



BEACON
MINERALS LIMITED

Jaurdi Gold Project CPS7794 Amendment Environmental Assessment



Prepared for
Beacon Mining Pty Ltd
November 2025

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GLOSSARY

Acronym	Description
ANCA	Australian Nature Conservation Agency.
BAM Act	<i>Biosecurity and Agriculture Management Act 2007</i> , WA Government.
BC Act	<i>Biodiversity Conservation Act 2016</i> , WA Government.
BoM	Bureau of Meteorology.
DBCA	Department of Biodiversity, Conservation and Attractions, WA Government.
DCCEEW	Department of Climate Change, Energy the Environment and Water, Australian Government.
DMPE	Department of Mines, Petroleum and Exploration, WA Government
DPIRD	Department of Primary Industries and Regional Development, WA Government
DWER	Department of Water and Environmental Regulation, WA Government
EP Act	<i>Environmental Protection Act 1986</i> , WA Government.
EP Regulations	Environmental Protection (Clearing of Native Vegetation) Regulations 2004, WA Government.
EPA	Environmental Protection Authority (now DWER), WA Government.
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> , Australian Government.
ESA	Environmentally Sensitive Area.
Ha	Hectare (10,000 square metres).
IBRA	Interim Biogeographic Regionalisation for Australia.
IUCN	International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union.
Km	Kilometre (1,000 metres).
MVG	Major Vegetation Groups.
NVIS	National Vegetation Information System.
PEC	Priority Ecological Community.
RAOU	Royal Australia Ornithologist Union.
SRE	Short Range Endemic.
SSC	Species Survival Commission, International.
TEC	Threatened Ecological Community.
WA	Western Australia.
WAHERB	Western Australian Herbarium.
WAM	Western Australian Museum, WA Government.

1 INTRODUCTION

The Jaurdi Gold Project (the Project) is located approximately 35 kilometres (km) northeast of Coolgardie, 50 km west of Kalgoorlie, in the Shire of Coolgardie, Western Australia (Figure 1-1). A list of the Project tenements is provided in Table 1-1.

The Project encompasses the Lost Dog, Black Cat and Panther Open Pits/ in-pit Tailings Storage Facilities (TSF), Jaurdi TSF, Processing Plant and associated infrastructure. The eastern borefield and Lost Dog in-pit sumps are utilised for mineral processing and dust suppression purposes. The processing plant has been constructed north of the Lost Dog open pits. The plant is licenced to process up to 750,000 tonnes of ore per annum. Ore is crushed on the ROM pad by a mobile crushing plant. Tailings from the processing plant is deposited in the Black Cat in-pit TSF, Panther in-pit TSF, the Lost Dog in-pit TSF (Panel 1 and Panel 2/4) and the Jaurdi TSF.

To allow for additional water supply for ongoing processing, the existing eastern borefield (located within L16/131) is proposed to be extended further east (within L16/154). The Project currently holds a groundwater abstraction licence (GWL 201802(5)) allows for up to 2,000,000kL abstraction per annum and will not require an increase in abstraction volume from the proposed eastern borefield extension.

The Project requires an amendment to the existing clearing permit, CPS7794/5 to include an additional tenement for the eastern borefield; L16/154 and increase the duration of the clearing permit to 2031 which is the indicative current life of mine. No change to the total area of clearing already permitted (389.9 ha) is required. A map showing the existing clearing permit area and proposed amended clearing permit area is provided in Figure 1-2.

Table 1-1: Jaurdi Gold Project Tenements

Tenement	Holders	Area (ha)	Grant	Expiry
L 16/120	Beacon Mining Pty Ltd	2.00	11/10/2017	10/10/2038
L 16/122	Beacon Mining Pty Ltd	4.40	1/05/2019	30/04/2040
L 16/154	Beacon Mining Pty Ltd	171.23	20/11/2025	19/11/2046
M 16/34	Beacon Mining Pty Ltd	341.25	28/01/1987	27/01/2029
M 16/115	Beacon Mining Pty Ltd	228.80	10/09/1990	9/09/2032
M 16/529	Beacon Mining Pty Ltd	483.55	8/03/2011	7/03/2032
M 16/561	Beacon Mining Pty Ltd	76.82	16/02/2022	15/02/2043

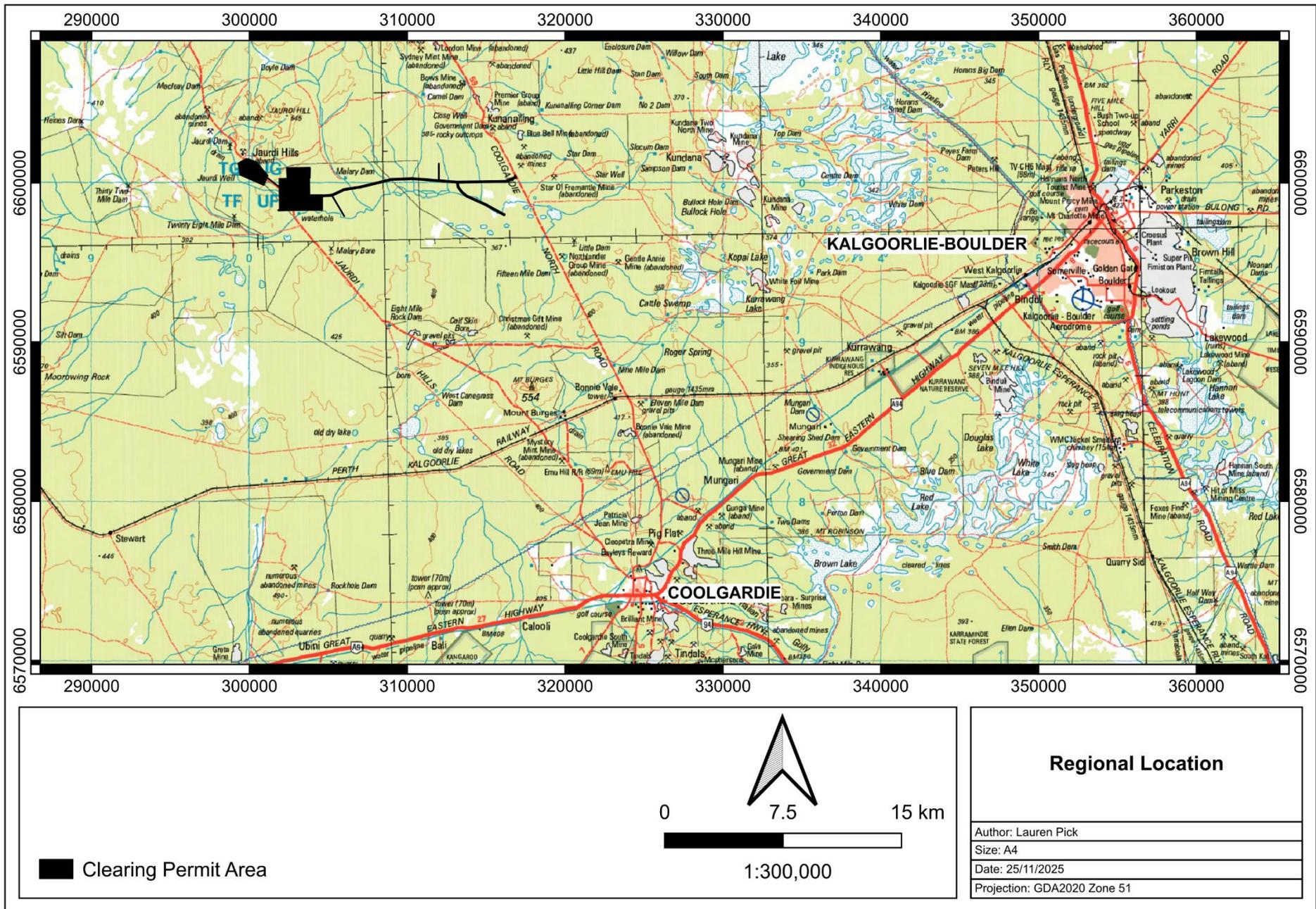


Figure 1-1: Regional location of the clearing permit area

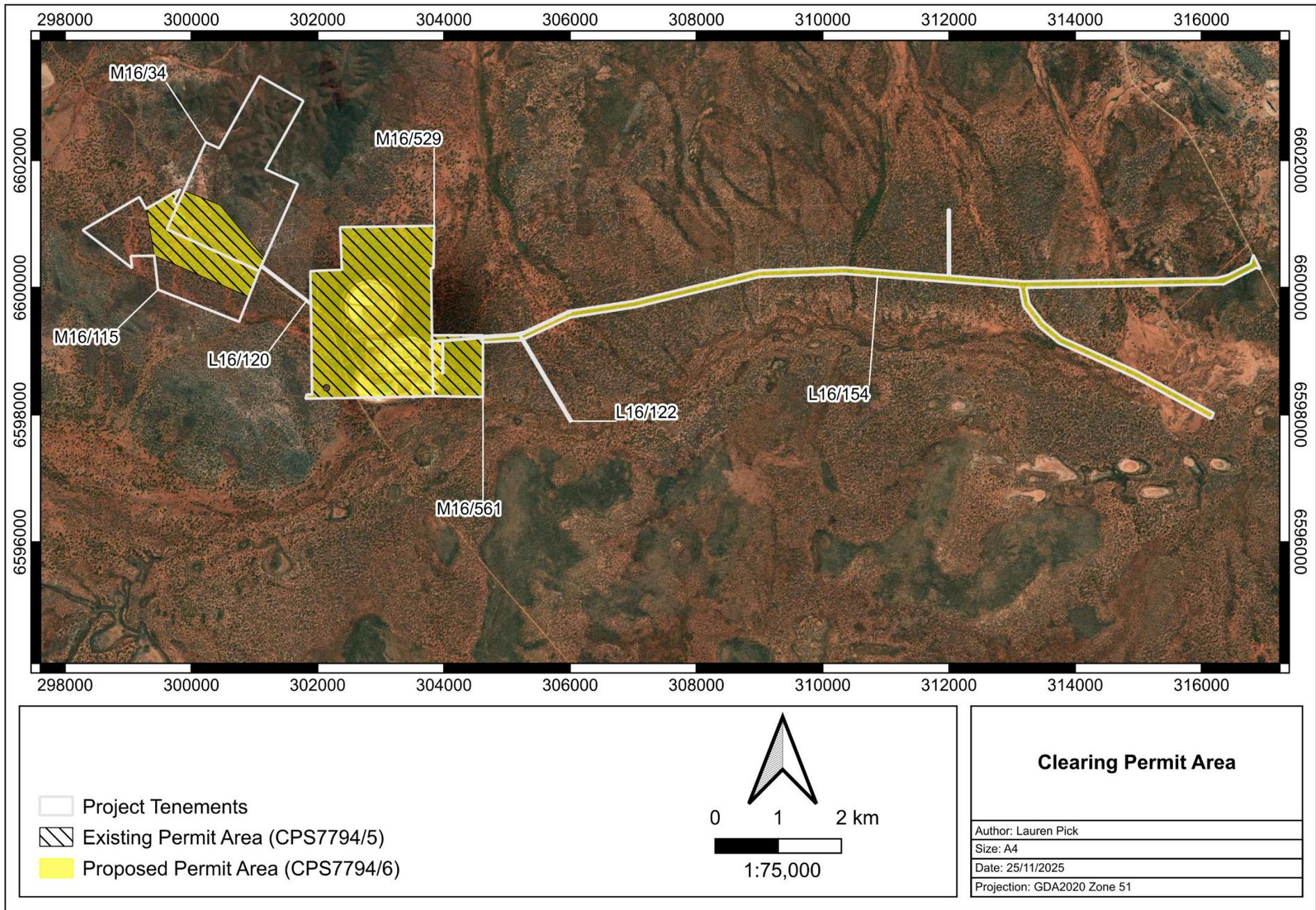


Figure 1-2: Clearing permit area

2 EXISTING ENVIRONMENT

2.1 REGIONAL SETTING

The Project lies within the South-West Interzone of WA in the Coolgardie Botanical District. Based on the Interim Biogeographic Regionalisation of Australia (IBRA, Version 7) (DotEE, 2012) the Project is located within the Coolgardie Bioregion of WA. The Coolgardie Bioregion is further divided into three subregions; Mardabilla (COO1), Southern Cross (COO2) and Eastern Goldfields (COO3) with the Project located within the Eastern Goldfields subregion.

The Coolgardie Bioregion is located within the Yilgarn Craton. Its granite basement includes Archaean Greenstone intrusions in parallel belts. Drainage is occluded (McKenzie, May & McKenna, 2002). Diverse woodlands, rich in endemic eucalypts, occur on low greenstone hills, on alluvial soils on the valley floors, around the saline playas of the region's occluded drainage system, and on broad plains of calcareous earths (McKenzie, May & McKenna, 2002).

The Eastern Goldfields subregion lies on the Yilgarn Craton's 'Eastern Goldfields Terrains'. The relief is subdued and comprised of gently undulating plains interrupted in the west with low hills and ridges of Archaean greenstones and in the east by a horst of Proterozoic basic granulite. The underlying geology is of gneisses and granites eroded into a flat plane covered with tertiary soils and with scattered exposures of bedrock. Calcareous earths are the dominant soil group and cover much of the plains and greenstone areas. A series of large playa lakes in the western half are the remnants of an ancient major drainage line (Cowan, 2001).

2.2 PRE-EUROPEAN VEGETATION

The Department of Primary Industries and Regional Development (DPIRD) GIS file (2022a) indicates that the Project is located within pre-European vegetation associations of the Boorabbin and Kununulling systems as listed in Table 2-1. The extent of these vegetation associations as specified in the *2018 Statewide Vegetation Statistics* (DBCA, 2019) is provided in Table 2-1.

Areas retaining less than 30% of their pre-European vegetation extent generally experience exponentially accelerated species loss, while areas with less than 10% are considered "endangered" (EPA, 2000). Development within the clearing permit area will not significantly reduce the extent of pre-European vegetation.

