9562 7136

TERRESTRIAL ECOSYSTEMS

Astral Resources NL
ARID BRONZE AZURE BUTTERFLY SURVEY
FEYSVILLE PROJECT AREA

ARID BRONZE AZURE BUTTERFLY SURVEYS

Figure 3

Drawn: S. Thompson

Date: 16 Oct 2024

Job: 2024-0050

Appendix 1. Host ant survey data

Site name: Feysville	
Date: 17 September 2024	Observers: Dr Scott Thompson and Isaac Cable

Tree	Species/type	Diameter (mm) at ~ 1.5m above the ground	Ants present? (Yes/No)	Leafhoppers present (Yes/No/NA)	Easting	Northing
1	Smooth	400	No	No	364495	6575751
2	Smooth	350	No	No	364601	6575727
3	Smooth	700	No	No	364786	6575708
4	Smooth	500	No	No	364928	6575714
5	Smooth	300	No	No	365062	6575725
6	Rough	400	No	No	365217	6575702
7	Smooth	600	No	No	365434	6575725
8	Rough	600	No	No	365521	6575715
9	Smooth	300	No	No	365682	6575719
10	Rough	500	No	No	365841	6575737
11	Rough	700	No	No	365997	6575691
12	Rough	700	No	No	366098	6575711
13	Rough	600	No	No	366241	6575704
14	Smooth	450	No	No	366411	6575725
15	Rough	800	No	No	366529	6575715
16	Rough	400	No	No	366725	6575719
17	Rough	500	No	No	366850	6575698
18	Rough	650	No	No	367020	6575719
19	Rough	800	No	No	367156	6575727
20	Rough	150	No	No	367329	6575721
21	Rough	700	No	No	367447	6575702
22	Rough	850	No	No	367577	6575732
23	Rough	650	No	No	367531	6576017
24	Rough	1000	No	No	367434	6576011
25	Rough	700	No	No	367323	6576016
26	Rough	600	No	No	367161	6576025
27	Smooth	400	No	No	366985	6576011
28	Rough	450	No	No	366857	6575985
29	Rough	800	No	No	366700	6575998
30	Rough	500	No	No	366547	6575990
31	Rough	500	No	No	366417	6576017
32	Rough	500	No	No	366276	6576011
33	Rough	500	No	No	366103	6576017
34	Rough	550	No	No	365938	6576027
35	Rough	1000	No	No	365809	6576035
36	Rough	300	No	No	365661	6576011
37	Smooth	400	No	No	365489	6576016
38	Rough	400	No	No	365334	6576031

Tree	Species/type	Diameter (mm) at ~ 1.5m above the ground	Ants present? (Yes/No)	Leafhoppers present (Yes/No/NA)	Easting	Northing
39	Rough	150	No	No	365216	6576019
40	Rough	250	No	No	365043	6576032
41	Rough	300	No	No	364953	6576038
42	Smooth	1200	No	No	364788	6576018
43	Smooth	400	No	No	364598	6576021
44	Rough	1000	No	No	364474	6575997
45	Smooth	500	No	No	364472	6576322
46	Smooth	300	Small black ants	No	364588	6576322
47	Smooth	400	Small black ants	No	364745	6576306
48	Smooth	200	No	No	364905	6576323
49	Rough	800	No	No	365071	6576335
50	Smooth	400	Small black ants	No	365188	6576350
51	Rough	500	No	No	365346	6576332
52	Rough	450	No	No	365527	6576323
53	Smooth	200	No	No	365662	6576336
54	Smooth	400	Small black ants	No	365811	6576322
55	Rough	550	Small black ants	No	365951	6576322
56	Rough	500	Small black ants	No	366117	6576328
57	Rough	600	No	No	366264	6576342
58	Rough	500	No	No	366423	6576316
59	Rough	700	No	No	366553	6576325
60	Smooth	300	No	No	366679	6576314
61	Rough	500	No	No	366843	6576344
62	Smooth	400	No	No	367028	6576327
63	Rough	600	No	No	367164	6576339
64	Smooth	400	No	No	367289	6576309
65	Rough	450	No	No	367445	6576339
66	Rough	200	No	No	366973	6576599
67	Rough	250	No	No	366845	6576668
68	Rough	600	No	No	366692	6576602
69	Rough	600	No	No	366503	6576612
70	Rough	500	No	No	366414	6576595
71	Rough	400	No	No	366034	6576597
72	Smooth	1000	No	No	365939	6576620
73	Smooth	450	No	No	365768	6576642
74	Rough	800	No	No	365659	6576636
75	Rough	400	No	No	365524	6576629
76	Rough	500	No	No	365358	6576607
77	Smooth	250	No	No	365192	6576594
78	Smooth	200	Small black ants	No	365061	6576620
79	Rough	250	No	No	364890	6576632
80	Smooth	350	Small black ants	No	364759	6576613

Tree	Species/type	Diameter (mm) at ~ 1.5m above the ground	Ants present? (Yes/No)	Leafhoppers present (Yes/No/NA)	Easting	Northing
81	Smooth	600	No	No	364610	6576624
82	Smooth	250	No	No	364477	6576629
83	Rough	300	No	No	364484	6576934
84	Rough	800	No	No	364622	6576926
85	Smooth	600	Red and black ants	No	364771	6576928
86	Rough	300	Black ants	No	364930	6576901
87	Smooth	250	Black ants	No	365034	6576915
88	Rough	400		No	365215	6576927
89	Smooth	600	Small black ants	No	365363	6577258
90	Rough	900	No	No	365215	6577225
91	Smooth	500	No	No	365044	6577194
92	Rough	200	No	No	364895	6577224
93	Smooth	1100	No	No	364780	6577222
94	Smooth	600	No	No	364613	6577238
95	Smooth	500	Small black ants	No	364464	6577241
96	Rough	600	Black ants	No	364301	6577233
97	Smooth	600	No	No	364320	6577528
98	Smooth	500	Black ants	No	364470	6577516
99	Rough	600	Black ants	No	364614	6577552
100	Smooth	700	Black ants	No	364760	6577511
101	Smooth	650	No	No	364895	6577522
102	Smooth	500	No	No	365067	6577522
103	Rough	700	No	No	365203	6577501
104	Rough	300	No	No	365361	6577516
105	Rough	800	No	No	365498	6577515
106	Rough	150	No	No	365653	6577524
107	Rough	500	No	No	365808	6577753
108	Smooth	500	Black ants	No	365513	6577808
109	Rough	300	No	No	365329	6577831
110	Rough	250	No	No	365199	6577788
111	Smooth	400	Black ants	No	365064	6577846
112	Smooth	400	No	No	364896	6577857
113	Smooth	100	No	No	364736	6577811
114	Rough	300	No	No	364592	6577824
115	Rough	300	No	No	364406	6577816
116	Rough	500	No	No	364291	6577810
117	Rough	800	No	No	364303	6578122
118	Rough	800	No	No	364466	6578139
119	Rough	900	No	No	364635	6578139
120	Smooth	150	No	No	364752	6578128
121	Rough	600	No	No	364908	6578127
122	Rough	500	No	No	365065	6578122

Tree	Species/type	Diameter (mm) at ~ 1.5m above the ground	Ants present? (Yes/No)	Leafhoppers present (Yes/No/NA)	Easting	Northing
123	Smooth	500	No	No	365195	6578117
124	Smooth	700	No	No	365357	6578119
125	Rough	400	No	No	365505	6578114
126	Rough	400	No	No	365682	6578104
127	Rough	150	No	No	365778	6578422
128	Rough	400	No	No	365639	6578429
129	Rough	550	No	No	365479	6578450
130	Rough	800	No	No	365341	6578435
131	Rough	900	No	No	365185	6578421
132	Rough	900	No	No	365053	6578429
133	Smooth	800	Black ants	No	364903	6578472
134	Rough	700	No	No	364735	6578403
135	Rough	500	No	No	364595	6578432
136	Rough	200	No	No	364455	6578404
137	Rough	500	No	No	364289	6578404
138	Smooth	250	No	No	366556	6578177
139	Rough	300	No	No	366620	6578000
140	Rough	800	No	No	366699	6577972
141	Rough	200	No	No	366760	6577888
142	Rough	500	No	No	366840	6578000
143	Smooth	400	Black ants	No	366684	6578116
144	Rough	400	No	No	366844	6578133
145	Rough	300	No	No	367297	6578367
146	Rough	300	No	No	367611	6578432
147	Rough	250	No	No	367602	6578575
148	Rough	150	No	No	367455	6578260
149	Smooth	100	No	No	367311	6578125
150	Rough	300	No	No	367501	6578115
151	Rough	500	No	No	367449	6577969
152	Rough	200	No	No	367577	6577716
153	Rough	400	No	No	367633	6577554
154	Rough	300	No	No	367613	6577395
155	Rough	300	Small black ants	No	366489	6575568
156	Rough	800	Small black ants	No	366441	6575394
157	Rough	600	Small black ants	No	366419	6575277
158	Rough	800	Small black ants	No	366398	6575138
159	Rough	800	No	No	366384	6574979
160	Smooth	800	Small black ants	No	366404	6574774
161	Rough	500	No	No	366371	6574661
162	Rough	800	Small black ants	No	366393	6574546
163	Smooth	500	Small black ants	No	366396	6574394
164	Smooth	700	No	No	366425	6574212

Tree	Species/type	Diameter (mm) at ~ 1.5m above the ground	Ants present? (Yes/No)	Leafhoppers present (Yes/No/NA)	Easting	Northing
165	Smooth	700	Hairy black ants	No	366262	6574128
166	Rough	600	No	No	366101	6574146
167	Rough	500	Small black ants	No	365980	6574133
168	Rough	700	Small black ants	No	365801	6574135
169	Rough	600	Small black ants	No	365639	6574123
170	Rough	600	No	No	365494	6574128
171	Rough	500	Hairy black ants	No	365352	6574117
172	Smooth	800	Hairy black ants	No	365247	6574129
173	Smooth	800	Black ants	No	365043	6574121
174	Smooth	300	Black ants	No	364861	6574119
175	Rough	300	Hairy black ants	No	364734	6574144
176	Smooth	600	Black ants	No	364598	6574119
177	Smooth	900	Black ants	No	364426	6574108
178	Rough	500	No	No	364294	6574125
179	Rough	600	Black ants	No	364143	6574112
180	Rough	200	No	No	363989	6574110
181	Smooth	1000	Hairy black ants	No	363855	6574132
182	Rough	700	No	No	363699	6574112
183	Rough	300	No	No	364468	6575858
184	Smooth	320	No	No	364596	6575871
185	Smooth	760	No	No	364755	6575874
186	Smooth	450	No	No	364889	6575872
187	Smooth	800	No	No	365053	6575878
188	Smooth	530	No	No	365212	6575873
189	Smooth	470	No	No	365345	6575879
190	Rough	550	No	No	365497	6575862
191	Smooth	240	No	No	365659	6575885
192	Smooth	820	No	No	365822	6575866
193	Rough	450	No	No	365975	6575859
194	Smooth	120	No	No	366113	6575866
195	Smooth	770	No	No	366282	6575864
196	Smooth	350	No	No	366557	6575873
197	Smooth	300	No	No	366699	6575860
198	Smooth	230	No	No	366850	6575855
199	Rough	830	No	No	367014	6575880
200	Smooth	790	No	No	367171	6575882
201	Smooth	1020	No	No	367321	6575853
202	Rough	880	No	No	367465	6575871
203	Smooth	200	No	No	367443	6576180
204	Rough	450	No	No	367291	6576167
205	Smooth	320	No	No	367167	6576172
206	Smooth	350	No	No	366684	6576168

Tree	Species/type	Diameter (mm) at ~ 1.5m above the ground	Ants present? (Yes/No)	Leafhoppers present (Yes/No/NA)	Easting	Northing
207	Smooth	950	Small black ant	No	366550	6576180
208	Rough	470	No	No	366408	6576179
209	Smooth	500	Small black ant	No	366251	6576173
210	Smooth	450	No	No	366104	6576162
211	Rough	350	No	No	365940	6576174
212	Smooth	890	No	No	365797	6576163
213	Smooth	510	No	No	365657	6576172
214	Smooth	630	No	No	365527	6576167
215	Smooth	260	No	No	365346	6576157
216	Smooth	350	No	No	365202	6576152
217	Smooth	130	No	No	365051	6576159
218	Smooth	470	No	No	364905	6576148
219	Smooth	350	Small black ant	No	364767	6576186
220	Smooth	630	No	No	364608	6576186
221	Smooth	300	Small black ant	No	364452	6576159
222	Smooth	500	No	No	364450	6576481
223	Smooth	230	Small black ant	No	364597	6576471
224	Rough	440	No	No	364743	6576467
225	Smooth	250	No	No	364906	6576478
226	Rough	210	Small black ant	No	365044	6576455
227	Smooth	280	Small black ant	No	365216	6576472
228	Smooth	230	Hairy black ant	No	365353	6576476
229	Rough	800	No	No	365503	6576474
230	Smooth	450	No	No	365654	6576454
231	Smooth	530	No	No	365786	6576478
232	Smooth	1040	No	No	365975	6576457
233	Smooth	440	No	No	366096	6576460
234	Smooth	250	No	No	366397	6576459
235	Smooth	280	No	No	366549	6576482
236	Smooth	200	Small black ant	No	366734	6576482
237	Smooth	180	Small black ant	No	366859	6576482
238	Smooth	220	Small black ant and meat ant	No	367002	6576471
239	Smooth	350	No	No	366559	6576731
240	Smooth	280	No	No	366391	6576765
241	Smooth	330	No	No	365949	6576784
242	Smooth	170	No	No	365518	6576756
243	Smooth	190	Small black ant and meat ant	No	365338	6576785
244	Smooth	270	Small black ant	No	365208	6576759
245	Rough	480	Small black ant	No	365028	6576745
246	Smooth	320	Meat ant	No	364898	6576779
247	Smooth	250	No	No	364744	6576764

Tree	Species/type	Diameter (mm) at ~ 1.5m above the ground	Ants present? (Yes/No)	Leafhoppers present (Yes/No/NA)	Easting	Northing
248	Rough	370	No	No	364601	6576771
249	Smooth	270	Small black ant, meat ant and hairy black ant	No	364451	6576754
250	Smooth	290	Hairy black ant	No	364306	6577060
251	Rough	510	Hairy black ant	No	364460	6577102
252	Smooth	320	No	No	364586	6577094
253	Rough	840	No	No	364757	6577085
254	Smooth	140	Small black ant	No	364903	6577064
255	Smooth	450	No	No	365072	6577059
256	Smooth	250	No	No	365204	6577099
257	Rough	380	No	No	365343	6577354
258	Rough	810	No	No	365225	6577395
259	Rough	850	No	No	365051	6577351
260	Smooth	300	No	No	364896	6577357
261	Smooth	290	Meat ant	No	364705	6577394
262	Smooth	740	Meat ant	No	364572	6577406
263	Smooth	700	Small black ant	No	364435	6577361
264	Smooth	200	Meat ant	No	364332	6577378
265	Rough	330	Meat ant	No	364325	6577690
266	Rough	850	Hairy black ant	No	364464	6577675
267	Rough	300	Hairy black ant	No	364615	6577672
268	Smooth	350	Hairy black ant	No	364758	6577655
269	Rough	750	Small black ant	No	364908	6577690
270	Smooth	200	No	No	365063	6577690
271	Smooth	330	No	No	365193	6577651
272	Smooth	850	No	No	365348	6577667
273	Smooth	300	No	No	365510	6577658
274	Smooth	270	Small black ant and hairy black ant	No	365794	6577735
275	Smooth	250	Hairy black ant	No	365973	6577681
276	Smooth	280	Hairy black ant	No	365808	6577938
277	Smooth	220	No	No	365648	6577959
278	Rough	280	No	No	365515	6577958
279	Smooth	110	Small black ant	No	365377	6577975
280	Smooth	250	No	No	365207	6577956
281	Rough	500	No	No	365040	6577965
282	Rough	410	No	No	364906	6577955
283	Rough	890	No	No	364768	6577983
284	Rough	320	Hairy black ant	No	364639	6577968
285	Rough	350	No	No	364449	6577942
286	Rough	500	No	No	364301	6577978
287	Rough	450	No	No	364328	6578268

Tree	Species/type	Diameter (mm) at ~ 1.5m above the ground	Ants present? (Yes/No)	Leafhoppers present (Yes/No/NA)	Easting	Northing
288	Rough	530	No	No	364467	6578278
289	Smooth	250	No	No	364606	6578287
290	Rough	350	No	No	364735	6578276
291	Smooth	320	No	No	364895	6578275
292	Smooth	600	No	No	365056	6578293
293	Rough	1000	Small black ant	No	365218	6578280
294	Rough	350	Small black ant	No	365349	6578263
295	Rough	950	No	No	365514	6578278
296	Rough	900	No	No	365671	6578295
297	Rough	130	Meat ant	No	365801	6578566
298	Smooth	180	No	No	365657	6578568
299	Rough	300	Small black ant	No	365503	6578544
300	Smooth	470	No	No	365347	6578569
301	Smooth	220	Meat ant	No	365205	6578559
302	Smooth	300	No	No	365055	6578556
303	Smooth	210	Small black ant	No	364585	6578555
304	Smooth	290	No	No	364462	6578569
305	Smooth	200	Small black ant	No	364304	6578558
306	Smooth	230	No	No	366123	6578014
307	Smooth	320	Meat ant	No	366242	6577968
308	Smooth	350	No	No	366247	6577846
309	Smooth	210	No	No	366409	6577829
310	Smooth	310	No	No	366536	6577814
311	Smooth	140	Meat ant	No	366633	6577674
312	Smooth	350	No	No	366696	6577532
313	Rough	240	No	No	366571	6577387
314	Rough	450	No	No	366704	6577378
315	Rough	570	No	No	366846	6577378
316	Smooth	310	No	No	366868	6577203
317	Smooth	90	No	No	366991	6577222
318	Smooth	100	No	No	366871	6577081
319	Rough	820	No	No	366685	6577220

Appendix 2. Arid Bronze Azure Butterfly survey data (weather)