Table 2-1: Extent of Pre-European vegetation associations within the clearing permit area

Region	Pre-European extent (ha)	Current extent (ha)	% remaining	% current extent protected for conservation ¹
<i>Boorabbin 8: Medium woodland; salmon gum & gimlet</i>				
Eastern Goldfields Subregion	81,850.70	81,726.90	99.85	0.00
Western Australia	115,004.15	114,880.35	99.89	5.04
<i>Kununulling 8: Medium woodland; salmon gum & gimlet</i>				
Eastern Goldfields Subregion	36,106.37	36,106.37	100.00	0.00
Western Australia	36,368.76	36,368.76	100.00	0.00
<i>Kununulling 221: Succulent steppe; saltbush</i>				
Eastern Goldfields Subregion	596.17	596.17	100.00	0.00
Western Australia	596.17	596.17	100.00	0.00
<i>Kununulling 468: Medium woodland; salmon gum & goldfields blackbutt</i>				
Eastern Goldfields Subregion	184,812.52	181,666.52	98.30	0.04
Western Australia	186,202.68	182,938.32	98.25	0.04
<i>Kununulling 555: Hummock grasslands, mallee steppe; red mallee over spinifex, Triodia scariosa</i>				
Eastern Goldfields Subregion	13,245.55	13,090.72	98.83	0.00
Western Australia	13,245.55	13,090.72	98.83	0.00

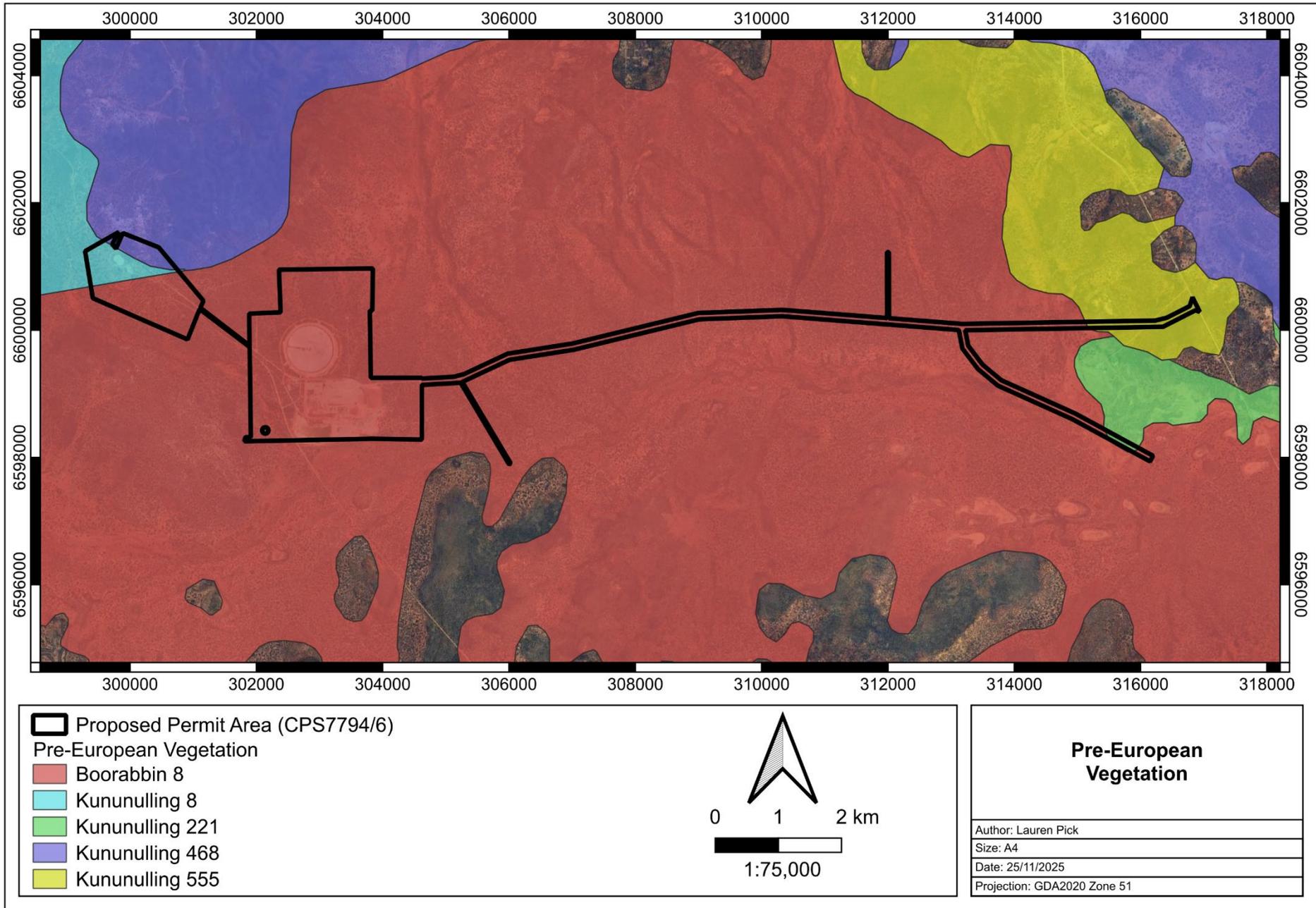


Figure 2-1: Pre-European vegetation associations within the clearing permit area

2.3 SOILS AND LANDSCAPE SYSTEMS

Based on geographic information provided by the DPIRD (2022b), the Project is located within the Norseman Zone (266) of the Kalgoorlie Province (26).

The Kalgoorlie Province is characterised by undulating plains (with some sandplains, hills and salt lakes) on the granitic rocks and greenstone of the Yilgarn Craton. Soils include calcareous loamy earths and red loamy earths with some salt lake soils, red deep sands, yellow sandy earths, shallow loams and loamy duplexes. Vegetation is dominated by Eucalypt woodlands with some Acacia-Casuarina thickets, Mulga shrublands, Halophytic shrublands and Spinifex grasslands. This Province is located in the southern Goldfields between Paynes Find, Menzies, Southern Cross and Balladonia (Tille, 2006).

The Norseman Zone is characterised by undulating plains and uplands (with some sandplains and salt lakes) on granitic rocks of the Yilgarn Craton. Soils comprise of calcareous loamy earths, yellow sandy and loamy earths, red loamy earths, red deep sands and salt lake soils. Vegetation includes Salmon Gum-redwood-merrit-red mallee-gimlet woodland with Acacia/ Casuarina thickets (and some Mulga shrublands and Spinifex grasslands). This zone is located in the southern Goldfields between Koolyanobbing, Menzies, Zanthus (Trans-Australian Railway), Norseman and Lake Hope (Tille, 2006).

The Norseman Zone are further divided into soil landscape systems with the Project located within one soil landscape system; Mx43- Gently undulating valley plains and pediments; some outcrop of basic rock (Figure 2-2).

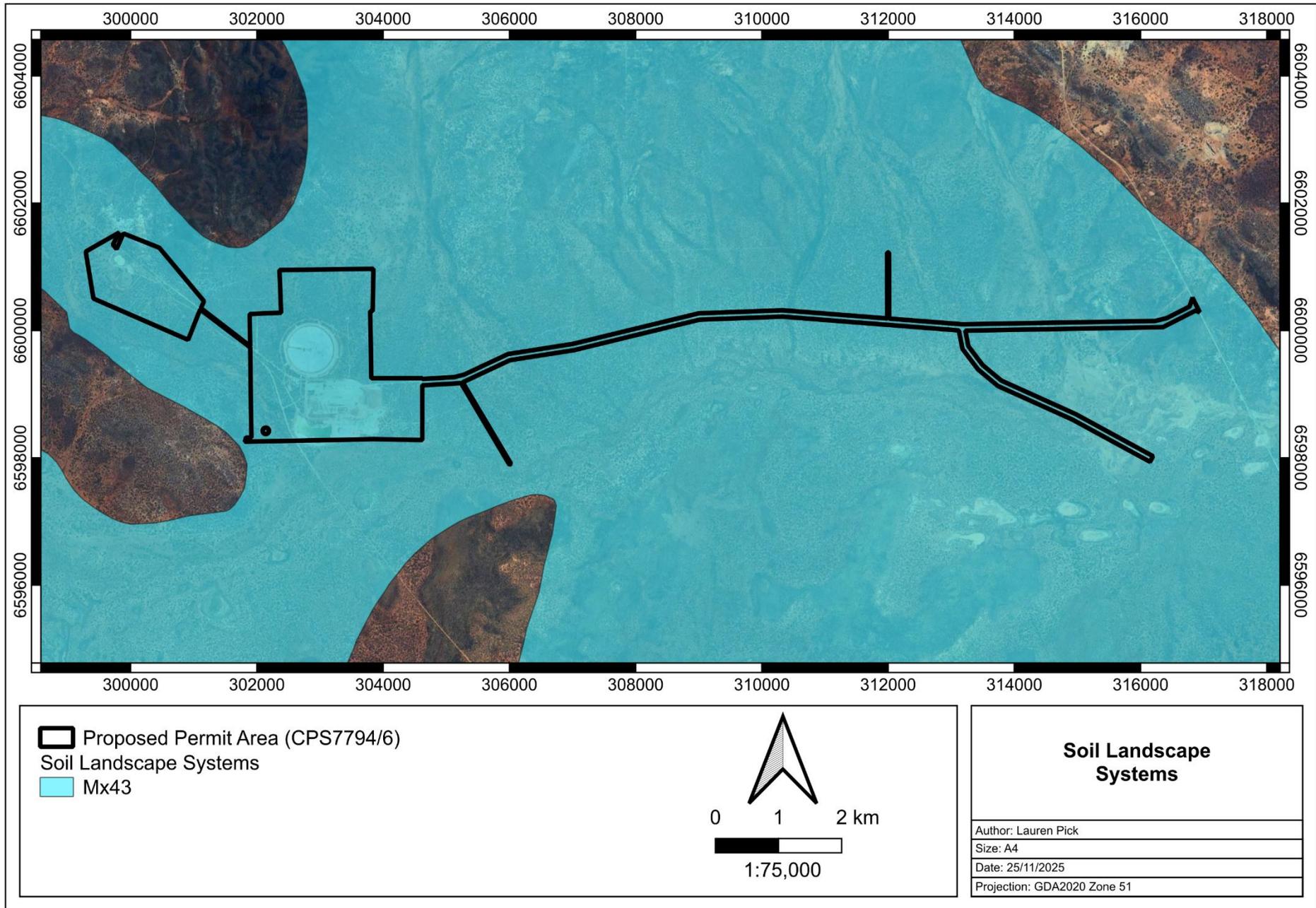


Figure 2-2: Soil landscape systems within the clearing permit area

2.4 HYDROLOGY

According to the Geoscience Australia Global Map Australia database (2021), there are no permanent or ephemeral inland waters within the clearing permit area. No permanent drainage lines occur within the clearing permit area however multiple minor ephemeral drainage lines and one major ephemeral drainage line intersects the clearing permit area (Figure 2-3). Culverts will be installed along the pipeline corridor to enable natural flow of these ephemeral drainage lines.

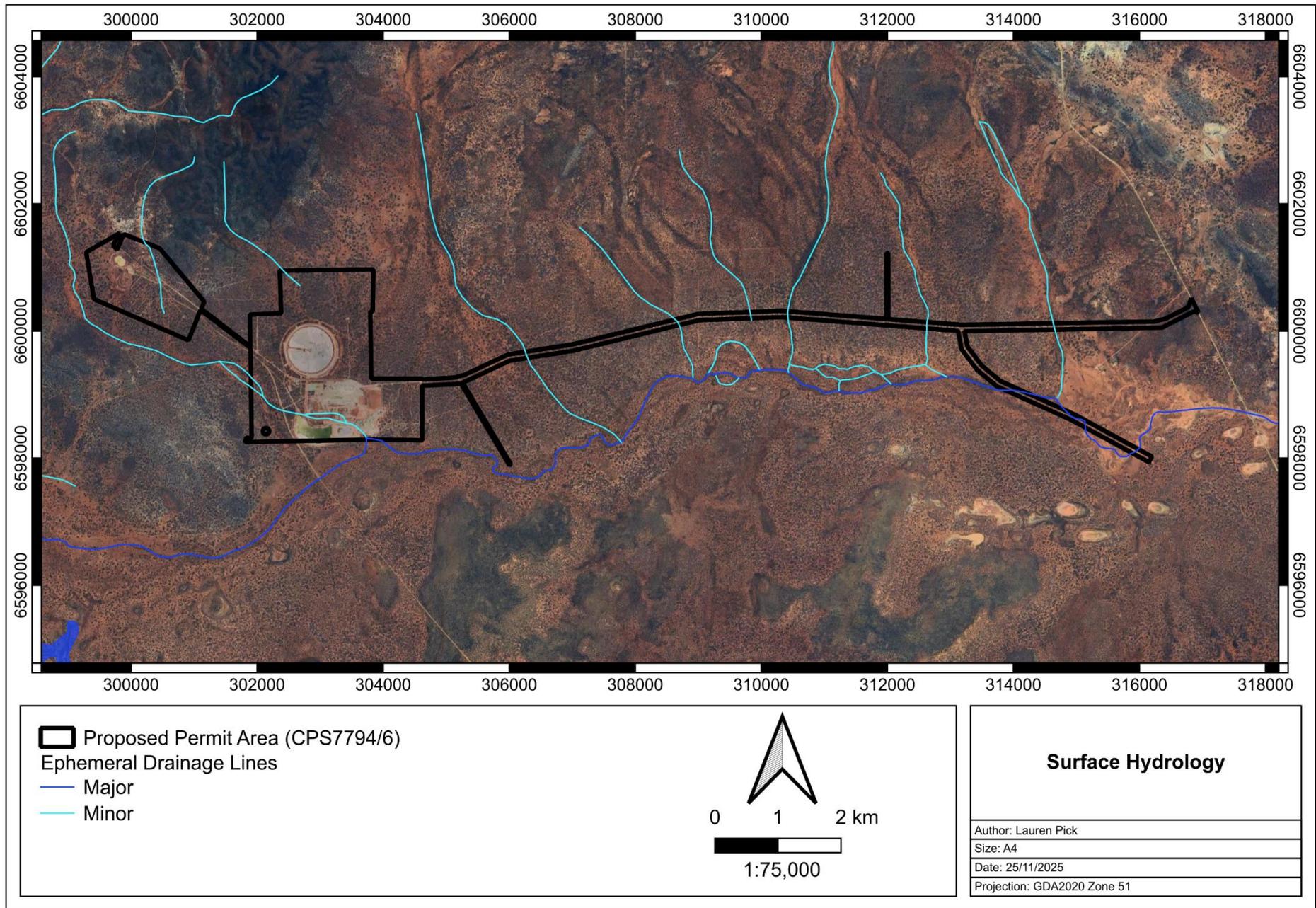


Figure 2-3: Surface hydrology in relation to the clearing permit area

2.5 CONSERVATION AREAS & GOVERNMENT RESERVES

The clearing permit area is not located within an Environmentally Sensitive Area (ESA) as listed under the *Environmental Protection Act 1986*. There are no Ramsar Wetlands or Nationally Important Wetlands within the clearing permit area.

The nearest gazetted conservation reserves are the Clear and Muddy Lakes Nature Reserve and the Rowles Lagoon Conservation Park located approximately 30 km north of the clearing permit area. The nearest proposed conservation reserve (managed by DBCA) is the Credo Conservation Park (LR3067/590) located approximately 16km of the clearing permit area. Credo was run as a pastoral lease from the early 1900s to 2007, when it was acquired by the (then) Department of Environment and Conservation (now DBCA). Land within the former Credo pastoral station is currently Unallocated Crown Land (UCL) proposed for conservation.

The clearing permit area is not located within a Public Drinking Water Source Area (listed under Section 9 of the *Country Areas Water Supply Act 1947*).

A map showing conservation areas and government reserves in relation to the clearing permit area is provided in Figure 2-4.