Site name: Feysville Observers: Dr Scott Thompson and Isaac Cable		
Date: 17/9/2024	Cloud cover %: zero	
Start time: 0630hrs	Temperature C˚ - 5.5 ºC	Wind speed (km/hr) – 0kph,
Time: 750hrs	Temperature C˚ - 24 ºC	Wind speed (km/hr) – 0kph,
Time: 930hrs	Temperature C˚ - 25 ºC	Wind speed (km/hr) – 7.5kph,
Time: 1100hrs	Temperature C˚ - 27 ºC	Wind speed (km/hr) – 0kph,
Time: 1230hrs	Temperature C˚ - 33 ºC	Wind speed (km/hr) – 7.5kph,

Appendix 3. Sampled trees

Tree 1

Tree 2

Tree 3

Tree 4

Tree 5

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Tree 7

Tree 8

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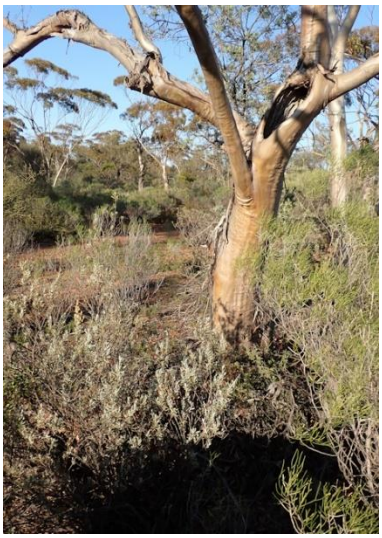
Tree 13



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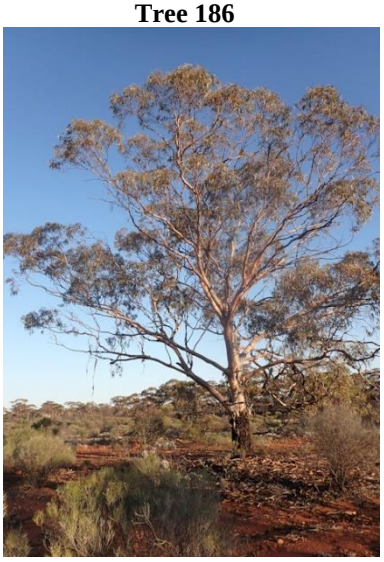

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Appendix E: Subterranean Fauna Survey (Invertebrate Solutions, 2025)

Invertebrate Solutions

Desktop assessment of subterranean fauna for the Feysville Gold Project – Kalgoorlie, Western Australia

ASTRAL RESOURCES

Report by *Invertebrate Solutions Pty Ltd*
for Astral Resources Ltd.

November 2025

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Invertebrate Solutions (2025). Desktop assessment of subterranean fauna for the Feysville Gold Project, Kalgoorlie, Western Australia. Unpublished report Astral Resources Ltd, November 2025.

Report Number 2024ISJ11-03_D01_20251120

Prepared for: Astral Resources Ltd

Report Version		Date
2024SJ11-03_D01_20251120	Draft D01 for comment	20th November 2025

Frontispiece: Diamond core photo of volcanics from Feysville Project.

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Executive Summary

Astral Resources NL (Astral) is planning to undertake mining operations at its Feysville Gold Project (Feysville; the Project), located ~20km south-east of Kalgoorlie-Boulder in the Goldfields region of Western Australia. The proposed mine development includes multiple open pits, waste rock landforms, and other supporting infrastructure areas.

Invertebrate Solutions was engaged by Astral to complete this desktop-level subterranean fauna (stygofauna and troglofauna) assessment for the Project. Searches of the Western Australian Museum databases for Crustaceans and Arachnids/Myriapods were undertaken for a rectangular area approximately 65,000 Km^2, centred on Project area.

Feysville is in the northern part of the Kalgoorlie greenstone belt, specifically within the Kambalda Domain. The Feysville Project sits among a group of elevated ultramafic rocks, which are found within the Black Flag volcanic sedimentary sequence and is largely covered in shallow colluvium and alluvium. The colluvium and alluvium lithologies surrounding and within much of the Project area have a low suitability for both troglofauna and stygofauna habitat due to the absence of interconnected voids in these fine grained units. The ultramafics and other volcanics are generally considered to be poor habitat for troglofauna or stygofauna unless they are highly fractured locally. The intrusive granitoids are also considered to have poor subterranean fauna suitability due to a general absence of interconnected voids unless they are highly locally fractured. Hydrogeological drilling has demonstrated an absence, or minor fracturing in the most part, and provides little opportunity for subterranean fauna. Water quality in the Project area is largely, significantly reducing the likelihood that stygofauna are present within the local aquifers.

The absence of stygofauna and troglofauna records from the Kalgoorlie area would suggest that subterranean habitat, are generally absent or present in very low abundance, although it is unknown what sampling intensity has previously been undertaken and it may be due to a paucity of sampling. It is reasonable to conclude that subterranean fauna have a low likelihood of occurrence within the Project area, when considering the absence of potential voids and cracks, and the hypersaline nature of the groundwater.

No further survey work for stygofauna or troglofauna is considered necessary for the proposed mine pit development area, as the thorough review of the pit lithology/ geology data meets the requirements of the Technical Guidance – Subterranean Fauna Surveys for Environmental Impact Assessment (EPA 2021).

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1 Introduction

Astral Resources NL (Astral) is planning to undertake mining operations at its Feysville Gold Project (Feysville; the Project), located ~20km south-east of Kalgoorlie-Boulder in the Goldfields region of Western Australia. The proposed mine development includes multiple open pits, waste rock landforms, and other supporting infrastructure areas.

Invertebrate Solutions was engaged by Astral to complete this desktop-level subterranean fauna (stygofauna and troglofauna) assessment for the proposed project development.

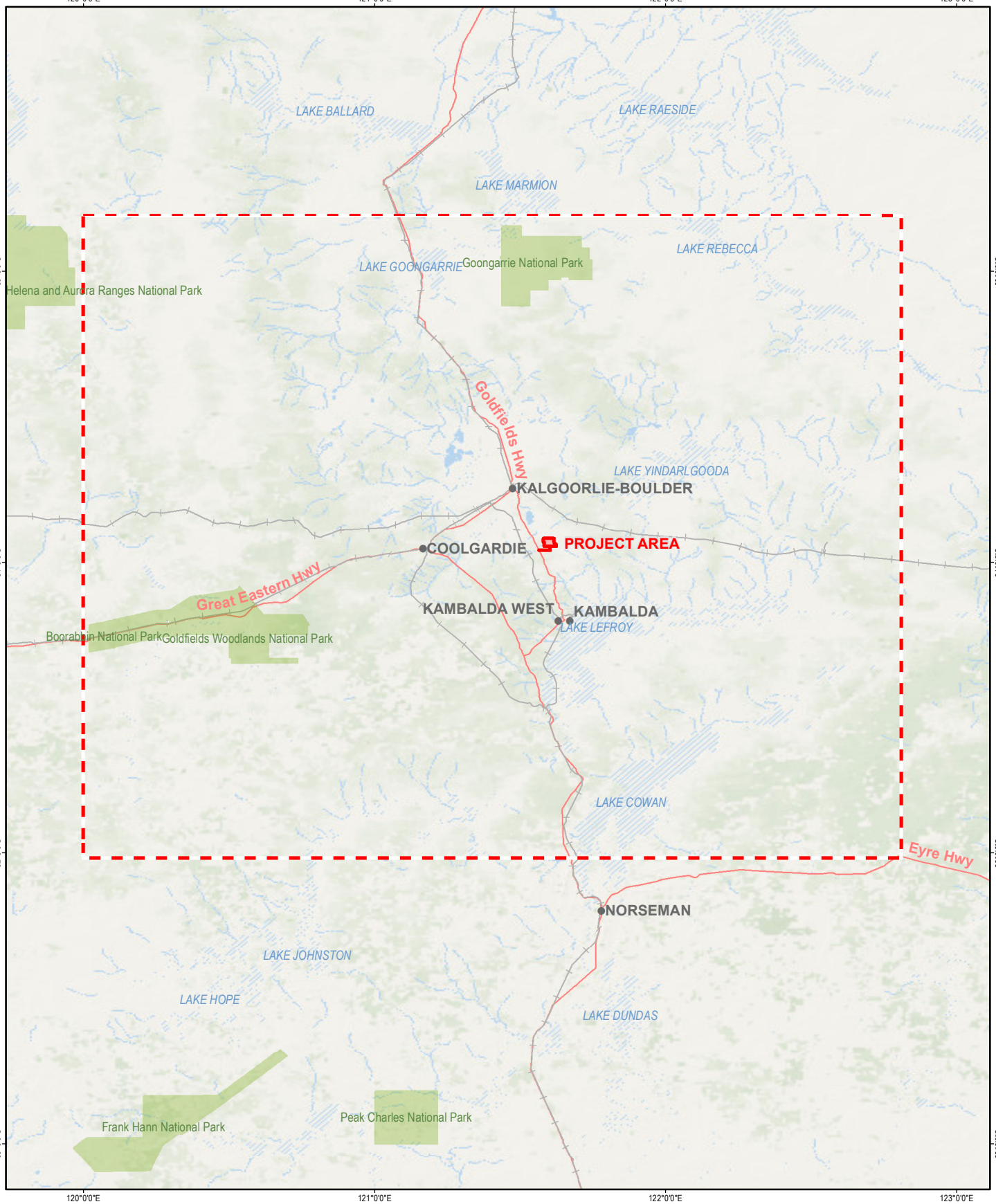
Subterranean fauna is comprised of stygofauna (aquatic subterranean dependent species) and troglofauna (air breathing subterranean dependent species), which are known to form a subterranean faunal biodiversity hotspot on a worldwide scale in the Pilbara and Yilgarn cratons of Western Australia (Guzik et al. 2010). Over 4,000 species of subterranean fauna are likely to occur in Western Australia (Guzik et al. 2010), and it is estimated that over 80% of these taxa remain unknown to science. Subterranean fauna is also known to play an important role in ecosystem function (Humphreys 2006). Many species of subterranean fauna have highly restricted ranges, and can be considered short range endemics (*sensu* Harvey 2002), sometimes as a result of highly restricted ranges due to habitat connectivity issues and evolutionary history. Stygofauna and troglofauna are known to occur widely in much of Western Australia with many locally endemic species present.

The high degrees of local endemism and lack of habitat connectivity make subterranean fauna susceptible to impacts from localised projects (Ponder & Colgan 2002), with species' extinction a real possibility if they are not adequately considered during project planning phases.

1.1 Purpose of this report

Astral has requested Invertebrate Solutions to undertake the following scope of works for the Project:

- Undertake a desktop review for stygofauna and troglofauna presence.
- Undertake a risk assessment for impacts to stygofauna and troglofauna from the proposed development.
- Provide recommendations to minimise potential impacts and any suggested requirements for further work to comply with relevant legislation.
- Provide a written report containing the above items.



Legend

- Project Area
- Desktop Study Area
- Major Road
- Railway

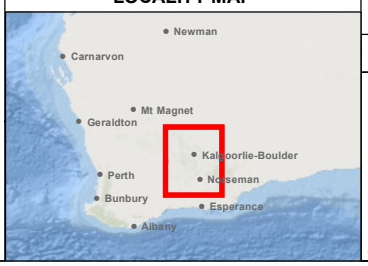
0 12.5 25 50 km

Scale: 1:2,000,000 @ A4

N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP



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HORIZONTAL DATUM & PROJECTION	DATE
GDA2020	5/11/2025

PROJECT
Feysville Gold Project

CREATED	CHECKED	APPROVED	REVISION
ENVIRONMAPS	TM	TM	0

Feysville Gold Project

Figure 1

Feysville Gold Project Area and Desktop Study Area

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1.2 Desktop Study Area, Project Areas and Background Environmental Information

The Project area is located approximately 20 km south-east of Kalgoorlie, in the Goldfields region of Western Australia and shown in Figure 1.

The Desktop Study area is rectangular and consists of sides approximately 250 km in length (~65,000 Km^2), bounded by the north west corner (29.808064°S, 119.999493°E) and the south east corner (32.017306°S, 122.807975°E). The study area is centred on the project and was used for the purposes of database searches and relevant literature (Figure 1).

The Interim Biogeographic Regionalisation of Australia (IBRA) classifies Australia's landscapes into 89 large geographically distinct bioregions based on common climate, geology, landform, native vegetation, and species information (DCCEEW 2025). The Project is located within the Coolgardie (IBRA) bioregion, which has an arid to semi-arid warm Mediterranean climate. The bioregion is characterised by Mallees and low scrub on sandplains with lateritised uplands, playas and granite outcrops. Eucalyptus woodlands contain diverse and endemic species on low greenstone hills, valley alluvials and broad plains of calcareous earth. In the west, the scrub is rich in endemic Proteaceae, while in the east they are rich in endemic Acacia species. Drainage is internal to playas and salt lakes (Environment Australia 2000).

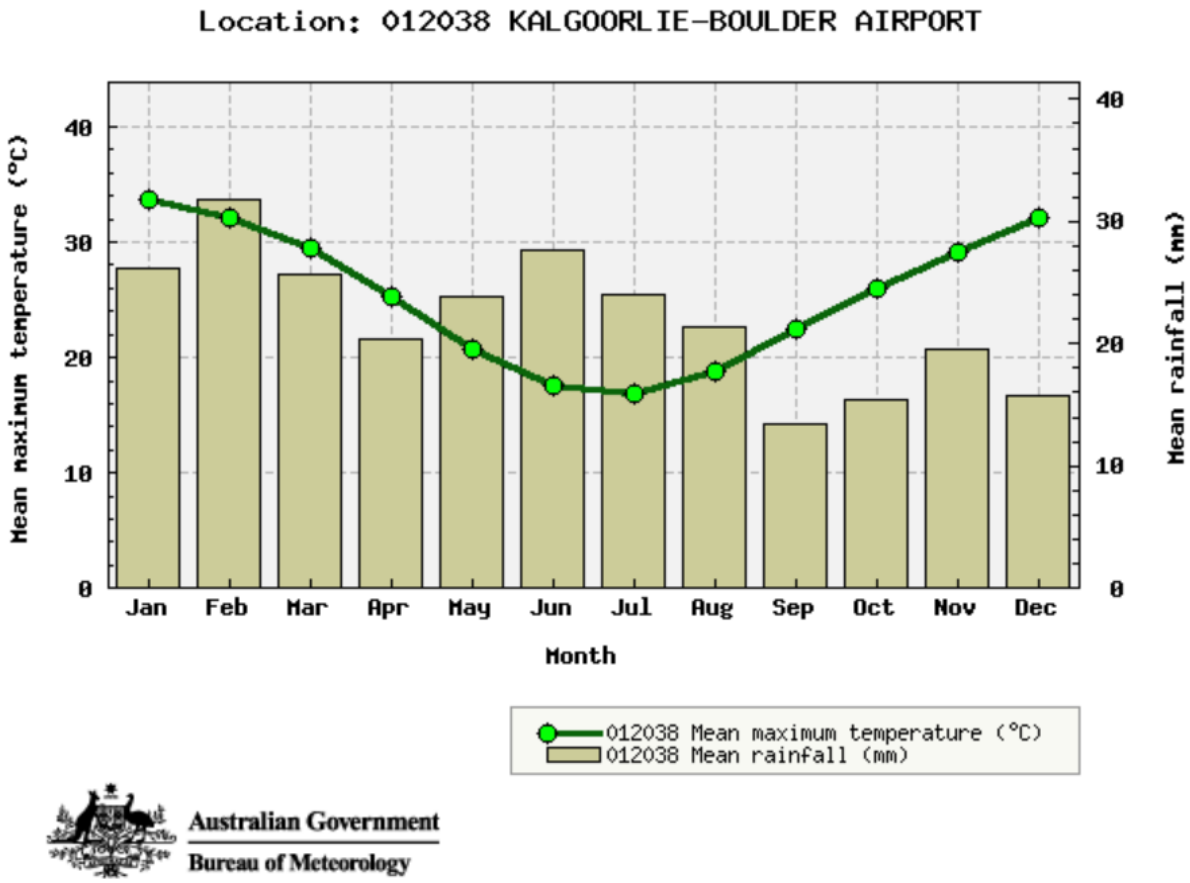


Plate 1 Kalgoorlie-Boulder long term climate data (After BOM.gov.au).

The land tenure for the Project area consists of pastoral Crown and Unallocated Crown Land and the localised climate is classified as warm and temperate with an average annual rainfall of 269 mm recorded at the Bureau of Meteorology (BoM) Station 12038 in Kalgoorlie (BoM, 2025), which is located to the north of the Desktop Study area. Annual rainfall is highly variable, but with the majority of rainfall occurring during the late summer through to winter months linked to both cyclonic events (January to March) and southern fronts (April – August) (Plate 1).

1.3 Conservation Legislation and Guidance Statements

Subterranean fauna are protected under state legislation via the *Biodiversity Conservation Act 2016* (BC Act) which came into force on 1st January 2019, replacing the *Wildlife Conservation Act 1950* (WC Act). The BC Act is aligned with the federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The assessment of subterranean fauna for environmental impact assessment (EIA) is undertaken in Western Australia with regard to the Technical Guidance – Subterranean Fauna Surveys for Environmental Impact Assessment (EPA2021).

At the State level, the BC Act provides a list of species that have special protection as listed under Part 2 of the BC Act, 2016. This notice is updated periodically by the Department of Biodiversity, Conservation and Attractions (DBCA) and the current list (October 2024) includes numerous subterranean species mainly from the Cape Range 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, although it offers no formal legislative protection, these species are generally considered in the EIA process.

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. Several subterranean ecological communities are recognised as Threatened including the Bundera Cenote Anchialine community on Cape Range, Cameron's Cave near the townsite of Exmouth on Cape Range, stygal root mat communities in both the Yanchep and Margaret River regions and stygobionts in the Ethel Gorge aquifer in the Pilbara.

The federal *EPBC Act* protects both species and ecological communities. The most relevant listings for subterranean fauna include the Bundera Cenote on the western side of the Cape Range which contains a unique anchialine ecosystem including the stygal Cape Range Remipede *Kumonga exleyi* (Yager and Humphreys 1996) that is listed as Vulnerable. The Cape Range gudgeon *Milyeringa veritas* and the Cape Range blind eel *Ophisternon candidum* (Humphreys 2008) are also listed as Vulnerable species from subterranean habitats on the Cape Range. No EPBC listed subterranean species occur in the Goldfields region.