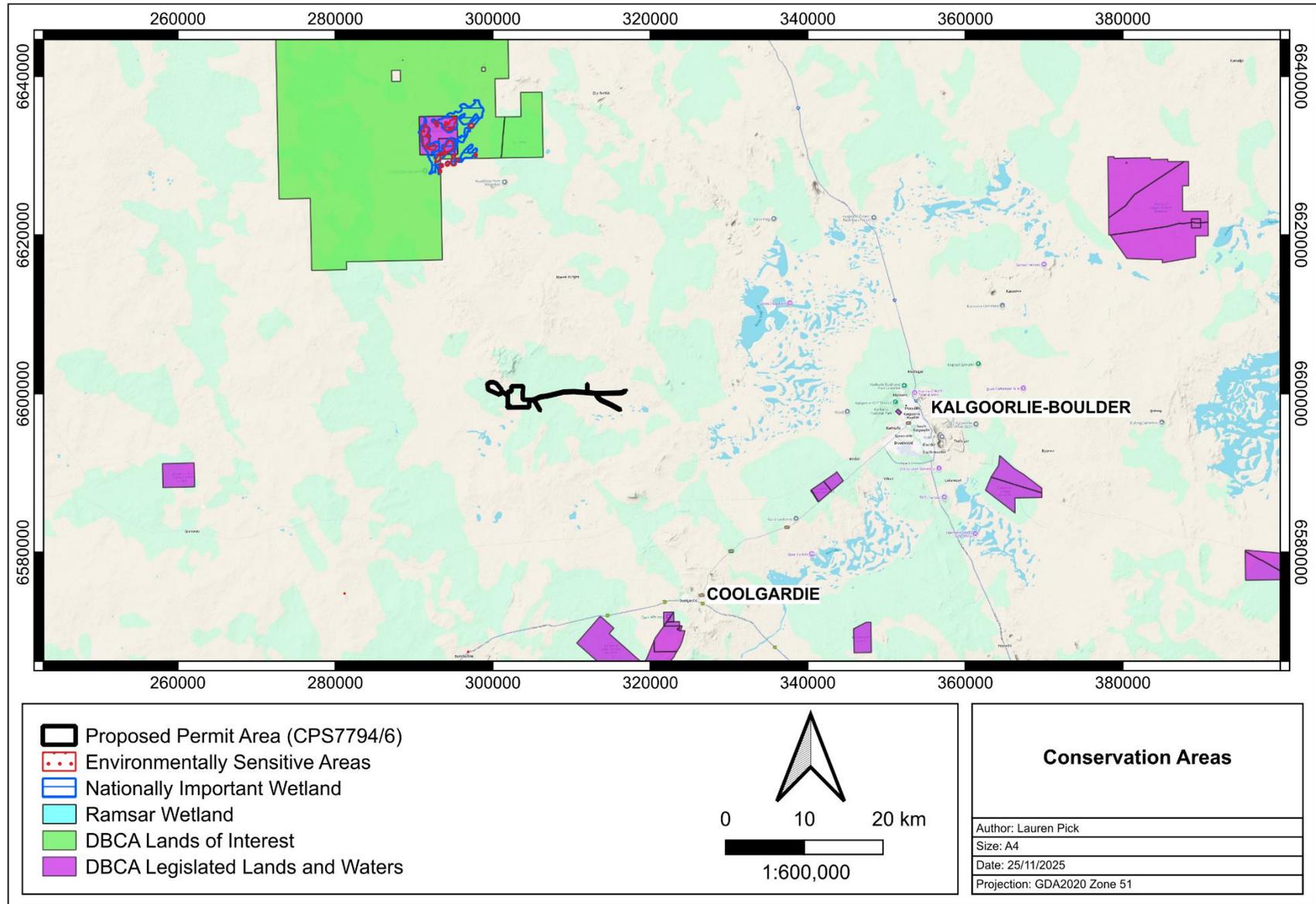


Figure 2-4: Conservation areas and government reserves in relation to the clearing permit area

2.6 FLORA AND VEGETATION

A reconnaissance flora and vegetation survey of L16/154 was conducted by Native Vegetation Solutions in June 2023 (Native Vegetation Solutions, 2023). A total of 15 vegetation units were identified within L16/154 as listed in Table 2-2 and shown in Figure 2-5. No unique or restricted vegetation communities were identified, and all vegetation types/communities are common, widespread and well represented in the Eastern Goldfields subregion.

Table 2-2: Vegetation types within L15/154

Vegetation Unit	Vegetation Code	Total Area (Ha)
<i>Acacia acuminata</i> and <i>Acacia effusifolia</i> thicket	A	3.3
<i>Acacia acuminata</i> shrubland with occasional <i>Eucalyptus griffithsii</i>	B	5.2
<i>Acacia acuminata</i> thicket	C	7.8
<i>Acacia kalgoorliensis</i> over sclerophyll shrubland	E	11.4
<i>Eucalyptus salmonophloia</i> woodland over sclerophyll shrubland	F	15.0
<i>Eucalyptus oleosa</i> and <i>Eucalyptus griffithsii</i> over <i>Acacia acuminata</i> shrubland	H	2.0
<i>Eucalyptus oleosa</i> over chenopod shrubland	I	6.3
<i>Eucalyptus salmonophloia</i> over <i>Acacia acuminata</i> and <i>Eremophila dempsteri</i> thicket	J	1.4
<i>Eucalyptus salubris</i> open woodland	K	4.7
<i>Eucalyptus salubris</i> thicket along drainage line	L	1.2
<i>Melaleuca lateriflora</i> thicket	N	0.9
Open Chenopod and sclerophyll shrubland	O	0.3
Sclerophyll shrubland	P	3.1
Tecticornia shrubland	Q	1.5
Transitional <i>Eucalyptus</i> woodland over sclerophyll shrubland	R	94.5
Existing Disturbance	N/A	13.2
Total		172

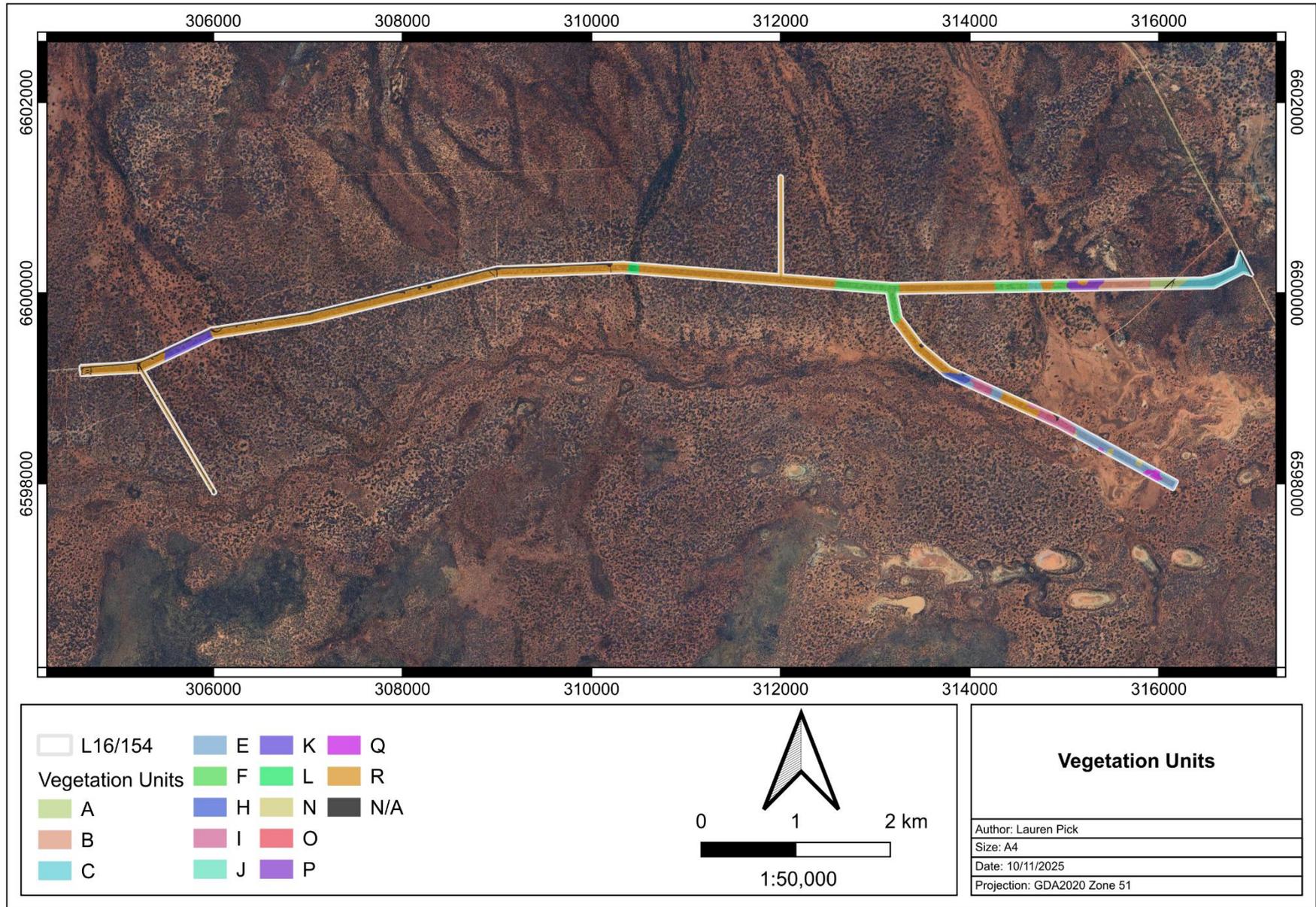


Figure 2-5: Vegetation types within L16/154

2.6.1 VEGETATION CONDITION

Vegetation condition within L16/154 ranged from good to excellent with 7.7% of L16/154 comprising of existing clearing. Five introduced species were identified within L16/154:

1. *Asphodelus fistulosus* (Onion Weed)
2. *Heliotropium europaeum* Common Heliotrope)
3. *Lysimachia arvensis* (Pimpernel)
4. *Salvia verbenaca* (Wild Sage)
5. *Sonchus oleraceus* (Common Sowthistle)

None of these species are listed as a Declared Pest under the *Biosecurity and Agriculture Management Act 2007* or a Weed of National Significance. Weed control measures will be implemented during clearing and post-development to prevent further spread of weeds.

2.6.2 SIGNIFICANT FLORA AND VEGETATION

No threatened flora or ecological communities listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or the State *Biodiversity Conservation Act 2016* (BC Act) were identified within L16/154. No Priority flora or ecological communities as listed by DBCA were identified within L16/154. The regional locations of threatened or priority flora species recorded in the generally Project locality, based on search results from the DBCA Threatened and Priority Fauna Database (DBCA, 2024b) are shown in Figure 2-8.

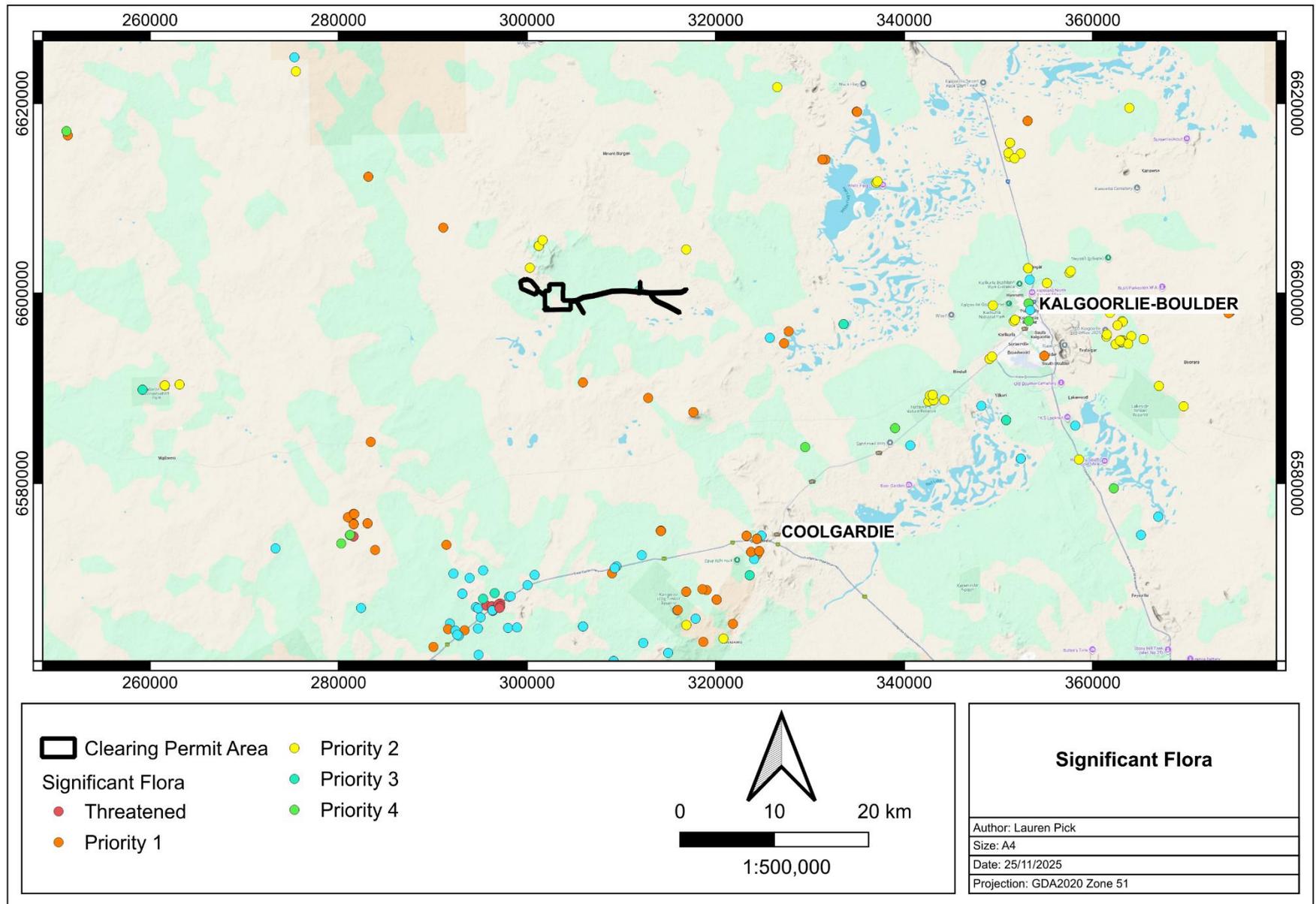


Figure 2-6: Significant flora records in relation to the clearing permit area

2.7 FAUNA

A basic vertebrate fauna survey of L16/154 was conducted by Terrestrial Ecosystems in July 2023 (Terrestrial Ecosystems, 2023). A total of four fauna habitats were identified within L16/154 as listed in Table 2-3 and shown in Figure 2-7. Fauna habitat represented in the project area is abundant and in similar condition in adjacent areas. Therefore, the fauna assemblage that is present in the project area will also be present in adjacent areas.

The fauna habitat quality varies in condition from degraded to good with the more degraded areas due to anthropogenic disturbance and some disturbed areas have been rehabilitated.

Table 2-3: Fauna habitats within L16/154

Fauna Habitat	Total Area (Ha)
Chenopod and salt pan habitats	1.8
Eucalypt woodland over mixed shrubs	116.8
Mallee over shrubs	8.3
Mixed shrubland	31.6
Disturbed	13.3
Total	172

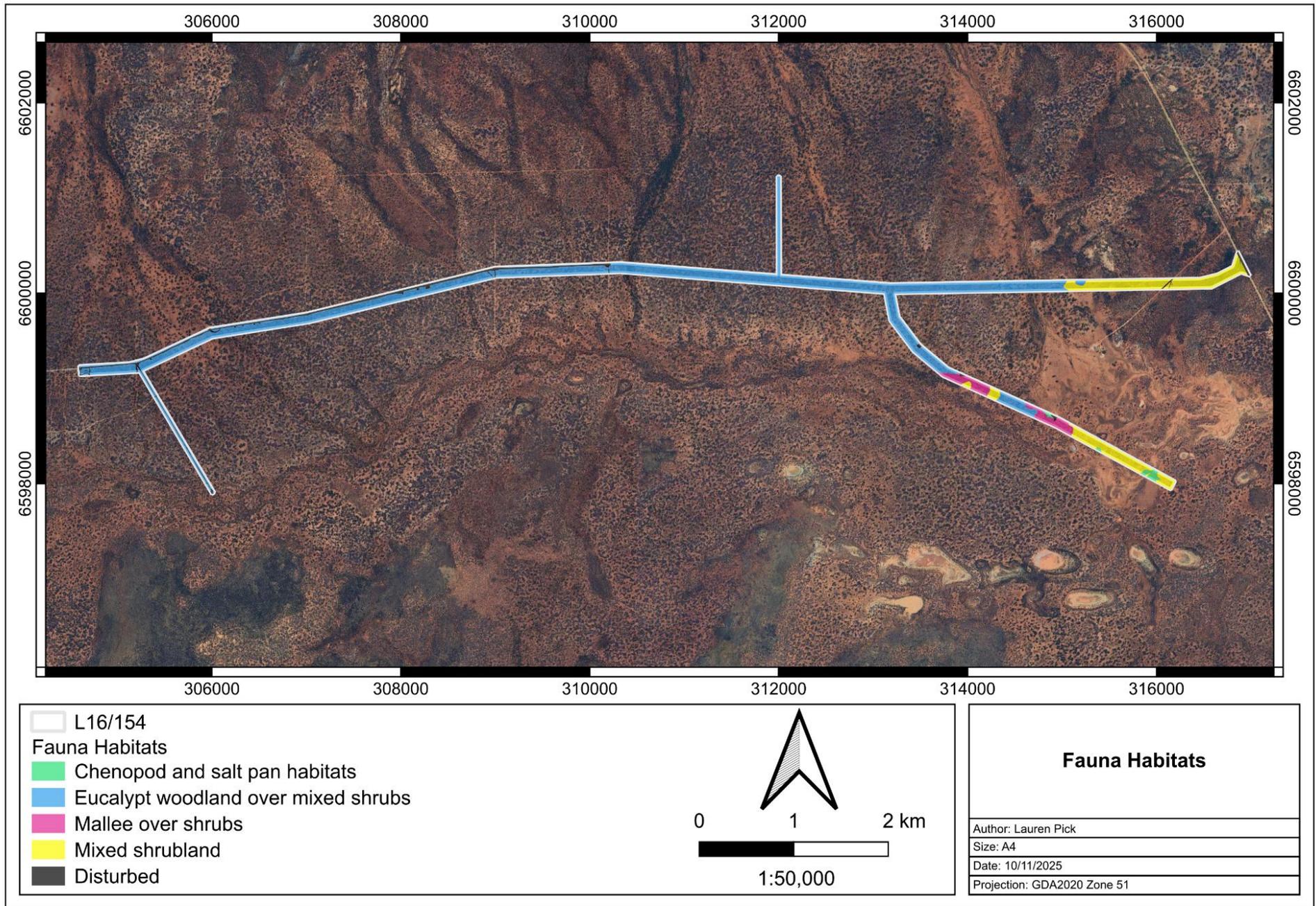


Figure 2-7: Fauna habitats within L16/154

2.7.1 SIGNIFICANT FAUNA

No Threatened fauna as listed under the EPBC Act or BC Act were identified within L16/154. No Priority fauna as listed by DBCA were identified within L16/154. The regional locations of threatened or priority fauna species recorded in the generally Project locality, based on search results from the DBCA Threatened and Priority Fauna Database (DBCA, 2024b) are shown in Figure 2-8.

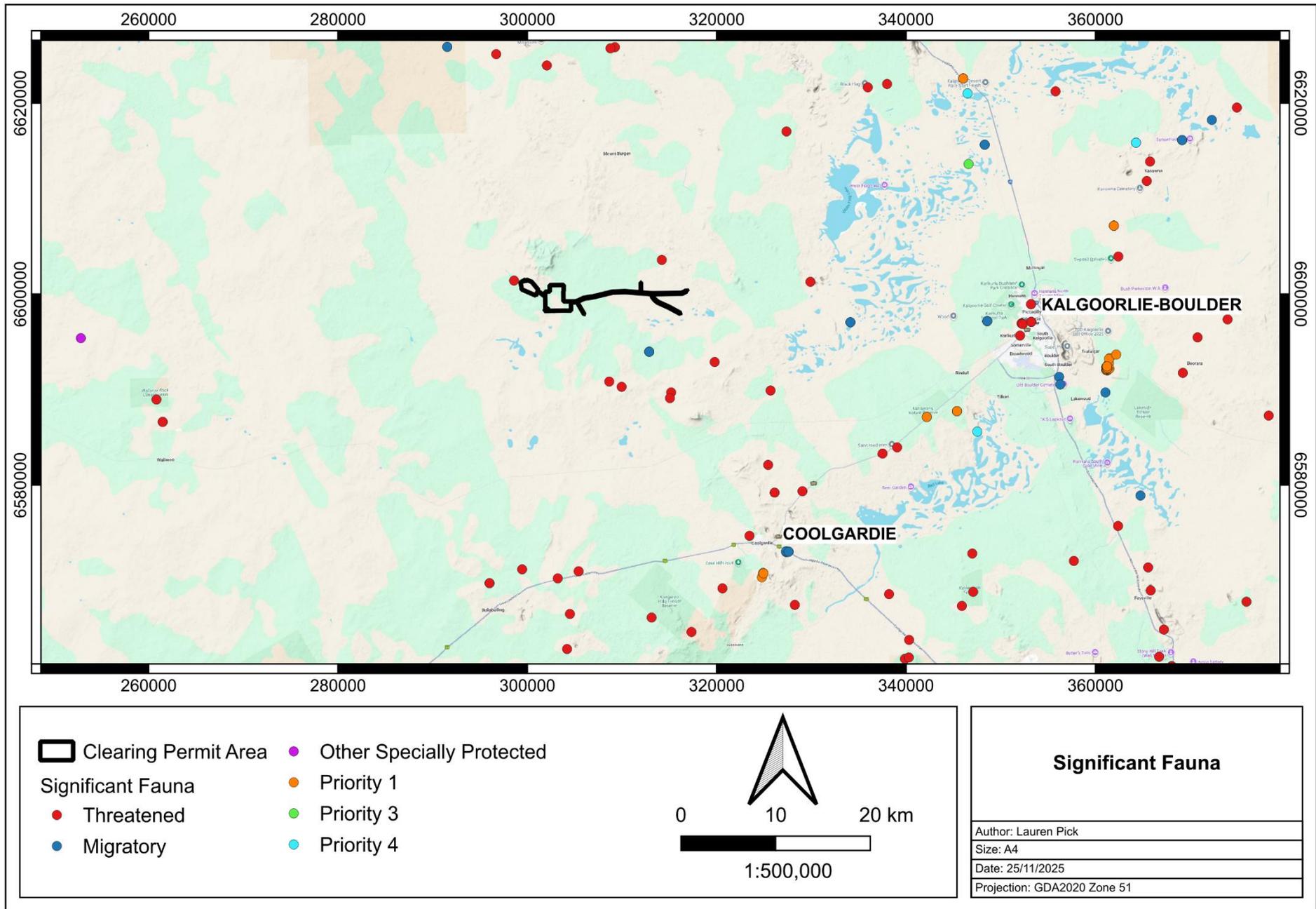


Figure 2-8: Significant fauna records in relation to the clearing permit area

3 ENVIRONMENTAL LEGISLATION

An assessment of the clearing permit area against relevant Commonwealth and State environmental legislation is provided in the following sections.

3.1 COMMONWEALTH LEGISLATION

3.1.1 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The EPBC Act protects matters of national environmental significance, and is used by the Commonwealth DCCEEW to list threatened taxa and ecological communities into categories based on the criteria set out in the Act (www.environment.gov.au/epbc/index.html). The Act provides a national environmental assessment and approval system for proposed developments and enforces strict penalties for unauthorised actions that may affect matters of national environmental significance. Matters of national environmental significance as defined by the Commonwealth EPBC Act include:

- Nationally threatened flora species;
- World heritage properties;
- National heritage places;
- Wetlands of international importance (often called ‘Ramsar’ wetlands after the international treaty under which such wetlands are listed);
- Nationally threatened ecological communities;
- Commonwealth marine area;
- The Great Barrier Reef Marine Park; and
- Nuclear actions (including uranium mining) a water resource, in relation to coal seam gas development and large coal mining development.

No matters of national environmental significance as defined by the Commonwealth EPBC Act were identified within the clearing permit area.

3.2 STATE LEGISLATION

3.2.1 ENVIRONMENTAL PROTECTION ACT WA 1986

The EP Act provides for the prevention, control and abatement of pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment. The Act is administered by The Department of Water and Environment Regulation (DWER), which is the State Government’s environmental regulatory agency.

Under Section 51C of the EP Act and the *Environmental Protection (Clearing of Native Vegetation) Regulations (Regulations) WA 2004* any clearing of native vegetation in Western Australia that is not eligible for exemption under Schedule 6 of the *EP Act 1986* or under the Regulations 2004 requires a clearing permit from the DWER or DMIRS. Under Section 51A of the *EP Act 1986* native vegetation includes aquatic and terrestrial vegetation indigenous to Western Australia, and intentionally planted vegetation declared by regulation to be native vegetation, but not vegetation planted in a plantation or planted with commercial intent. Section 51A of the *EP Act 1986* defines clearing as “the killing or destruction of; the removal of; the severing or ringbarking of trunks or stems of; or the doing of substantial damage to some or all of the native vegetation in an area, including the flooding of land, the burning of vegetation, the grazing of stock or an act or activity that results in the above”. Exemptions under Schedule 6 of the EP Act and the EP Regulations do not apply in Environmentally Sensitive Areas (ESA) as declared under Section 51B of the EP Act or TEC listed under State and Commonwealth legislation.

No evidence of the clearing permit area containing any TEC or Threatened Flora or Fauna was identified during the survey. The clearing permit area is not located within an ESA.

3.2.2 BIODIVERSITY CONSERVATION ACT 2016

This Act has been established for the conservation and protection of biodiversity and biodiversity components in Western Australia and to promote the ecologically sustainable use of biodiversity components in the State. Taxa are classified as ‘Threatened’ when their populations are geographically restricted or are threatened by local processes (see following sections for Threatened definitions). Under this Act all native flora and fauna are protected throughout the State. Financial penalties are enforced under this Act if threatened species are collected without an appropriate licence.

Under Section 54(1) of the BC Act, habitat is eligible for listing as critical habitat if:

- (a) it is critical to the survival of a threatened species or a threatened ecological community; and
- (b) its listing is otherwise in accordance with the ministerial guidelines.

No threatened species or critical habitat listed under the BC Act were recorded within the clearing permit area.

3.3 NATIVE VEGETATION CLEARING PRINCIPLES

Based on the outcomes from the survey, an assessment of the proposed clearing against the native vegetation clearing principles listed under Schedule 5 of the EP Act was conducted as summarised in Table 3-1. The assessment identified that clearing may be at variance with clearing principle f. The proposed clearing is not at variance or unlikely to be at variance with all remaining clearing principles.

Table 3-1: Native vegetation clearing principles assessment

Letter	Principle	Assessment	Outcome
(a)	Native vegetation should not be cleared if it: comprises a high level of biological diversity.	Vegetation identified within the clearing permit area is not considered to be of high biological diversity and is well represented in the local area.	Clearing is unlikely to be at variance to this principle
(b)	comprises the whole or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to WA.	Fauna habitat represented in the project area is abundant and in similar condition in adjacent areas. Therefore, the fauna assemblage that is present in the project area will also be present in adjacent areas. The project area does not include habitat, that if it was lost would threaten the survival of Malleefowl, but given this species’ low abundance in the Goldfields, all populations of Malleefowl should be managed and conserved. Malleefowl are in low abundance and widely dispersed in the Goldfields. Any loss of individuals would be regrettable, and every effort should be made to minimise the possibility of this occurring.	Clearing is unlikely to be at variance to this principle
(c)	includes, or is necessary for the continued existence of rare flora.	No Threatened Flora taxa, pursuant to the BC Act and the EPBC Act were identified within the clearing permit area.	Clearing is not at variance to this principle
(d)	comprises the whole or part of or is necessary for the maintenance of a threatened ecological community (TEC).	No TEC listed under the EPBC Act or by the BC Act occur within the clearing permit area.	Clearing is not at variance to this principle
(e)	is significant as a remnant of native vegetation in an area that has been extensively cleared	The clearing permit area occurs within pre-European Beard vegetation associations in the Boorabbin and Kununulling systems of the Coolgardie Bioregion all of which retain >98% of the original pre-European vegetation extent.	Clearing is unlikely to be at variance to this principle
(f)	is growing, in, or in association with, an	There are no inland waters (lakes/ playas) or perennial drainage lines within the clearing permit area. Multiple minor ephemeral drainage lines and	Clearing may be at variance to this principle

Letter	Principle	Assessment	Outcome
	Native vegetation should not be cleared if it: environment associated with a watercourse or wetland	one major ephemeral drainage line intersect the clearing permit area. One vegetation unit was identified associated with ephemeral drainage; <i>Eucalyptus salubris</i> thicket along drainage line (Veg Unit L) which accounts for 1.2 ha (0.7%) of the clearing permit area.	
(g)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	The clearing permit area occurs within pre-European Beard vegetation associations in the Boorabbin and Kununulling systems of the Coolgardie Boioregion all of which retain >98% of the original pre-European vegetation extent. Clearing within these vegetation associations is not likely to lead to land degradation issues such as salinity, water logging or acidic soils.	Clearing is 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 clearing permit area is not located within a proposed or gazetted conservation reserve. The closest conservation reserves are the Clear and Muddy Lakes Nature Reserve and the Rowles Lagoon Conservation Park, which are located approximately 30 km north of the clearing permit area.	Clearing is unlikely to be 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.	There are no inland waters (lakes/ playas) or perennial drainage lines within the clearing permit area. Multiple minor ephemeral drainage lines and one major ephemeral drainage line intersect the clearing permit area. One vegetation unit was identified associated with ephemeral drainage; <i>Eucalyptus salubris</i> thicket along drainage line (Veg Unit L) which accounts for 1.2 ha (0.7%) of the clearing permit area. Most rainfall is lost by evaporation or surface runoff. Only a small portion infiltrates the soil and recharges the groundwater.	Clearing is 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 of flooding	Rainfall is unreliable and highly variable with an average rainfall for Kalgoorlie-Boulder of approximately 266mm and an evaporation rate of 2400mm. The region is not prone to flooding and does not contain perennial water sources.	Clearing is unlikely to be at variance to this principle

4 CONCLUSIONS AND SUMMARY

Fifteen vegetation types were identified within L16/154 which were common and widespread with no significant vegetation identified including no vegetation representative of Threatened Ecological Communities listed under State or Commonwealth legislation or Priority Ecological Communities listed by DBCA. No Threatened flora listed under State or Commonwealth legislation or Priority flora species were identified within L16/154.

L16/154 comprises of four broad fauna habitats that are typical of habitat in the wider region. No significant fauna were observed within the assessment area, including no Threatened fauna or Migratory fauna listed under State or Commonwealth legislation or Priority fauna listed by DBCA. Given the locality of the assessment area adjacent to existing mining and habitats are represented outside of the assessment area, vegetation clearing in the assessment area is unlikely to have a significant impact on any conservation significant fauna.

No permanent drainage lines occur within the clearing permit area however multiple minor ephemeral drainage lines and one major ephemeral drainage line intersects the clearing permit area. Culverts will be installed along the pipeline corridor to enable natural flow of these ephemeral drainage lines.