1.4 Classifications of subterranean dependence

Subterranean fauna is a collective term that refers to both troglofauna (terrestrial subterranean fauna inhabiting air voids) and stygofauna (aquatic subterranean fauna) (Humphreys 2000). Extensive jargon has historically been associated with subterranean fauna and multiple forms of classification have been used through time (Sket 2008). The most commonly accepted classifications

divide troglofauna into categories that describe a particular species' degree of dependence upon the subterranean environment. Due to the reliance upon ecological information to determine if a species is a troglobite, the concept of troglomorphy (Christiansen 1962), specific morphological adaptations to the subterranean environment, is used to define obligate subterranean species. The term troglomorphy, initially confined to morphology, has since been used to describe both morphological or behavioural adaptations (Howarth 1973). This combination provides a practical system, easily applied in the field and requires minimal detailed ecological studies (Sket 2008). The level of subterranean dependency for different ecological groupings is described below:

- Troglobiont: animals that are obligate subterranean species, and mostly show morphological adaptation to subterranean habitats (troglomorphisms) including depigmentation, loss or reduction of eyes, elongation of appendages, flightlessness or wing reduction, and extra sensory hairs.
- Troglophiles: animals that can complete their entire lifecycle within a cave but possess no specific adaptations to the cave environment. These species are capable of living outside caves in suitably dark and moist epigean habitats.
- Trogloxenes: animals that use the subterranean environment but require surface environments to complete part of their lifecycle (generally either feeding or breeding). Common trogloxenes are cave dwelling bats, cave swiftlets and cave crickets that leave subterranean habitats to feed.

The terms above refer to stygofauna when the prefix is altered to stygo (Humphreys 2000).

Species which inhabit the deep soil habitat (Edaphophiles) often exhibit convergent morphological adaptations to those animals found exclusively within caves, such as loss/reduction of eyes, body flattening, loss of pigmentation etc. Soil dwelling species typically lack restrictions in distribution, as these organisms have experienced relatively minimal isolation in evolutionary timeframes, thus, only true troglobitic animals are studied in subterranean fauna surveys. Taxa discussed in this study were assessed upon their combination of loss/reduction of eyes, and reduction in pigmentation, wing development, and elongation of appendages to assess if a taxon was an edaphophile or truly reliant upon the subterranean habitat (Troglobiont).

1.5 Report Limitations and Exclusions

This study was limited to the written scope provided to the client by Invertebrate Solutions (21st November 2024) 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.

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 Astral Resources 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.

Site conditions may change after the date of this report. Invertebrate Solutions does not accept responsibility arising from, or in connection with, any change to the site conditions. Invertebrate Solutions is also not responsible for updating this report if the site conditions change.

1.6 Assumptions and Limitations

Invertebrate Solutions has made the following assumptions in the writing of this report and its subsequent conclusions:

- Dewatering for the mining proposal and operations will not significantly impact the regional watertable due to low porosity constricting the lateral extent of the drawdown cone.
- Water for construction and process will be sourced from existing local pit lakes and onsite dewatering during mining.

2 Desktop Methods

The subterranean fauna desktop review comprises:

- An assessment of the likelihood that subterranean species are present in the habitats located within the study area.

The likelihood of stygofauna and troglofauna species occurring in the study area was assessed using a combination of regional information, geological, hydrogeological and database searches including:

- Analysis of published and unpublished reports concerning subterranean fauna from the region.
- Available geological maps.
- Geological, geotechnical and hydrogeological information available for the Study area.
- Results of a Protected Matters Search from the Federal Government's Department of Climate Change, Energy, and the Environment (DCCEEW) website.
- Records of fauna held by the Western Australian Museum.

Based on the analysis of all available information the study area was assigned a level of likelihood to support subterranean fauna of either 'Low', 'Moderate', 'High', or 'Definite'.

3 Desktop Subterranean Fauna Review

3.1 Subterranean fauna in the Goldfields

A wide variety of differing geologies within the Goldfields provide numerous opportunities for subterranean fauna to be present. The most likely habitat for both stygofauna and troglofauna are the sometimes extensive and numerous calcrete outcrops, many of which are listed as Priority Ecological Communities (PECs) for their endemic stygofauna assemblages (Cooper et al. 2002; Cooper et al. 2007; Watts and Humphreys 2003; Watts and Humphreys 2004; Guzik et al. 2011). The upper unsaturated portions of Yilgarn calcretes contain troglofauna including pseudoscorpions, spiders, palpigrades and isopods (Barranco & Harvey 2008, Baehr et al. 2012, Cooper et al. 2008, Edward & Harvey 2008 and Platnick 2008). The diversity of troglofauna in calcrete can be exceptionally high with 45 species of troglofauna recorded from the Yeelirrie calcrete (Bennelongia 2015) and 20 species at Lake Maitland (Outback Ecology 2011).

The presence of subterranean fauna in other lithologies is mixed with palaeochannel aquifers often being host to stygofaunal assemblages, but not as diverse as surficial calcrete aquifers (GHD 2012). This is due to lower hydraulic conductivity in palaeochannel aquifers compared with highly transmissive calcrete aquifers. Smaller and less well connected pore spaces limit the infiltration and dispersion of oxygen and carbon into subterranean habitats (Hose et al. 2015).

The lithologies associated with gold deposits tend to have smaller voids with less connectivity that makes them less preferable to host subterranean fauna unless the rocks are highly fractured. Intense weathering profiles of many gold bearing lithologies also reduce the likelihood of subterranean fauna with available pore spaces clogged with clay weathering products from the saprolitic zone. Troglofauna surveys at the Tropicana project recorded only four troglofauna species (Ecologia 2009a), compared with more vuggy Banded Iron Formation (BIF) habitats such as those surveyed at Weld Range, Koolyanobbing and Mt Jackson that have yielded moderately rich troglofauna communities (Ecologia 2009b, Bennelongia 2008a; Bennelongia 2008b).

Analysis has shown that there is little correlation between water quality and geology for predicting the presence of stygofauna, however, the non-random siting of groundwater wells in highly transmissive locations within various geologies has undoubtedly created a bias in the data (Halse et al. 2014). When stygofauna are present it does, however, show high levels of endemism with 98% of the stygobites and 83% of the other groundwater species recorded in the Pilbara being endemic (Halse et al. 2014). Stygofauna communities within the Goldfields show similar patterns of endemism associated with calcrete aquifers. The majority of calcrete aquifers sampled in a systematic manner have revealed the presence of high degrees of stygofaunal and to a lesser degree troglofauna endemism, with many calcretes listed as PECs by DBCA under the BC Act (2016).

3.2 Conservation Significant Fauna and Habitats

A list of conservation significant subterranean invertebrate fauna for the Desktop Study Area was compiled from the DBCA Wildlife Conservation (Specially Protected Fauna) Notice 2024 (DBCA 2024) and the DCCEEW's Protected Matters Search Tool (PMST, August 2025, 50 km search). No subterranean species that are listed under the BC Act and/or the EPBC Act are likely to occur, or have known habitat within the Desktop Study Area. The PMST results listed no known subterranean fauna within the Desktop Study Area. A full description of the DBCA and EPBC conservation codes are shown in Appendix 1 and 2 respectively. The full list of species obtained from the PMST search is shown in Appendix 2.

3.3 Subterranean Fauna Habitat in the Kalgoorlie Area

Feysville is in the northern part of the Kalgoorlie greenstone belt, specifically within the Kambalda Domain. The Feysville Project sits among a group of elevated ultramafic rocks, which are found within the Black Flag volcanic sedimentary sequence, along with younger granitic intrusions and both mafic and ultramafic volcanic formations. Aquifers in this segment of the Kalgoorlie greenstone belt commonly host localised saline to hypersaline groundwater resources (Kern, 1995). According to Kern (1995), hydraulic connectivity within the fractured rock aquifer zone is generally limited, with groundwater recharge likely restricted to localised sources.

Groundwater in fractured rock environments of the Goldfields typically exhibits salinity levels ranging from saline to hypersaline, with significant local variability. In elevated regions, groundwater generally exhibits salinity between 3,000 and 30,000 mg/L Total Dissolved Solids (TDS), which may increase to as much as 350,000 mg/L in palaeochannels, playa lake sediments, and fractured rock aquifers hydraulically connected to these systems (GRM 2025).

The fractured bedrock is characterised by secondary permeability resulting from tectonic fracturing and further enhanced by chemical dissolution. Fractured-bedrock aquifers occur more commonly in mafic, ultramafic, and granitic rocks than in sedimentary or felsic volcanic and volcaniclastic rocks with open fractures occurring up to a depth of 125 m along major faults and shear zones (Kern 1995)

The Roe palaeodrainage and Yindarlgooda South Palaeovalley aquifer, located to the north and east of the Project area, offer limited stygofauna habitat due to their composition of fine-grained sand layers confined by clay and silt layers (Kern 1995, Table 1). While this sandy unit allows for substantial water storage, it lacks the interconnected void spaces necessary for stygofauna populations. Although the palaeochannel and its related aquifer are relatively proximate to Feysville, the localised geology of the Project area suggests that any dewatering activity is unlikely to result in significant lateral extension (GRM 2025).