5 BIBLIOGRAPHY

- Beard, J.S., (1990). *Plant Life of Western Australia*, Kangaroo Press Pty Ltd, NSW.
- Cowan, M. (2001). *A Biodiversity Audit of Western Australia's 53 Biogeographical Region in 2001- Eastern Goldfields (COO3 –Eastern Goldfields subregion)*, Department of Conservation and Land Management.
- DBCA (2019). *2018 Statewide Vegetation Statistics (formerly the CAR Reserve Analysis)*. Department of Biodiversity, Conservation and Attractions.
- DBCA (2024a). Priority/ Threatened Flora Database Search. Department of Biodiversity, Conservation and Attractions.
- DBCA (2024b). Priority/ Threatened Ecological Communities Database Search. Department of Biodiversity, Conservation and Attractions.
- DCCEEW (2024a). *Protected Matters Search Tool, Environment Protection and Biodiversity Conservation Act 1999*, Department of Climate Change, Energy the Environment and Water, Australian Government.
- DCCEEW (2025b). *Species Profile and Threats Database*, Department of Climate Change, Energy the Environment and Water, Australian Government.
- DotEE (2012). *Interim Biogeographic Regionalisation for Australia (IBRA)*, Version 7, Department of the Environment and Energy.
- DPIRD (2022a). *Pre-European Vegetation - Western Australia (NVIS Compliant Version GIS file)*, Department of Primary Industries and Regional Development, Western Australia.
- DPIRD (2022b). *Soil Landscape Mapping - Western Australia (NVIS Compliant Version GIS file)*, Department of Primary Industries and Regional Development, Western Australia.
- DPIRD (2025). *Declared Organism-database search*, Department of Primary Industries and Regional Development, Western Australia.
Available: <http://www.biosecurity.wa.gov.au/>
- EPA (2016a). *Environmental Factor Guideline for Flora and Vegetation – December 2016*. Environmental Protection Authority.
- EPA (2016b). *Environmental Factor Guideline for Terrestrial Fauna – December 2016*. Environmental Protection Authority.
- EPA (2016c). *Technical Guideline - Flora and Vegetation Surveys for Environmental Impact Assessment – December 2016*. Environmental Protection Authority.
- EPA (2020). *Technical Guideline – Terrestrial Fauna Surveys for Environmental Impact Assessment – December 2016*. Environmental Protection Authority.
- Geoscience Australia (2021). *Surface Hydrology GIS*. Australian Government.
- McKenzie, N.L., May J.E. and McKenna, S, (2002). *Bioregional Summary of the 2002 Biodiversity Audit for Western Australia*.
- Native Vegetation Solutions. (2023). *Reconnaissance Flora and Vegetation Survey of Miscellaneous Licenses L15/453 & L16/154*.
- Tille, P. (2006). *Soil Landscapes of Western Australia's Rangelands and Arid Interior*, Department of Agriculture and Food Western Australia.
- Terrestrial Ecosystems. (2023). *Basic and Targeted Vertebrate Fauna Survey Beacon Haul Roads*.

Appendix 1: Flora and Vegetation Survey Report



**Reconnaissance Flora and
Vegetation Survey of Miscellaneous
Licenses L15/453 and L16/154-
June 2023**

Prepared for
Beacon Mining Pty Ltd
Subsidiary of



FINAL V2.1
November 2023

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1 INTRODUCTION

The parent entity, Beacon Minerals Limited (ASX:BCN) is a publicly listed company which has a 100% interest in Beacon Mining Pty Ltd (BM). BCN is required to make all the financial and operating policy decisions for this subsidiary. BM has gold interests and is the operator of its Jaurdi Gold Project in the Coolgardie Region (COO) of Western Australia (Figure 1).

BCN are proposing to establish additional pipelines and access roads to connect their other projects in nearby areas.

Native Vegetation Solutions (NVS) was supplied with a survey area located approximately 39.5 km northwest of Coolgardie in Western Australia,

The total survey area received from BCN covered approximately 312.14 ha. The survey area lies within Miscellaneous Licences L15/453 and L16/154. 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 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 5 December 2018 (Smith and Jones, 2018) and were taken into account.

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

- EPA (2016) *Statement of Environmental Principles, Factors and Objectives*; 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 (DMIRS) 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, 2019a) 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 (Smith

and Jones, 2018) 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 5.1 million hectares. The Eastern Goldfields subregion lies on the 'Eastern Goldfields Terrains'. The relief is subdued and comprises of gently undulating plains interrupted in the west with low hills and ridges of Archaean greenstones and in the east by a horst of Proterozoic basic granulite. The underlying geology is of gneisses and granites eroded into a flat plane covered with tertiary soils and with scattered exposures of bedrock. Calcareous earths are the dominant soil group and over much of the plains and greenstone areas. A series of large playa lakes in the western half are the remnants of an ancient major drainage line (CALM, 2002).

The dominant land uses of the COO03 subregion are: UCL and Crown reserves, Grazing-Native pastures-leasehold (37.8%), freehold (7.15%), conservation, mining leases (CALM, 2002).

This bioregion consists of granite rocky outcrops, low greenstone hills, laterite uplands and broad plains. There are no major rivers or creeks within the bioregion. Numerous salt lakes of varying size occur across the region (DAWE, 2020).

Beard (1990) describes the soil types in the COO03 subregion as: principally brown calcareous earths, with sandplains in the western part and some large playa lakes.

The survey area is located in the Coolgardie Botanical District of Beard (1990). The Coolgardie Botanical District is dominated by eucalypt woodlands, eucalypt open woodlands in the east, other shrublands, heath, *Acacia* shrublands, chenopod and samphire shrublands, mallee woodlands and shrublands. There are small areas of *Acacia* forests and woodlands, and hummock grasslands occurring in the north (DAWE, 2023).

Within the Coolgardie Botanical District, the Eastern Goldfields subregion is comprised of Mallees, *Acacia* thickets and shrubheaths on sandplains. Diverse *Eucalyptus* woodlands occur around salt lakes, on ranges, and in valleys. Salt lakes support dwarf shrublands of samphire. Woodlands and *Dodonaea* shrubland occur on basic granulites of the Fraser Range. The area is rich in endemic *Acacia*'s (CALM, 2002).

The Goldfields Woodlands is a centre of endemism and includes exceptionally high diversity of *Eucalyptus* species with as many as 170 species occurring in the bioregion. The COO03 subregion also has high diversity in *Acacia* species, as well as ephemeral flora communities of tertiary sandplain shrublands and of valley floor woodlands (CALM, 2002).

2.2 Climate

The climate of the Coolgardie Region is classified as arid to semi-arid Mediterranean with mainly winter rainfall as well as summer thunderstorms. The area receives approximately 250-300mm of rainfall per year (Beard, 1990; 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 87 km southeast 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 25.3°C (BOM, 2023). 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).

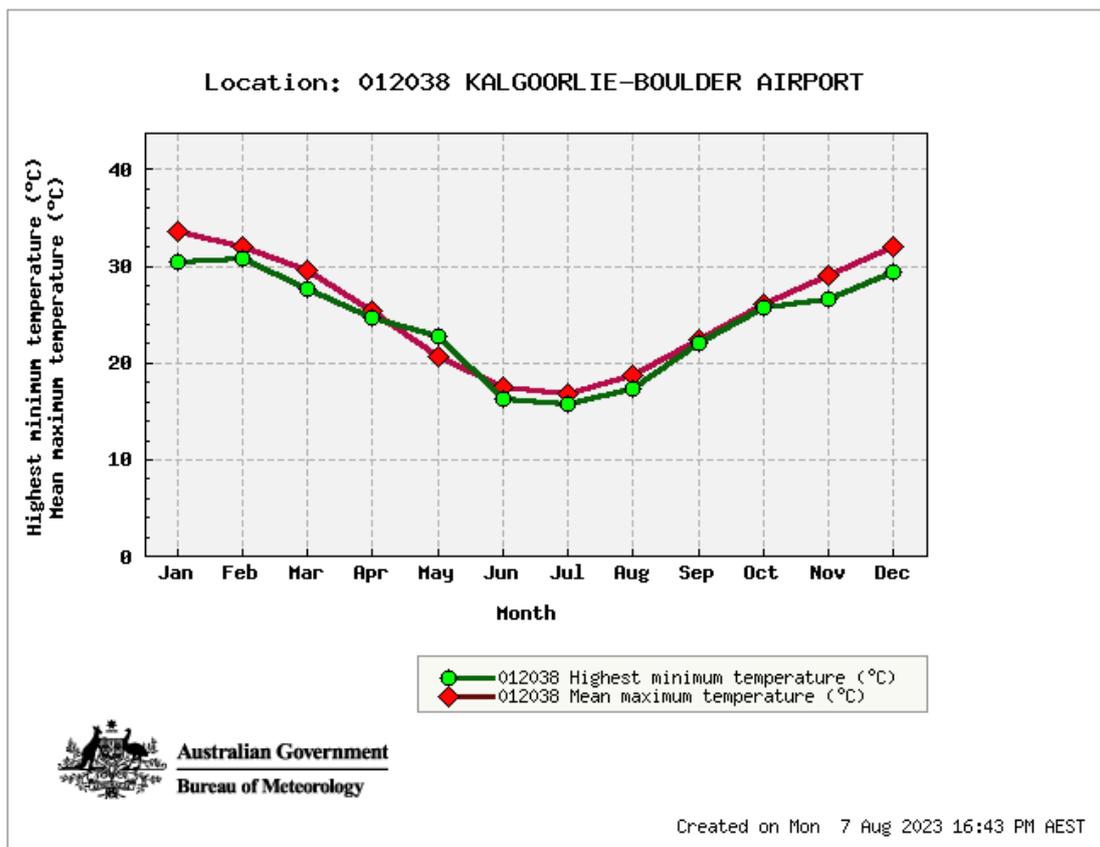


Figure 2: Mean temperature ranges for Kalgoorlie-Boulder Airport weather station

2.2.2 Rainfall

The annual average rainfall at Leinster Aero is 264.8 mm, which falls (>1 mm) on an average of 39.2 rain-days (BOM, 2023). Larger rainfall events occur from January to August (Figure 3). Prior to the survey in 2023, rainfall in April and June exceeded monthly averages while rainfall for all other months remained below monthly averages (BOM, 2023).

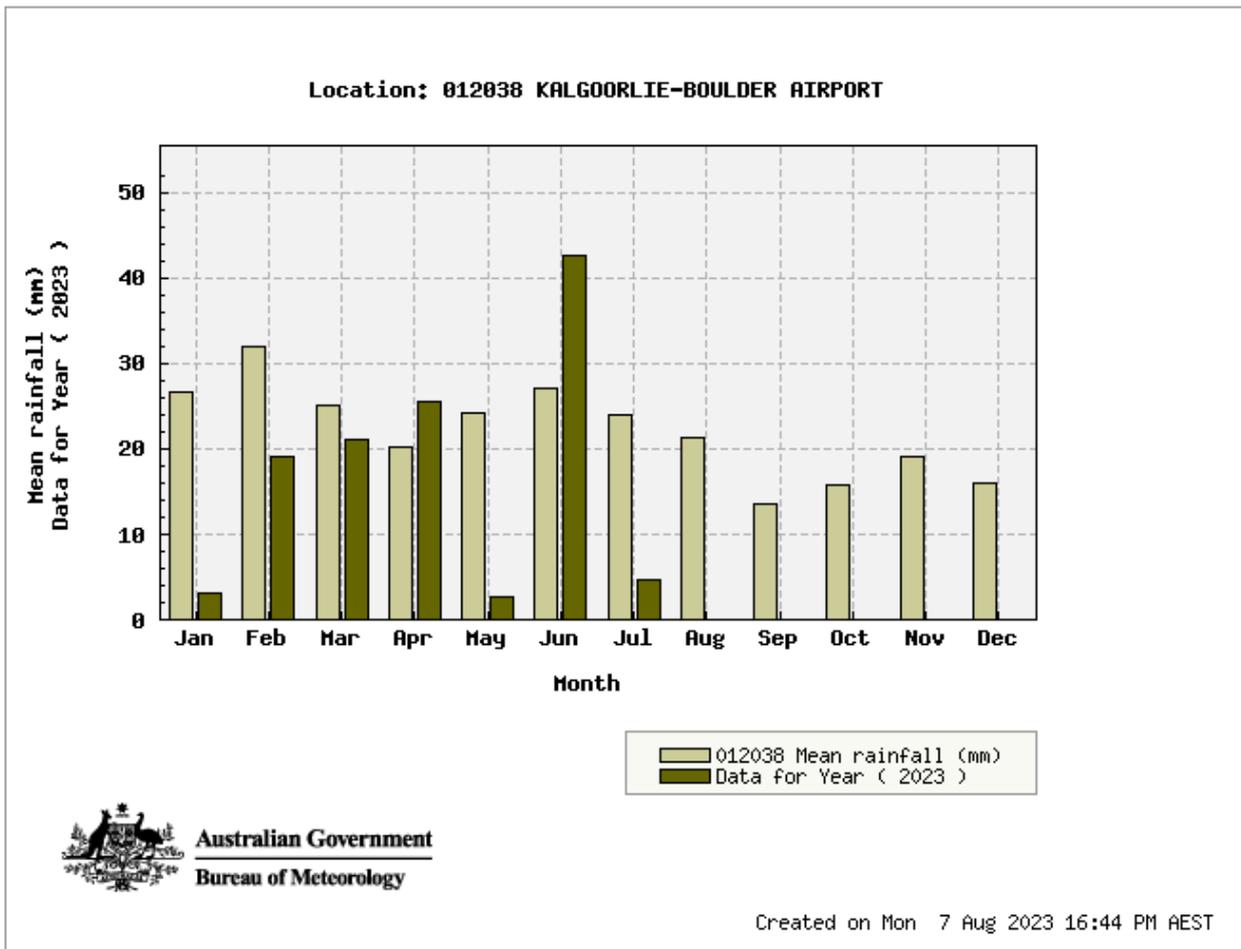


Figure 3: Monthly and mean rainfall for Kalgoorlie-Boulder Airport weather station

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 19 years' experience in botanical surveys throughout the Coolgardie Region and over a variety of environments across Western Australia.

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 3.2.6, 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 Known Previous Flora and Vegetation Surveys

One known Detailed Flora and Vegetation Survey has previously been completed at the Jaurdi Gold Project in July and September 2019 (NVS, 2017). The location of this previous survey area occurs adjacent to the current survey area.

Eighty-five species were recorded within the survey area with 84 species recorded within quadrats. Thirty-nine genera and 24 families were found. Of the native species, Chenopodiaceae had the highest representation, with 19 species from 8 genera, dominated by *Maireana*. Fabaceae and Scrophulariaceae were the next best represented families with 12 species each.

Of the 85 taxa recorded there were two introduced weed species; *Carrichtera annua* (Ward's Weed) and *Cucumis myriocarpus* (Prickly Paddy Melon). These weed species were recorded within 2 of the 29 quadrats.

There were 30 taxa recorded from within a single site. Of these, none were weed species.

No Threatened species were recorded during the survey.

One Priority species, *Eremophila praecox* (P1), was identified in the survey area. Two plants were recorded within a 200m radius.

Vegetation condition was generally 'Good' to 'Very Good' (Keighery 1994). Disturbance was present within the survey area mostly attributed to historic mining activities, access tracks, exploration related activities, and also grazing.

3.2.2 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, 2023).

3.2.3 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 30km radial area of the survey area (DBCA, 2017a).

The TEC and PEC database was searched to determine the presence of PECs or TECs (DBCA, 2017), with Geographic Information System (GIS) data supplied for assessment, within a 20 km radial area of the survey area.

3.2.4 Environmentally Sensitive Areas (ESAs) and Conservation Reserves

The Department of Water and Environmental Regulation (DWER, 2023) Clearing Permit System Map Viewer was used to determine the location of any ESAs and Conservation Reserves.

3.2.5 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.

3.2.6 Wetlands

The potential of wetlands within the project area was determined by examining DWER's Clearing Permit System Map Viewer (DWER, 2023).

3.2.7 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 from the 19th to 21st of June 2023 to examine the flora and vegetation groups contained within the survey area. A total of 30 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

Flora was collected for identification under the Scientific Collection 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 $\pm 4\text{m}$ 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, 2023). 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 Mines, Industry Regulation and Safety (DMIRS) 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.

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 (<i>BSc</i>) has over 19 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 June 2023. Flowering annual species were present within the survey area, suggesting recent above average rainfall in April and June 2023 was sufficient for the period of survey. The most recent rainfall received in the area was on 9 th June 2023.
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 Previous Flora Survey Reports

4.1.1.1 Jaurdi Level 2 Flora and Vegetation Survey- Part 2, September 2017 (NVS, 2017)

The Jaurdi survey area (589.91 hectares) in 2017 was located adjacent to the current survey area. This survey was a Detailed quadrat survey including twenty-nine 20m x 20m quadrats.

Eighty-five species were recorded within the survey area with 84 species recorded within quadrats. Thirty-nine genera and 24 families were found. Of the native species, Chenopodiaceae had the highest representation, with 19 species from 8 genera, dominated by *Maireana*. Fabaceae and Scrophulariaceae were the next best represented families with 12 species each.

Nine vegetation groups were identified during this survey, largely following topographical features and dominant species. A summary of the vegetation groups can be seen below in Table 2.

Table 2: Vegetation Group Extent within the Jaurdi Hills Survey Area

Vegetation Group	Families	Genera	Species	Area (ha)	Percentage of survey area (%)
A- <i>Eucalyptus griffithsii</i> and <i>E. campaspe</i> over <i>Acacia acuminata</i> over mixed sclerophyll shrubland	14	16	26	5.051	0.86%
B- <i>Eucalyptus campaspe</i> and <i>Eucalyptus clelandii</i> woodland	12	19	36	42.94	7.28%
C- <i>Eucalyptus griffithsii</i> woodland over Chenopod shrublands	9	15	27	1.55	0.26%
D- Open Chenopod shrubland	8	13	26	9.58	1.62%
E- <i>Eucalyptus salmonophloia</i> woodland	14	26	53	164.27	27.85%
F- Mixed <i>Eucalyptus</i> woodland over sclerophyll shrubland	16	25	57	255.03	43.23%
G- <i>Eucalyptus</i> thicket in open depressions	9	11	19	26.90	4.56%
H- <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> over Chenopod shrublands	10	17	37	5.04	0.85%
I- <i>Eucalyptus</i> over <i>Melaleuca sheathiana</i> over <i>Cratystylis conocephala</i> on calcrete rises	14	24	40	55.37	9.39%
J- Existing Disturbance	0	0	0	24.18	4.10%
Total	24*	39*	85*	589.91#	100.00%#

*Denotes total recorded in the survey area (not sum of column)

Denotes sum of column

The field assessment established that the condition of the vegetation in the proposed disturbance area was overall “Very Good”, with few areas of “Good” vegetation condition, where exploration disturbance, grazing and access tracks were present within the survey area.

No Threatened species were recorded during the survey.

One Priority species, *Eremophila praecox* (P1), was identified in the survey area within Q22, which lies within Vegetation Group H. Two plants were recorded here within a 200m radius. There is some suggestion that *Eremophila praecox* (P1) is a hybrid between *Eremophila ionantha* and *Eremophila parvifolia*, which were both abundant in the general area.

4.1.1.2 Threatened flora and Malleefowl mound targeted search: Jaurdi Gold project magazine area and access track (NVS, 2018)

On the 13th February 2018, NVS was commissioned by Beacon Mining Pty Ltd to conduct a Threatened Flora Targeted search as well as a Malleefowl mound targeted search along the proposed access track to the proposed Explosive Magazine area at the Jaurdi Gold Project.

A total of 3 hours was spent on site surveying the targeted search area via a Kawasaki Mule. All areas were accessible, and vegetation consisted of open mixed Eucalypt woodlands.

No Threatened Flora were recorded in the survey area.

No Mallee Fowl Mounds were recorded in the survey area. Vegetation in the survey area was not consistent with suitable habitat for Malleefowl, as the vegetation was open and sparse.

4.1.1.3 Threatened flora and Malleefowl mound targeted search: Jaurdi Gold project production borefield and access tracks (NVS, 2018a)

On the 22nd May 2018, Native Vegetation Solutions (NVS) was commissioned by Beacon Mining Pty Ltd to conduct a Threatened Flora Targeted search as well as a Mallee Fowl mound targeted search, along the proposed access tracks to the proposed Production Borefield area at the Jaurdi Gold Project.

A total of 4 hours was spent on site surveying the targeted search area via a Kawasaki Mule. All areas were accessible, and vegetation consisted of open mixed Eucalypt woodlands.

No Threatened Flora were recorded in the survey area.

No Mallee Fowl Mounds were recorded in the survey area. Vegetation in the survey area was not consistent with suitable habitat for Malleefowl, as the vegetation was open and sparse.

4.1.1.4 Targeted Threatened Flora and Malleefowl Mound Survey, Panther Project- April 2020 (NVS, 2020)

Beacon Mining Pty Ltd (BCN) were proposing to expand the existing Panther Project, by cutting back the existing Open Pit and expanding the existing Waste Landform, as well as establishing a 3.1km pipeline route from the Black Cat Project to the Panther Project. The Panther Project lies approximately 2.8km northwest of the Black Cat Project, and approximately 7.2km northwest of the main Jaurdi Gold Project.

NVS conducted field assessments on the 4th April and 28th April 2020. Four hours in total were spent covering the entire survey area on foot and via 4-wheeldrive vehicle. During field work

NVS confirmed that the vegetation present within the survey area is representative of the vegetation groups described in NVS (2017).

No Threatened Flora or Priority Flora were recorded in the survey area during the field assessment. The vegetation present in the survey had the potential to provide suitable habitat for *Eremophila praecox* (P1), however the survey area was searched extensively, and this species was not recorded during the field work.

No Malleefowl mounds were recorded in the survey area.

4.1.2 EPBC Act Protected Matters

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

The EPBC Protected Matters search tool revealed that the survey area could possibly contain suitable habitat for Threatened Flora species *Gastrolobium graniticum* (T) and *Thelymitra stellata* (T).

Gastrolobium graniticum (T) occurs mainly on granite outcrops. No granite outcrops occur in the survey area; therefore it is very unlikely that this species occurs in the survey area.

Thelymitra stellata (T) is known only to occur on the western Coast of Western Australia between Geraldton and Perth. It is very unlikely that this species occurs in the survey area.

The EPBC Protected Matters report indicated no TECs or Commonwealth Reserves within the requested survey area.

4.1.3 Threatened Flora and Communities

The DBCA database searches revealed a potential for two Threatened and 18 Priority Flora species to occur within a 30km radius of the survey area (DBCA, 2017a). No known locations of Threatened or Priority Flora occur within the survey area, with the closest Priority Flora located approximately 45 km northwest of the survey area.

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.

The PEC/TEC search (DBCA, 2017) revealed that no TECs or PECs fall within the survey area, or within 20km of the survey area.

4.1.4 Environmentally Sensitive Areas and Conservation Reserves

No ESA's or Conservation Reserves are located within the survey area (DWER, 2023).

4.1.5 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 3 below and displayed in Appendix 4.

Table 3: Land Systems occurring within the survey area (DPIRD, 2017)

Land System	Description	Extent of Survey Area (ha)	% Of Survey Area (%)
Mx43	Gently undulating valley plains and pediments; some outcrop of basic rock	312.14	100.00%

4.1.6 Vegetation Type, Extent and Status

Five vegetation units defined by Beard (1990) were identified as part of the desktop assessment. The vegetation unit identifies 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 4, Table 5, Table 6, Table 7, Table 8 and Table 9 below. This information has been compiled through both desktop assessments and the site visit.

The extent of the Beard vegetation unit within the survey area at all scales is less than 1% of the total area at each scale (Table 4). The Beard vegetation units are above the 30% threshold at a State, bioregional and subregional scales.

Table 4: 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 (Coolgardie)
8	207.43	66.45%	<1%	<1%	<1%	<1%
128	5.83	1.87%	<1%	<1%	<1%	<1%
221	5.24	1.68%	<1%	<1%	<1%	<1%
555	18.99	6.08%	<1%	<1%	<1%	<1%
1413	74.65	23.92%	<1%	<1%	<1%	<1%

Table 5: Summary of information regarding Pre-European and current vegetation extent of Vegetation Association 8 within the survey area

Factor	Value				
Beard Vegetation Association*	8				
Vegetation Association Description*	Medium woodland; salmon gum & gimlet				
Pre-European Extent (ha)	Scale				
	By Association (WA)	By Association (WA)	By IBRA Region (COO)	By IBRA Sub-region (COO03)	By Shire (Shire Coolgardie)
	1,096,450*	694,638**	280,248**	226,086**	160,584**
% Pre-European Extent Remaining	57.63%*	49.87%**	98.34%**	99.53%**	99.34%**
Surrounding Land Use***	Mining, Exploration, Pastoral Lease				
Weed prevalence***	Low				

* Source: Shepherd *et al.* (2002) Appendix 2

**Source: DBCA, (2019)

***Source: Field Assessment

Table 6: Summary of information regarding Pre-European and current vegetation extent of Vegetation Association 128 within the survey area

Factor	Value				
Beard Vegetation Association*	128				
Vegetation Association Description*	Bare areas; rock outcrops				
Pre-European Extent (ha)	Scale				
	By Association (WA)	By Association (WA)	By IBRA Region (COO)	By IBRA Sub-region (COO03)	By Shire (Shire Coolgardie)
	503,092*	329,836**	184,549**	26,871**	96,232**
% Pre-European Extent Remaining	60.14%*	87.56%**	99.64%**	99.93%**	99.98%**
Surrounding Land Use***	Mining, Exploration, Pastoral Lease				
Weed prevalence***	Low				

* Source: Shepherd *et al.* (2002) Appendix 2

**Source: DBCA, (2019)

***Source: Field Assessment

Table 7: Summary of information regarding Pre-European and current vegetation extent of Vegetation Association 221 within the survey area

Factor	Value				
Beard Vegetation Association*	221				
Vegetation Association Description*	Succulent steppe; saltbush				
Pre-European Extent (ha)	Scale				
	By Association (WA)	By Association (WA)	By IBRA Region (COO)	By IBRA Sub-region (COO03)	By Shire (Shire Coolgardie)
	58,600*	63,720**	19,497**	17,695**	1003**
% Pre-European Extent Remaining	100.00%*	94.04%**	99.01%**	99.03%**	99.02%**
Surrounding Land Use***	Mining, Exploration, Pastoral Lease				
Weed prevalence***	Low				

* Source: Shepherd *et al.* (2002) Appendix 2

**Source: DBCA, (2019)

***Source: Field Assessment

Table 8: Summary of information regarding Pre-European and current vegetation extent of Vegetation Association 555 within the survey area

Factor	Value				
Beard Vegetation Association*	555				
Vegetation Association Description*	Hummock grasslands, mallee steppe; red mallee over spinifex <i>Triodia scariosa</i>				
Pre-European Extent (ha)	Scale				
	By Association (WA)	By Association (WA)	By IBRA Region (COO)	By IBRA Sub-region (COO03)	By Shire (Shire Coolgardie)
	57,310*	57,420**	34,944**	13,314**	15,060**
% Pre-European Extent Remaining	100.00%*	99.71%**	99.54%**	98.79%**	98.97%**
Surrounding Land Use***	Mining, Exploration, Pastoral Lease				
Weed prevalence***	Low				

* Source: Shepherd *et al.* (2002) Appendix 2

**Source: DBCA, (2019)

***Source: Field Assessment

Table 9: Summary of information regarding Pre-European and current vegetation extent of Vegetation Association 1413 within the survey area

Factor	Value				
Beard Vegetation Association*	1413				
Vegetation Association Description*	Shrublands; <i>Acacia</i> , <i>Casuarina</i> & <i>Melaleuca</i> thicket				
Pre-European Extent (ha)	Scale				
	By Association (WA)	By Association (WA)	By IBRA Region (COO)	By IBRA Sub-region (COO03)	By Shire (Shire Coolgardie)
	1,981,503*	1,679,916**	1,061,212**	107,974**	334,488**
% Pre-European Extent Remaining	67.05%*	76.60%**	98.24%**	99.77%**	99.93%**
Surrounding Land Use***	Mining, Exploration, Pastoral Lease				
Weed prevalence***	Low				

* Source: Shepherd *et al.* (2002) Appendix 2

**Source: DBCA, (2019)

***Source: Field Assessment

4.1.7 Wetlands

The DWER Clearing Permit System Map Viewer revealed no waterbodies within the survey area (DWER, 2023).

4.1.8 Dieback

The survey area lies south of the 26th parallel, however receives average annual rainfall of 264.8 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 Threatened Flora were recorded in the survey area.

One Priority Flora was recorded in the survey area, *Homalocalyx grandiflorus* (P3). Locations of Priority Flora species are included in Appendix 4. Population numbers and GPS locations of Priority Flora recorded by NVS and located inside the survey area are included in Table 10 below.

Table 10: Priority Flora recorded within the survey area

Taxon Name	Abundance	WACONSTAT	Longitude (GDA2020)	Latitude (GDA2020)
<i>Homalocalyx grandiflorus</i>	10	P3	120.908629	-30.829607
<i>Homalocalyx grandiflorus</i>	10	P3	120.909963	-30.824242

There are 16 records of this species on Florabase detailing a population in excess of 2,000 plants. The locations on Florabase range from 90km to the north of the survey area and 140km to the west of the survey area. Therefore, the proposed disturbance of 20 plants within the survey area is not likely to affect the conservation significance of this species locally or regionally.

4.2.2 Vegetation Type, Extent and Status

A total of 32 Families, 78 Genera and 180 Species were recorded within the survey area. Nineteen major vegetation groups were recorded in the survey area and range from Completely Degraded to Excellent 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 11 below. Maps of the survey area can be seen in Appendix 4.

Table 11: Vegetation Group Summary

Vegetation Group	Veg group Code	Families	Genera	Species	Area (ha)	Percentage of survey area (%)
<i>Acacia acuminata</i> and <i>Acacia effusifolia</i> thicket	A	11	14	18	3.48	1.11
<i>Acacia acuminata</i> shrubland with occasional <i>Eucalyptus griffithsii</i>	B	12	14	19	5.19	1.66
<i>Acacia acuminata</i> thicket	C	11	21	28	15.42	4.94
<i>Acacia heteroneura</i> var. <i>jutsonii</i> shrubland with occasional <i>Eucalyptus griffithsii</i> on yellow sandplains	D	9	19	27	24.36	7.80
<i>Acacia kalgoorliensis</i> over sclerophyll shrubland	E	15	26	37	11.39	3.65
<i>Eucalyptus salmonophloia</i> woodland over sclerophyll shrubland	F	10	14	21	15.03	4.81
<i>Eucalyptus</i> mallee woodland over sclerophyll shrubland	G	14	18	26	8.78	2.81
<i>Eucalyptus oleosa</i> and <i>Eucalyptus griffithsii</i> over <i>Acacia acuminata</i> shrubland	H	12	18	24	2.02	0.65
<i>Eucalyptus oleosa</i> over chenopod shrubland	I	14	18	26	6.32	2.02
<i>Eucalyptus salmonophloia</i> over <i>Acacia acuminata</i> and <i>Eremophila dempsteri</i> thicket	J	9	12	18	1.43	0.46
<i>Eucalyptus salubris</i> open woodland	K	7	9	13	4.68	1.50
<i>Eucalyptus salubris</i> thicket along drainage line	L	10	11	18	1.16	0.37
<i>Eucalyptus griffithsii</i> over <i>Melaleuca</i> shrubland	M	13	15	23	10.83	3.47
<i>Melaleuca lateriflora</i> thicket	N	14	21	29	0.88	0.28
Open Chenopod and sclerophyll shrubland	O	13	21	31	4.25	1.36
Sclerophyll shrubland	P	18	27	48	5.06	1.62
Tecticornia shrubland	Q	5	9	15	1.50	0.48
Transitional <i>Eucalyptus</i> woodland over sclerophyll shrubland	R	20	31	74	157.92	50.59
<i>Eucalyptus</i> mallee woodland over Spinifex	S	13	23	31	15.82	5.07
Existing Disturbance	N/A	N/A	N/A	N/A	16.63	5.33
Total		32*	78*	180*	312.15#	100%#

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 *Acacia acuminata* and *Acacia effusifolia* thicket (A)

This Thicket (Muir, 1977) consisted of 11 Families, 14 Genera and 18 Species. The vegetation group was approximately 3.48 ha which makes up 1.11% of the survey area.