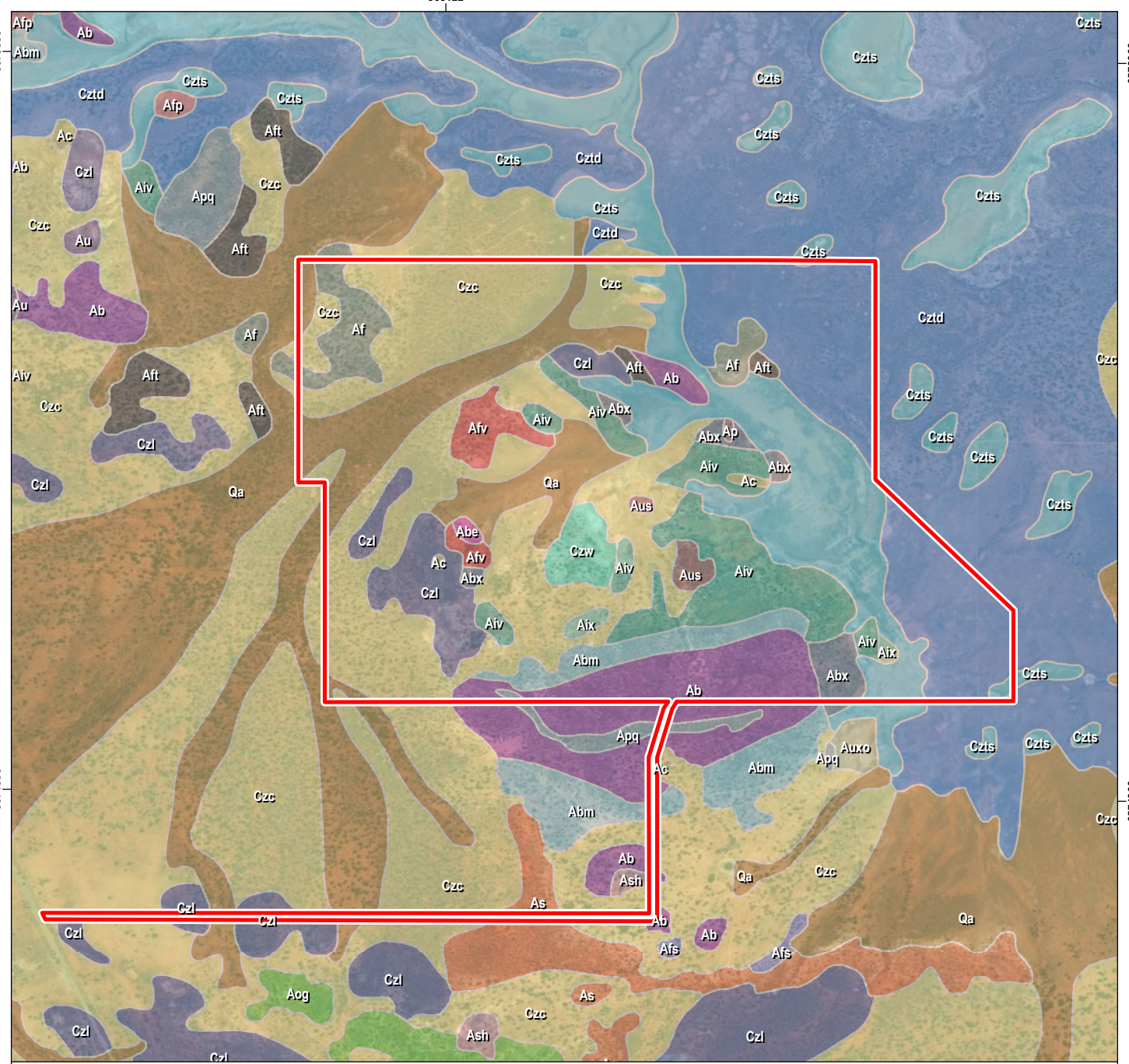
The ultramafics and other volcanics are generally considered to be poor habitat for troglofauna or stygofauna unless they are highly fractured locally (Table 1) which is indicated from the hydrogeological drilling results within the Project that has shown fracturing to be absent in the most part or minor, and provides little opportunity for subterranean fauna.

Table 1 Geological units in the Project area and Subterranean fauna habitat potential.

Unit	Description / Remarks	Subterranean Fauna Suitability
Colluvium and alluvium	Quartz sand and soil	Low for stygofauna and troglofauna.
Roe Palaeochannel	Sand confined by clay and silts	Low to Moderate for stygofauna (hypersaline) Nil for troglofauna (saturated)
Ultramafics	Ultramafic sequences	Low for stygofauna and troglofauna unless highly fractured.
Granitoids	Intrusive granodiorite	Low for stygofauna (Moderate if highly fractured) Low for troglofauna
Archean basement greenstones	Partially remelted Archean ultra mafics, komatiites	Low for stygofauna and troglofauna unless highly fractured.

The local granitoids are also considered to have poor subterranean fauna suitability due to being massive in nature with minor foliation and a general absence of interconnected voids except at a localised permeable horizon immediately above the fresh bedrock (Kern 1995, Table 1, Figure 2). Pegmatite dykes and quartz veins are highly fractured and can locally form important aquifers (Kern 1995), however, in general the granitic rock is considered to be poor aquifer hosts in the Coolgardie and Kalgoorlie region and hence are considered to have a low likelihood of forming suitable stygofauna habitat (Table 1).

Plate 2 Core from the Feysville Project showing an absence of stygofauna habitat FYGT004



Geology

- Ab: Basalt, undivided
- Abe: Epidotized basalt
- Abm: High-Mg basalt (komatiitic basalt)
- Abp: Porphyritic basalt
- Abx: Basaltic breccia
- Ac: Chert, banded chert, silicified black shale and slate, and exhalite
- Af: Felsic volcanic and intrusive rocks, undivided
- Afp: Porphyritic or porphyroclastic felsic rock of uncertain origin
- Afs: Schist derived from felsic volcanic, sub-volcanic, and volcaniclastic rock; acid to intermediate composition
- Aft: Felsic pyroclastic rock; minor volcanogenic sedimentary rock
- Afv: Felsic volcaniclastic and volcanic rock; subordinate tuff and lapilli tuff
- Aiv: Intermediate volcanic rock; (c) carbonated
- Aix: Intermediate fragmenatal rock
- Am: Mafic rock, protolith unknown due to metamorphism and weathering; (c) carbonated
- Aog: Gabbro, undivided; includes gabbro; gabbronorite; and quartz gabbro
- Ap: Felsic porphyry
- Apq: Felsic porphyry with quartz and feldspar phenocrysts
- As: Sedimentary and felsic volcaniclastic rocks, undivided; commonly highly weathered
- Ash: Slate and shale; minor siltstone and sandstone; commonly silicified
- Au: Ultramafic rock, undivided; mainly schistose; commonly weathered, may be silicified
- Auk: Komatiite; commonly spinifex-textured; may be silicified and/or weathered
- Aus: Serpentinite
- Auxo: Orthopyroxenite
- Czc: Colluvium - gravel, sand, and soil; includes laterite fragments
- Czl/Aog: Laterite (ferricrete) and reworked products; includes carbonate nodules
- Czl: Laterite (ferricrete) and reworked products; includes carbonate nodules
- Cztd: Sand, silt, clay, and gypsum in stabilized dunes adjacent to playas
- Czts: Evaporite interbedded with clay, silt, and sand in playas
- Czw: Weathered rock, protolith unrecognizable
- Qa: Alluvium-clay, silt, sand, and gravel; in stream channels, floodplains, and small fans on lake margins

Legend

Project Area

0 0.25 0.5 1 km

Scale: 1:40,000 @ A4

N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP

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HORIZONTAL DATUM & PROJECTION	DATE
GDA2020	5/11/2025

PROJECT
Feysville Gold Project

CREATED	CHECKED	APPROVED	REVISION
ENVIRONMAPS	TM	TM	0

Feysville Gold Project

Figure 2
Feysville Gold Project Area and Geology

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3.4 Likelihood of stygofauna presence

A search was undertaken of the Western Australian Museum databases for Crustaceans (WAM 2025a) and Arachnids/Myriapods (WAM 2025b). The results of these searches were filtered for subterranean stygofauna species. No stygofauna records are present within the WAM database records.

It should be noted that only WAM records from the Arachnida/Myriapoda, and Crustacean databases are available to determine subterranean species and does not include records of Insects (i.e. Stygobiontic diving beetles) as the WAM Insect database is unavailable for database searches.

Water quality in the Feysville Project area is predominantly hypersaline (Kern 1995) and hypersaline groundwater salinity significantly decreases the probability of stygofauna being present in local aquifers. While stygofauna have been recorded in hypersaline groundwater up to 35,000 mg/L TDS, these occurrences are mainly associated with calcrete aquifers at the periphery of salt lakes, and most hypersaline waters have not contained stygofauna (Kern 1995, Invertebrate Solutions 2020). The groundwater in the region varies from slightly acidic to slightly alkaline, is classified as sodium chloride type, and ranges from hard to very hard with elevated sulphate concentrations, consistent with typical conditions in the Goldfields region (GRM 2025).

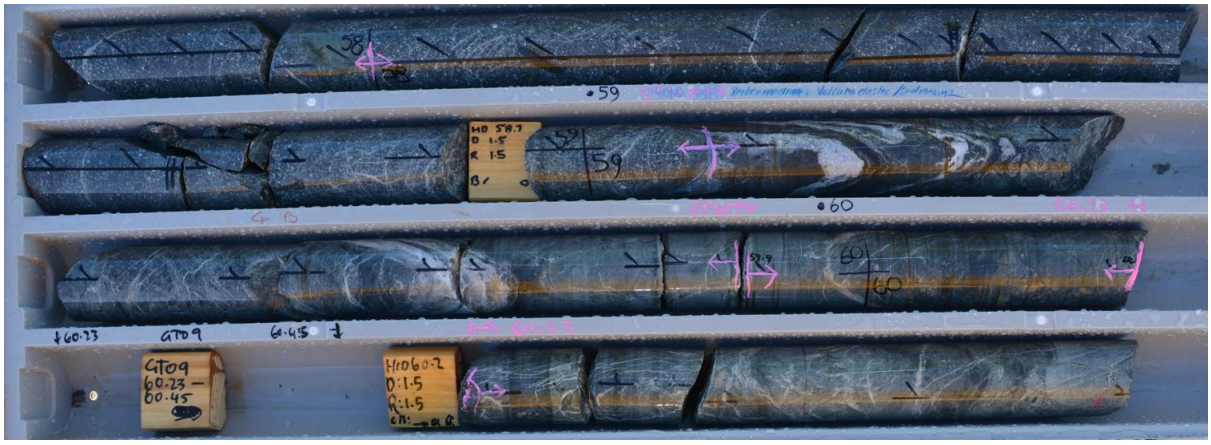

Plate 3 Absence of any interconnected void space in saturated zone to provide stygofauna habitat FYGT014

Tertiary sandstone units along the base of regional scale palaeochannels, and overlying calcrete units, where they occur can by highly permeable and where saturated, contain significant volumes of groundwater. They are typically the largest groundwater source in the region (GRM 2025)

Stygofauna have rarely been recorded in the Coolgardie and Kalgoorlie area, which may indicate a general absence or low abundance of stygofauna habitats. However, the extent of previous sampling efforts is unclear, and limited data could be due to insufficient sampling. Based on the lack of suitable habitat within the Project area (Plate 2, Plate 3) and sub-optimal water quality, the likelihood of stygofauna occurring in this area is low.

3.5 Likelihood of troglofauna presence

A search was undertaken of the Western Australian Museum databases for Crustaceans (WAM 2025a) and Arachnids/Myriapods (WAM 2025b). The results of these filtered for subterranean troglofauna species. No troglofauna has been recorded from within the Desktop Study Area in databased WAM records.

Drilling logs for the upper unsaturated zone confirm that there is no suitable fracturing to provide interconnected void space. The presence of fine sand and clay further fills any potential habitats for troglofauna (Plate 4 and Plate 5). Additionally, the alluvium and colluvium deposits surrounding and within most of the Project area exhibit low suitability as troglofauna habitat due to the fine silty composition of the alluvium, which also fills minor voids or fractures (Plate 5 and Plate 6).

Plate 4 Unsaturated fine clays in FYGT014

Plate 5 Unsaturated fine clay present in the upper portion of FYGT009

Plate 6 Unsaturated fine clay present in the upper portion of FYGT004

The absence of troglofauna records from the Coolgardie and Kalgoorlie area would suggest that troglofauna is generally absent or present in very low abundance, although it is unknown what sampling intensity has previously been undertaken and it may be due to a paucity of sampling.

4 Conclusions and Recommendations

Feysville is in the northern part of the Kalgoorlie greenstone belt, specifically within the Kambalda Domain. The Feysville Project sits among a group of elevated ultramafic rocks, which are found within the Black Flag volcanic sedimentary sequence and is largely covered in shallow colluvium and alluvium. The colluvium and alluvium lithologies surrounding and within much of the Project area have a low suitability for both troglofauna and stygofauna habitat due to the absence of interconnected voids in these fine grained units (Plate 4, Plate 5). Ultramafic and other volcanic formations are typically regarded as unsuitable habitats for troglofauna or stygofauna unless significant local fracturing is present. Similarly, intrusive granitoids are considered suboptimal for subterranean fauna due to the general lack of interconnected voids (see Plate 2 and Plate 3), except where localized fracturing occurs. Hydrogeological and resource drilling have largely demonstrated either an absence or only minor instances of fracturing, thereby offering limited potential for supporting subterranean fauna. Furthermore, water quality within the Feysville project area is predominantly hypersaline, which substantially lowers the probability of stygofauna occurrence in local aquifers.

The absence of stygofauna and troglofauna records from the Kalgoorlie area would suggest that subterranean habitat, are generally absent or present in very low abundance, although it is unknown what sampling intensity has previously been undertaken, and it may be due to a paucity of sampling. It is reasonable to conclude that subterranean fauna has a low likelihood of occurrence within the Project area, when considering the absence of potential voids and cracks, and the hypersaline nature of the groundwater.

No further survey work for stygofauna or troglofauna is considered necessary for the proposed mine pit development area, as the thorough review of the pit lithology/ geology data meets the requirements of the Technical Guidance – Subterranean Fauna Surveys for Environmental Impact Assessment (EPA 2021).

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Appendix 1

DBCA Conservation Categories

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

Biodiversity and Conservation Science

CONSERVATION CATEGORY DEFINITIONS

for Western Australian Ecological Communities

GENERAL DEFINITIONS

An **ecological community** is a naturally occurring assemblage of organisms that occurs in a particular habitat, as defined in the *Biodiversity Conservation Act 2016* (BC Act). Ecological communities may comprise various life forms including plants, animals and microorganisms.

Note: The scale at which ecological communities are defined will often depend on the level of detail in the information source, therefore no particular scale is specified.

A **threatened ecological community** (TEC) means an ecological community that is listed under section 27(1) of the BC Act as a critically endangered, endangered or vulnerable ecological community, or is a rediscovered ecological community to be regarded as a threatened ecological community under section 33 of the BC Act.

An **assemblage** is a defined group of biological entities.

Habitat, as defined in the BC Act, means the biophysical medium or media —

a) occupied (continuously, periodically or occasionally) by an organism or group of organisms, or
b) once occupied (continuously, periodically or occasionally) by an organism, or group of organisms, and into which organisms of that kind have the potential to be reintroduced.

An **occurrence** is a discrete example of an ecological community, separated from other examples of the same community by more than 20 metres with, for example: a different ecological community, a sealed road, a building, a water body (for terrestrial communities), or a terrestrial body (for aquatic communities). There is no minimum size of an occurrence of a threatened or priority ecological community. By ensuring that every discrete occurrence is recognised and recorded, future changes in status can be readily monitored.

Adequately surveyed is defined as an ecological community that has been searched for thoroughly in most likely habitats, by relevant experts.

Community structure is defined as the spatial organisation, construction and arrangement of the biological elements comprising a biological assemblage. For example, the vegetation structure (e.g., *Eucalyptus salmonophloia* woodland over scattered small shrubs over dense herbs) or the trophic structure in a faunal assemblage (e.g., dominance by feeders on detritus as distinct from feeders on live plants).

To **modify** an occurrence of an ecological community, as defined in section 44 of the BC Act, means to take action that results in —

(a) the modification of the occurrence of the threatened ecological community to such an extent that the occurrence is unlikely to recover —
  (i) its species composition or structure; or
  (ii) its species composition and structure; or
(b) the destruction of the occurrence of the threatened ecological community.

Destruction of an occurrence of an ecological community means modification such that reestablishment of ecological processes, species composition or community structure within the range of variability exhibited by the original community is unlikely within the foreseeable future even with positive human intervention.

Modification and destruction are difficult concepts to quantify, and their application will be determined by scientific judgement. Refer to the document Guidance note – Modification of an occurrence of a threatened ecological community for more information on what constitutes modification and how to determine whether an action is likely to modify an occurrence of a threatened ecological community.

Threatening process means a process that threatens, or may threaten, the survival, abundance or evolutionary development of a native species or ecological community, as defined under the BC Act. Examples of some of the continuing threatening processes in Western Australia include: vegetation clearance; competition and land degradation by introduced fauna; dieback caused by the root-rot fungus (*Phytophthora cinnamomi*); competition and displacement of native plants by introduced flora; hydrological changes (declining groundwater levels); drying climate, fire regimes that cause declines in biodiversity; direct human exploitation and disturbance of ecological communities.

Restoration is defined as returning an ecological community to its pre-disturbance or natural state in terms of abiotic conditions, community structure and species composition.

Rehabilitation is defined as the re-establishment of ecological attributes in a damaged ecological community although the community will remain modified.

LISTED ECOLOGICAL COMMUNITIES

Assessment of the conservation status of ecological communities is carried out in accordance with the BC Act listing criteria and the requirements of Ministerial Guideline Number 1 and Ministerial Guideline Number 4 that adopt the use of the International Union for Conservation of Nature (IUCN) Red List of Ecosystems Categories and Criteria.

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, 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 —

(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. 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.

Examples of use:

- ‘Assemblages of the organic springs and mound springs of the Mandora Marsh area’ is listed as a critically endangered threatened ecological community under the *Biodiversity Conservation Act 2016.*
- ‘Assemblages of the organic springs and mound springs of the Mandora Marsh area’ is listed as critically endangered under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table – column heading: BC Act; row text: CR.

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. 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.

Examples of use:

- ‘Herb rich shrublands in clay pans (floristic community type 8 as originally described in Gibson *et al*. (1994))’ is listed as an endangered threatened ecological community under the *Biodiversity Conservation Act 2016.*
- ‘Herb rich shrublands in clay pans (floristic community type 8 as originally described in Gibson et al. (1994))’ is listed as endangered under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table – column heading: BC Act; row text: EN.