Figure 4: Vegetation Group A within the survey area

4.2.2.2 *Acacia acuminata* shrubland with occasional *Eucalyptus griffithsii* (B)

This Thicket (Muir, 1977) consisted of 12 Families, 14 Genera and 19 Species. The vegetation group was approximately 5.19 ha which makes up 1.66% of the survey area.



Figure 5: Vegetation Group B within the survey area

4.2.2.3 *Acacia acuminata* thicket (C)

This Thicket (Muir, 1977) consisted of 11 Families, 21 Genera and 28 Species. The vegetation group was approximately 15.42 ha which makes up 4.94% of the survey area.



Figure 6: Vegetation Group C within the survey area

4.2.2.4 *Acacia heteroneura* var. *jutsonii* shrubland with occasional *Eucalyptus griffithsii* on yellow sandplains (D)

This Heath B (Muir, 1977) consisted of 9 Families, 19 Genera and 27 Species. The vegetation group was approximately 24.36 ha which makes up 7.80% of the survey area.



Figure 7: Vegetation Group D within the survey area

4.2.2.5 *Acacia kalgoorliensis* over sclerophyll shrubland (E)

This Scrub (Muir, 1977) consisted of 15 Families, 26 Genera and 37 Species. The vegetation group was approximately 11.39 ha which makes up 3.65% of the survey area.



Figure 8: Vegetation Group E within the survey area

4.2.2.6 *Eucalyptus salmonophloia* woodland over sclerophyll shrubland (F)

This Woodland (Muir, 1977) consisted of 10 Families, 14 Genera and 21 Species. The vegetation group was approximately 15.03 ha which makes up 4.81% of the survey area.



Figure 9: Vegetation Group F within the survey area

4.2.2.7 *Eucalyptus* mallee woodland over sclerophyll shrubland (G)

This Open Tree Mallee (Muir, 1977) consisted of 14 Families, 18 Genera and 26 Species. The vegetation group was approximately 8.78 ha which makes up 2.81% of the survey area.



Figure 10: Vegetation Group G within the survey area

4.2.2.8 *Eucalyptus oleosa* and *Eucalyptus griffithsii* over *Acacia acuminata* shrubland (H)

This Tree Mallee (Muir, 1977) consisted of 11 Families, 18 Genera and 24 Species. The vegetation group was approximately 2.02 ha which makes up 0.65% of the survey area.



Figure 11: Vegetation Group H within the survey area

4.2.2.9 *Eucalyptus oleosa* over chenopod shrubland (I)

This Open Tree Mallee (Muir, 1977) consisted of 14 Families, 18 Genera and 26 Species. The vegetation group was approximately 6.32 ha which makes up 2.02% of the survey area.



Figure 12: Vegetation Group I within the survey area

4.2.2.10 *Eucalyptus salmonophloia* over *Acacia acuminata* and *Eremophila dempsteri* thicket (J)

This Woodland over Heath A (Muir, 1977) consisted of 8 Families, 12 Genera and 18 Species. The vegetation group was approximately 1.43 ha which makes up 0.46% of the survey area.



Figure 13: Vegetation Group J within the survey area

4.2.2.11 *Eucalyptus salubris* open woodland (K)

This Open Tree Mallee (Muir, 1977) consisted of 7 Families, 9 Genera and 13 Species. The vegetation group was approximately 4.68 ha which makes up 1.50% of the survey area.



Figure 14: Vegetation Group K within the survey area

4.2.2.12 *Eucalyptus salubris* thicket along drainage line (L)

This Tree Mallee (Muir, 1977) consisted of 10 Families, 11 Genera and 18 Species. The vegetation group was approximately 1.16 ha which makes up 0.37% of the survey area.



Figure 15: Vegetation Group L within the survey area

4.2.2.13 *Eucalyptus griffithsii* over *Melaleuca* shrubland (M)

This Open Tree Mallee (Muir, 1977) consisted of 13 Families, 15 Genera and 23 Species. The vegetation group was approximately 10.83 ha which makes up 3.47% of the survey area.



Figure 16: Vegetation Group M within the survey area

4.2.2.14 *Melaleuca lateriflora* thicket (N)

This Thicket (Muir, 1977) consisted of 14 Families, 21 Genera and 29 Species. The vegetation group was approximately 0.88 ha which makes up 0.28% of the survey area.



Figure 17: Vegetation Group N within the survey area

4.2.2.15 Open Chenopod and sclerophyll shrubland (O)

This Heath B (Muir, 1977) consisted of 13 Families, 21 Genera and 31 Species. The vegetation group was approximately 4.25 ha which makes up 1.36% of the survey area.



Figure 18: Vegetation Group O within the survey area

4.2.2.16 Sclerophyll shrubland (P)

This Heath B (Muir, 1977) consisted of 18 Families, 27 Genera and 48 Species. The vegetation group was approximately 5.06 ha which makes up 1.62% of the survey area.



Figure 19: Vegetation Group P within the survey area

4.2.2.17 *Tecticornia* shrubland (Q)

This Low Heath D (Muir, 1977) consisted of 5 Families, 9 Genera and 15 Species. The vegetation group was approximately 1.50 ha which makes up 0.48% of the survey area.



Figure 20: Vegetation Group Q within the survey area

4.2.2.18 Transitional *Eucalyptus* woodland over sclerophyll shrubland (R)

This Woodland (Muir, 1977) consisted of 20 Families, 31 Genera and 74 Species. The vegetation group was approximately 157.92 ha which makes up 50.59% of the survey area.



Figure 21: Vegetation Group R within the survey area

4.2.2.19 *Eucalyptus* mallee woodland over Spinifex (S)

This Low Woodland A (Muir, 1977) consisted of 13 Families, 23 Genera and 31 Species. The vegetation group was approximately 15.82 ha which makes up 5.07% of the survey area.



Figure 22: Vegetation Group S within the survey area

4.2.2.20 Existing Disturbance

Existing disturbance within the survey area consisted of historic exploration clearing and access roads and was approximately 16.63 ha which makes up 5.33% of the survey area.



Figure 23: Existing disturbance within the survey area

4.2.3 Weeds

Six weed species was recorded within the survey area, *Asphodelus fistulosus* (Onion Weed), *Centaurea melitensis* (Maltese Cockspur), *Heliotropium europaeum* (Common Heliotrope), *Lysimachia arvensis* (Pimpernel), *Salvia verbenaca* (Wild Sage), and *Sonchus oleraceus* (Common Sowthistle). None of these species is not considered a Declared Pest under the BAM Act (DPIRD, 2023).

4.2.4 Vegetation Condition

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

Overall, the condition of the vegetation was determined to range from “Completely Degraded” to “Excellent” 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 “Excellent” 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, *Asphodelus fistulosus* (Onion Weed), *Centaurea melitensis* (Maltese Cockspur), *Heliotropium europaeum* (Common Heliotrope), *Lysimachia arvensis* (Pimpernel), *Salvia verbenaca* (Wild Sage), and *Sonchus oleraceus* (Common Sowthistle). None of these species is not considered a Declared Pest under the BAM Act (DPIRD, 2023).

No Threatened Flora were recorded in the survey area.

One Priority Flora was recorded in the survey area, *Homalocalyx grandiflorus* (P3). Two locations with a total population size of 20 plants were recorded.

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.

6. REFERENCES

Beard, J.S., (1990), *Plant Life of Western Australia*, Kangaroo Press Pty Ltd, NSW

BOM, (2023), *Climate Data Online*, Bureau of Meteorology,

<http://www.bom.gov.au/climate/averages/>

Accessed: 31/01/2023

CALM, (2002), *A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002- Coolgardie (COO03 Eastern Goldfields synopses)*, Department of Conservation and Land Management

CALM, (2003), *Phytophthora cinnamomi and Diseases Caused by It, Volume 1-Management Guidelines*, Department of Conservation and Land Management

<https://library.dbca.wa.gov.au/FullTextFiles/021873.pdf>

Accessed: 31/01/2023

DCCEEW, (2022), *Interim Biogeographic Regionalisation for Australia (IBRA)*, Version 7, Department of Climate Change, Energy, the Environment and Water, Australian Government

<https://www.environment.gov.au/land/nrs/science/ibra>

Accessed: 31/01/2023

DCCEEW (2023), *Protected Matters Search Tool*, Department of Climate Change, Energy, the Environment and Water, Australian Government

<http://www.environment.gov.au/epbc/protected-matters-search-tool>

Accessed: 31/01/2023

DBCA, (2017), *TEC/PEC Database Results Ref:11_0717EC*, Department of Biodiversity, Conservation and Attractions

DBCA, (2017a), *Threatened Flora Database Results Ref: 04_0717FL*, Department of Biodiversity, Conservation and Attractions

DBCA, (2019), *2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report)- Current as of March 2019*, WA Department of Biodiversity, Conservation and Attractions, Perth

<https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics>

Accessed: 31/01/2023

DBCA, (2019a) *Conservation Codes for Western Australian Flora and Fauna*. Department of Biodiversity, Conservation and Attractions, Western Australia, January 2019

DBCA, (2020), *Phytophthora Dieback Management Manual, October 2020*, Department of Biodiversity, Conservation and Attractions

DPIRD, (2017), *NRInfo Digital Mapping*, Department of Primary Industries and Regional Development

<https://maps.agric.wa.gov.au/nrm-info/>

Accessed: 31/01/2023

DPIRD, (2023), *Declared Plants Database*, Department of Primary Industries and Regional Development, Western Australia

<https://www.agric.wa.gov.au/pests-weeds-diseases/weeds/declared-plants>

Accessed: 31/01/2023

DWER, (2023), Clearing Permit System Map Viewer, Department of Water and Environmental Regulation

<https://cps.dwer.wa.gov.au/main.html>

Accessed: 31/01/2023

EPA, (2016), *Environmental Factor Guideline: Flora and Vegetation*, Environmental Protection Authority, Western Australia

EPA, (2016a), *Technical Guidance Flora and Vegetation Surveys for Environmental Impact Assessment*, Environmental Protection Authority, Western Australia

Keighery, B.J., (1994), *Bushland Plant Survey; A guide to plant community survey for the Community*, Wildflower Society of Western Australia (Inc.) Nedlands

Muir, B.G., (1977), Biological Survey of the Western Australian Wheatbelt. Pt. 2. Vegetation and habitat of the Bending Reserve. Records of the Western Australian Museum Supplement 3

Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M., (2002), *Land-Use and Vegetation in Western Australia- National Land and Water Resources Audit Report*, Technical Report 250, Department of Agriculture Western Australia

Smith, M.G., Jones, A., (2018) *Threatened and priority flora list for Western Australia*, Department of Biodiversity, Conservation and Attractions

WAHERB, (2023), *Florabase- the Western Australian Flora*, Department of Parks and Wildlife

<http://florabase.dpaw.wa.gov.au/>

Accessed 31/01/2023

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
DMIRS	Department of 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
Ramsar	A wetland site designated of international importance under the Ramsar Convention (UNESCO)
TEC	Threatened Ecological Community
UNESCO	United Nations Educational, Scientific and Cultural Organization
WA	Western Australia
WAHERB	Western Australian Herbarium (DBCA)

Definitions:

DBCA (2019a) Conservation Codes for Western Australian Flora and Fauna. Department of Biodiversity, Conservation and Attractions, Western Australia, January 2019: -

T Threatened species:

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for Threatened Fauna.

Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the *Wildlife Conservation (Rare Flora) Notice 2018* for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR Critically endangered species

Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines".

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for critically endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for critically endangered flora.

EN Endangered species

Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines".

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for endangered flora.

VU Vulnerable species

Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines".

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for vulnerable fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for vulnerable flora.

Extinct species:

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

EX Extinct species

Species where "*there is no reasonable doubt that the last member of the species has died*", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.

EW Extinct in the wild species

Species that "is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially protected species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

MI Migratory species

Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

CD Species of special conservation interest (conservation dependent fauna)

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

OS Other specially protected species

Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Published as other specially protected fauna under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

P Priority Species

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

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

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

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. Such species are in need of 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 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 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: 07-Aug-2023

[Summary](#)

[Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

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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:	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:	None
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:	None
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 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
MAMMAL			
Dasyurus geoffroi 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 likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thelymitra stellata Star Sun-orchid [7060]	Endangered	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
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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]		Species or species habitat likely 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]		Species or species habitat likely to 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			

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

Scientific Name	Threatened Category	Presence Text	Buffer Status
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area overfly marine area	In feature area

Extra Information

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.