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. 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.

Examples of use:

- '*Calothamnus graniticus* subsp. *graniticus* heaths on south west coastal granites' is listed as a vulnerable threatened ecological community under the *Biodiversity Conservation Act 2016.*
- '*Calothamnus graniticus* subsp. *graniticus* heaths on south west coastal granites' is listed as vulnerable under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table – column heading: BC Act; row text: VU.

PRIORITY ECOLOGICAL COMMUNITIES

Priority is not a listing category under the BC Act. The Priority Ecological Communities list is maintained by the department and is published on the department's website.

All fauna and flora that may be present in an ecological community are protected in WA following the provisions in Part 10 of the BC Act. The protection applies even when these species occur in an ecological community that is not listed as threatened, and regardless of land tenure (State managed land (Crown land), private land, or Commonwealth land).

Possible threatened ecological communities that do not meet survey criteria or are not adequately defined to enable listing are added to the department's Priority Ecological Communities for Western Australia list under priority 1, 2 or 3. Ecological communities that are adequately known and not threatened but rare, near threatened, or have recently been removed from the threatened list are placed in priority 4. Conservation dependent ecological communities are placed in priority 5.

P1 Priority 1: Poorly known ecological communities – very few occurrences, very restricted distribution

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.

Examples of use:

- 'Banded Ironstone Hills with *Dryandra arborea*' is listed as a Priority 1 ecological community by the Department of Biodiversity, Conservation and Attractions.
- 'Banded Ironstone Hills with *Dryandra arborea*' is listed as Priority 1 on the DBCA Priority Ecological Communities List.
- Listing reference in a table – column heading: DBCA; row text: P1.

P2 Priority 2: Poorly known ecological communities – few occurrences, restricted distribution

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.

Examples of use:

- 'Aquatic invertebrate communities of peat swamps' is listed as a Priority 2 ecological community by the Department of Biodiversity, Conservation and Attractions.
- 'Aquatic invertebrate communities of peat swamps' is listed as Priority 2 on the DBCA Priority Ecological Communities List.
- Listing reference in a table – column heading: DBCA; row text: P2.

P3 Priority 3: Poorly known ecological communities – inadequately surveyed or not well defined

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.

Examples of use:

- ‘Assemblages of gypsum dunes of the central and southern wheatbelt’ is listed as a Priority 3(iii) ecological community by the Department of Biodiversity, Conservation and Attractions.
- ‘Assemblages of gypsum dunes of the central and southern wheatbelt’ is listed as Priority 3(iii) on the DBCA Priority Ecological Communities List.
- Listing reference in a table – column heading: DBCA; row text: P3(iii).

P4 Priority 4: Adequately known ecological communities – 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.

Examples of use:

- ‘Nimalaica (Nimalarragun) claypan and associated wetland assemblages’ is listed as a Priority 4(ii) ecological community by the Department of Biodiversity, Conservation and Attractions.
- ‘Nimalaica (Nimalarragun) claypan and associated wetland assemblages’ is listed as Priority 4(ii) on the DBCA Priority Ecological Communities List.
- Listing reference in a table: column heading: DBCA, row text: P4(ii).

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 2

Protected Matters Search Results

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: 03-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:	81
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:	8
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	7
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
Polytelis alexandrae Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Tringa nebularia			
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area	In buffer area only
INSECT			
Ogyris petrina listed as Ogyris subterrestris petrina			
Arid Bronze Azure [94250]	Critically Endangered	Species or species habitat may occur within area	In feature area
MAMMAL			
Dasyurus geoffroii			
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area	In feature area
PLANT			
Gastrolobium graniticum			
Granite Poison [14872]	Endangered	Species or species habitat may occur within area	In buffer area only
Tecticornia flabelliformis			
Bead Glasswort, Bead Samphire [82664]	Vulnerable	Species or species habitat known to 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 may 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
Defence		
Defence - AIRTC KALGOORLIE [50111]	WA	In buffer area only
Defence - AIRTC KALGOORLIE [50110]	WA	In buffer area only
Defence - KALGOORLIE RIFLE RANGE [50156]	WA	In buffer area only
Defence - KALGOORLIE TRAINING DEPOT [50198]	WA	In buffer area only
Defence - KALGOORLIE TRAINING DEPOT [50199]	WA	In buffer area only
Unknown		
Commonwealth Land - [51061]	WA	In buffer area only
Commonwealth Land - [51060]	WA	In buffer area only
Commonwealth Land - [51959]	WA	In buffer area only
Commonwealth Land - [51958]	WA	In buffer area only
Commonwealth Land - [51063]	WA	In buffer area only
Commonwealth Land - [51062]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [51762]	WA	In buffer area only
Commonwealth Land - [51795]	WA	In buffer area only
Commonwealth Land - [51794]	WA	In buffer area only
Commonwealth Land - [51783]	WA	In buffer area only
Commonwealth Land - [51791]	WA	In buffer area only
Commonwealth Land - [51790]	WA	In buffer area only
Commonwealth Land - [51793]	WA	In buffer area only
Commonwealth Land - [51792]	WA	In buffer area only
Commonwealth Land - [51949]	WA	In buffer area only
Commonwealth Land - [51780]	WA	In buffer area only
Commonwealth Land - [51953]	WA	In buffer area only
Commonwealth Land - [51776]	WA	In buffer area only
Commonwealth Land - [51784]	WA	In buffer area only
Commonwealth Land - [52233]	WA	In buffer area only
Commonwealth Land - [51765]	WA	In buffer area only
Commonwealth Land - [52230]	WA	In buffer area only
Commonwealth Land - [51760]	WA	In buffer area only
Commonwealth Land - [51761]	WA	In buffer area only
Commonwealth Land - [51950]	WA	In buffer area only
Commonwealth Land - [51962]	WA	In buffer area only
Commonwealth Land - [51763]	WA	In buffer area only
Commonwealth Land - [51764]	WA	In buffer area only
Commonwealth Land - [51768]	WA	In buffer area only
Commonwealth Land - [50335]	WA	In buffer area only
Commonwealth Land - [50329]	WA	In buffer area only
Commonwealth Land - [50336]	WA	In buffer area only
Commonwealth Land - [51954]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [50337]	WA	In buffer area only
Commonwealth Land - [51985]	WA	In buffer area only
Commonwealth Land - [51430]	WA	In buffer area only
Commonwealth Land - [51951]	WA	In buffer area only
Commonwealth Land - [51782]	WA	In buffer area only
Commonwealth Land - [51769]	WA	In buffer area only
Commonwealth Land - [51785]	WA	In buffer area only
Commonwealth Land - [52184]	WA	In buffer area only
Commonwealth Land - [50334]	WA	In buffer area only
Commonwealth Land - [51772]	WA	In buffer area only
Commonwealth Land - [51960]	WA	In buffer area only
Commonwealth Land - [51957]	WA	In buffer area only
Commonwealth Land - [51961]	WA	In buffer area only
Commonwealth Land - [50310]	WA	In buffer area only
Commonwealth Land - [51766]	WA	In buffer area only
Commonwealth Land - [51789]	WA	In buffer area only
Commonwealth Land - [51788]	WA	In buffer area only
Commonwealth Land - [50333]	WA	In buffer area only
Commonwealth Land - [51059]	WA	In buffer area only
Commonwealth Land - [50332]	WA	In buffer area only
Commonwealth Land - [50331]	WA	In buffer area only
Commonwealth Land - [51779]	WA	In buffer area only
Commonwealth Land - [51955]	WA	In buffer area only
Commonwealth Land - [52183]	WA	In buffer area only
Commonwealth Land - [51775]	WA	In buffer area only
Commonwealth Land - [52211]	WA	In buffer area only
Commonwealth Land - [51778]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [51963]	WA	In buffer area only
Commonwealth Land - [51786]	WA	In buffer area only
Commonwealth Land - [51781]	WA	In buffer area only
Commonwealth Land - [51406]	WA	In buffer area only
Commonwealth Land - [51787]	WA	In buffer area only
Commonwealth Land - [51773]	WA	In buffer area only
Commonwealth Land - [51956]	WA	In buffer area only
Commonwealth Land - [51759]	WA	In buffer area only
Commonwealth Land - [51758]	WA	In buffer area only
Commonwealth Land - [51771]	WA	In buffer area only
Commonwealth Land - [51770]	WA	In buffer area only
Commonwealth Land - [52244]	WA	In buffer area only
Commonwealth Land - [51952]	WA	In buffer area only
Commonwealth Land - [51777]	WA	In buffer area only
Commonwealth Land - [51767]	WA	In buffer area only
Commonwealth Land - [51774]	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 may 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 known to occur within area overfly marine area	In feature area
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
Bullock Holes Timber Reserve	5(1)(g) Reserve	WA	In buffer area only
Kalgoorlie Arboretum	5(1)(h) Reserve	WA	In buffer area only

Protected Area Name	Reserve Type	State	Buffer Status
Kambalda	Nature Reserve	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
Lakeside Timber Reserve	5(1)(g) Reserve	WA	In buffer area only
Scahill Timber Reserve	5(1)(g) Reserve	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
Gold Mining Developments on Lake Lefroy	2010/5402	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
Sale of Post Office, Hannan Street	2006/3084	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
-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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