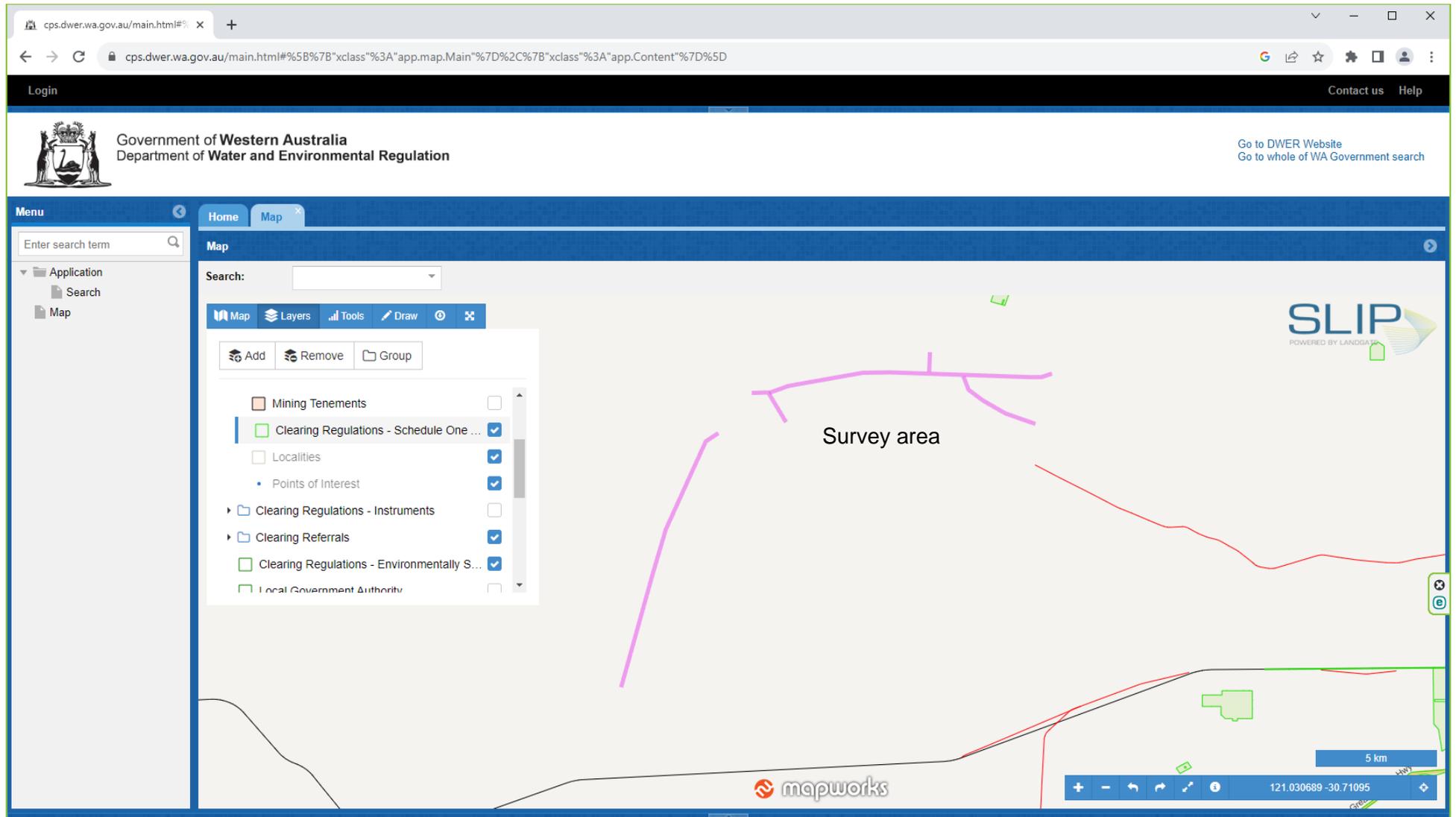
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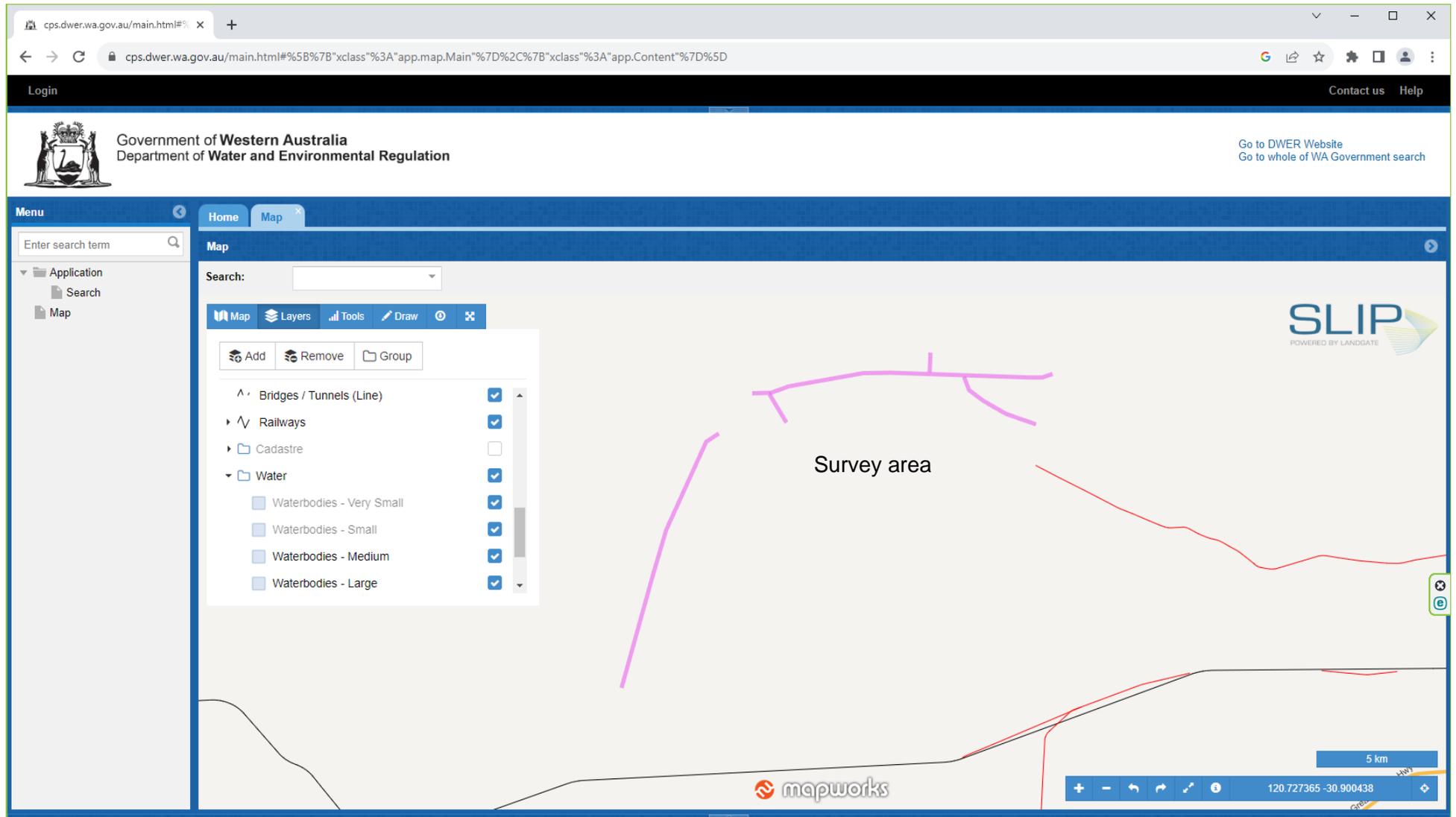
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DWER's Clearing Permit System Map Viewer showing no ESA's (dark green shaded areas) within the survey area (DWER, 2023)



DWER Clearing Permit System Map Viewer showing no waterbodies within the survey area (DWER, 2023)

Appendix 2: Threatened Flora Databases Search Results

GIS information provided in the Search results (Reference: 04-0717FL) listed the following species within a 30km radius of the survey area (DBCA, 2017a):

Taxon	Status	Likelihood Post Survey
<i>Acacia crenulata</i>	P3	Unlikely- Survey area extensively searched
<i>Alyxia tetanifolia</i>	P3	Unlikely- Survey area extensively searched
<i>Angianthus prostratus</i>	P3	Unlikely- Survey area extensively searched
<i>Austroparmelia macrospora</i>	P3	Unlikely- Survey area extensively searched
<i>Calytrix creswellii</i>	P3	Unlikely- Survey area extensively searched
<i>Cryptandra crispula</i>	P3	Unlikely- Survey area extensively searched
<i>Cyathostemon verrucosus</i>	P3	Unlikely- Survey area extensively searched
<i>Eremophila microphylla</i>	P3	Unlikely- Survey area extensively searched
<i>Elachanthus pusillus</i>	P2	Unlikely- Survey area extensively searched
<i>Eremophila praecox</i>	P2	Unlikely- Survey area extensively searched
<i>Eucalyptus crucis</i> subsp. <i>crucis</i>	T	Unlikely- Survey area extensively searched
<i>Eutaxia actinophylla</i>	P3	Unlikely- Survey area extensively searched
<i>Gastrolobium graniticum</i>	T	Unlikely- Survey area extensively searched
<i>Hakea rigida</i>	P2	Unlikely- Survey area extensively searched
<i>Hakea</i> sp. Great Victoria Desert (L. Cockram LAC 139) PN	P1	Unlikely- Survey area extensively searched
<i>Lepidium fasciculatum</i>	P3	Unlikely- Survey area extensively searched
<i>Notisia intonsa</i>	P3	Unlikely- Survey area extensively searched
<i>Phebalium clavatum</i>	P2	Unlikely- Survey area extensively searched
<i>Styphelia saxicola</i>	P3	Unlikely- Survey area extensively searched
<i>Xanthoparmelia dayiana</i>	P3	Unlikely- Survey area 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.

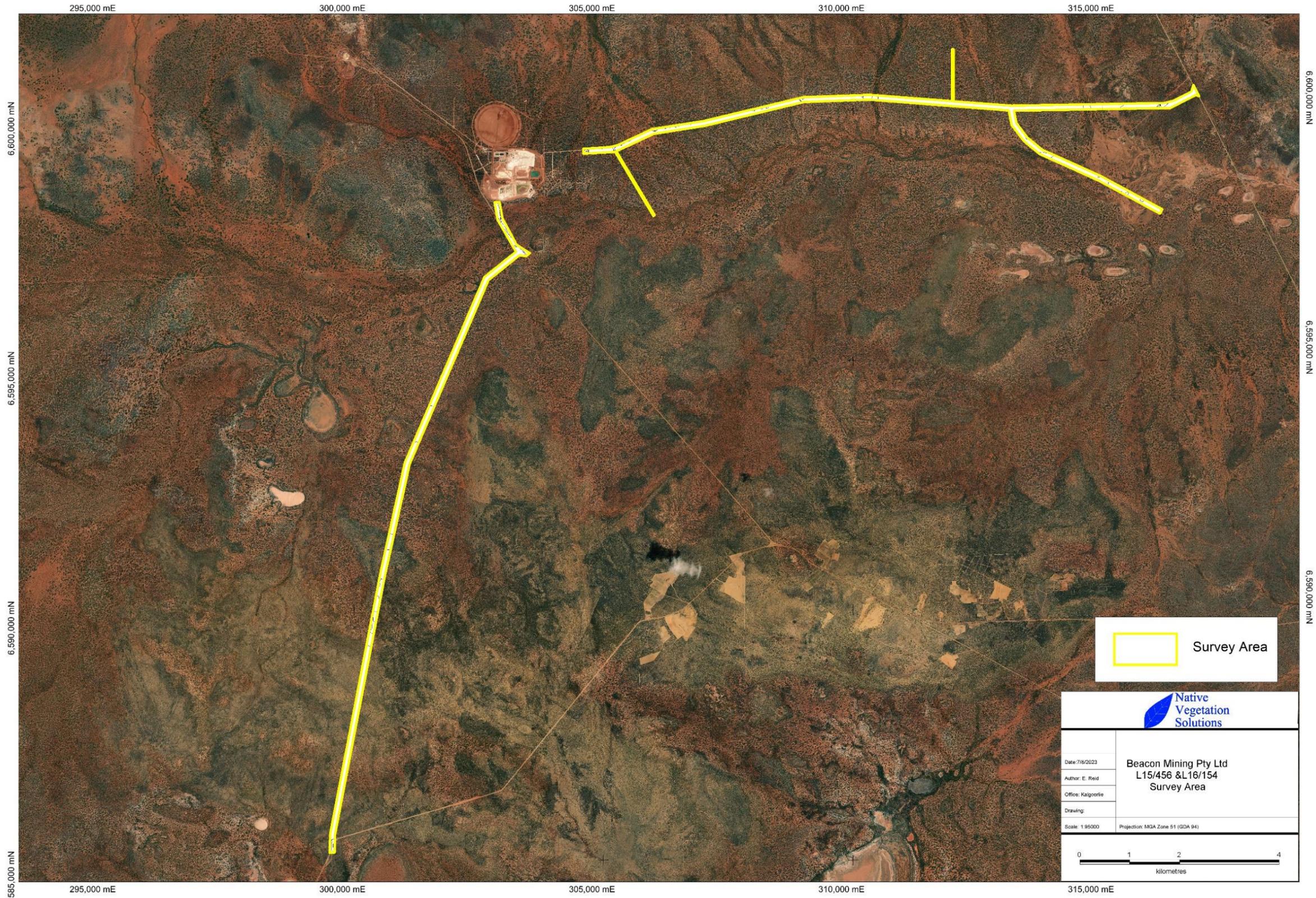
Completely Degraded (6). The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.

These areas are often described as 'parkland cleared' with the flora compromising weed or crop species with isolated trees or shrubs.

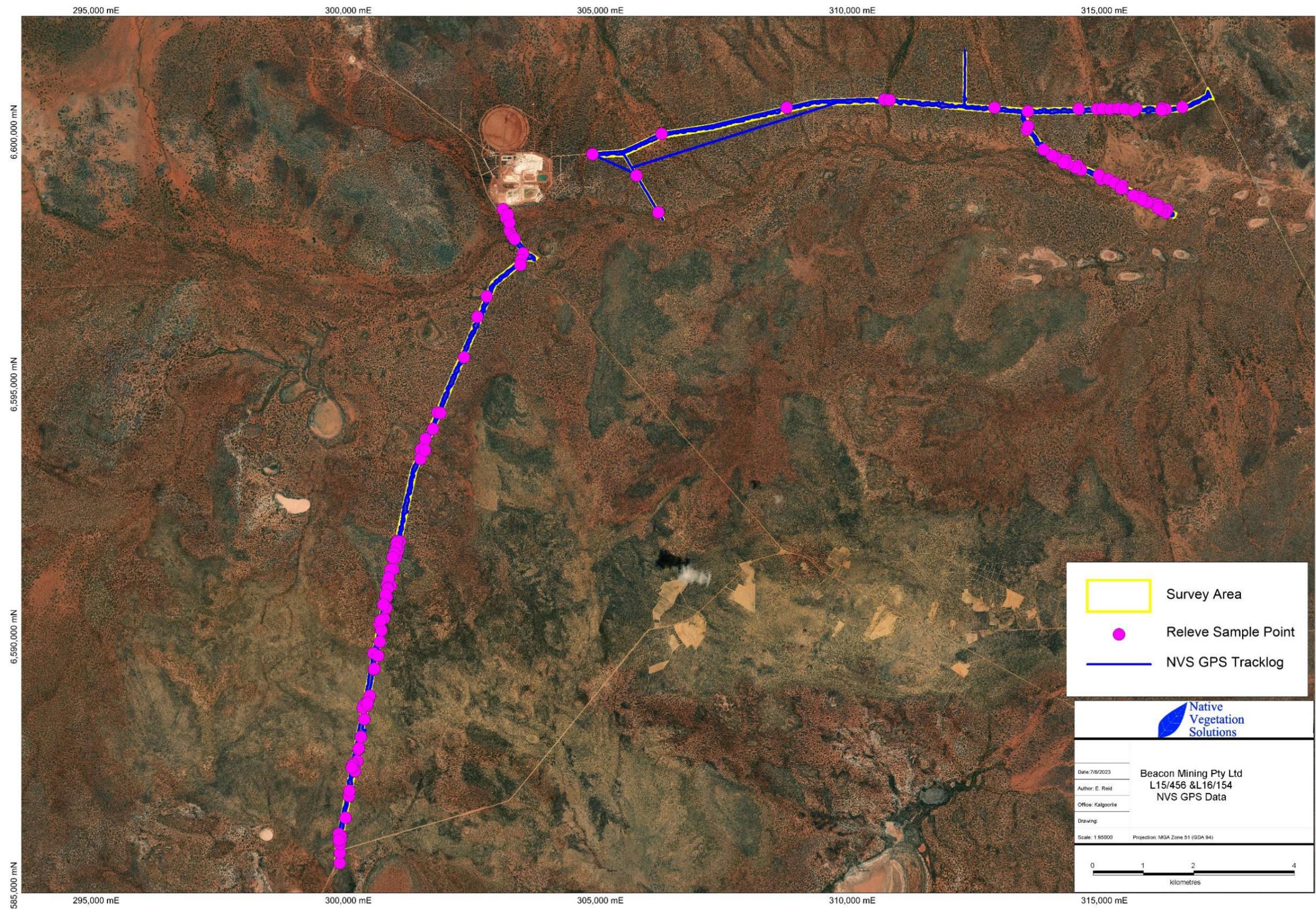
Vegetation Structure Definitions (Muir, 1977)

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 Woodland
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

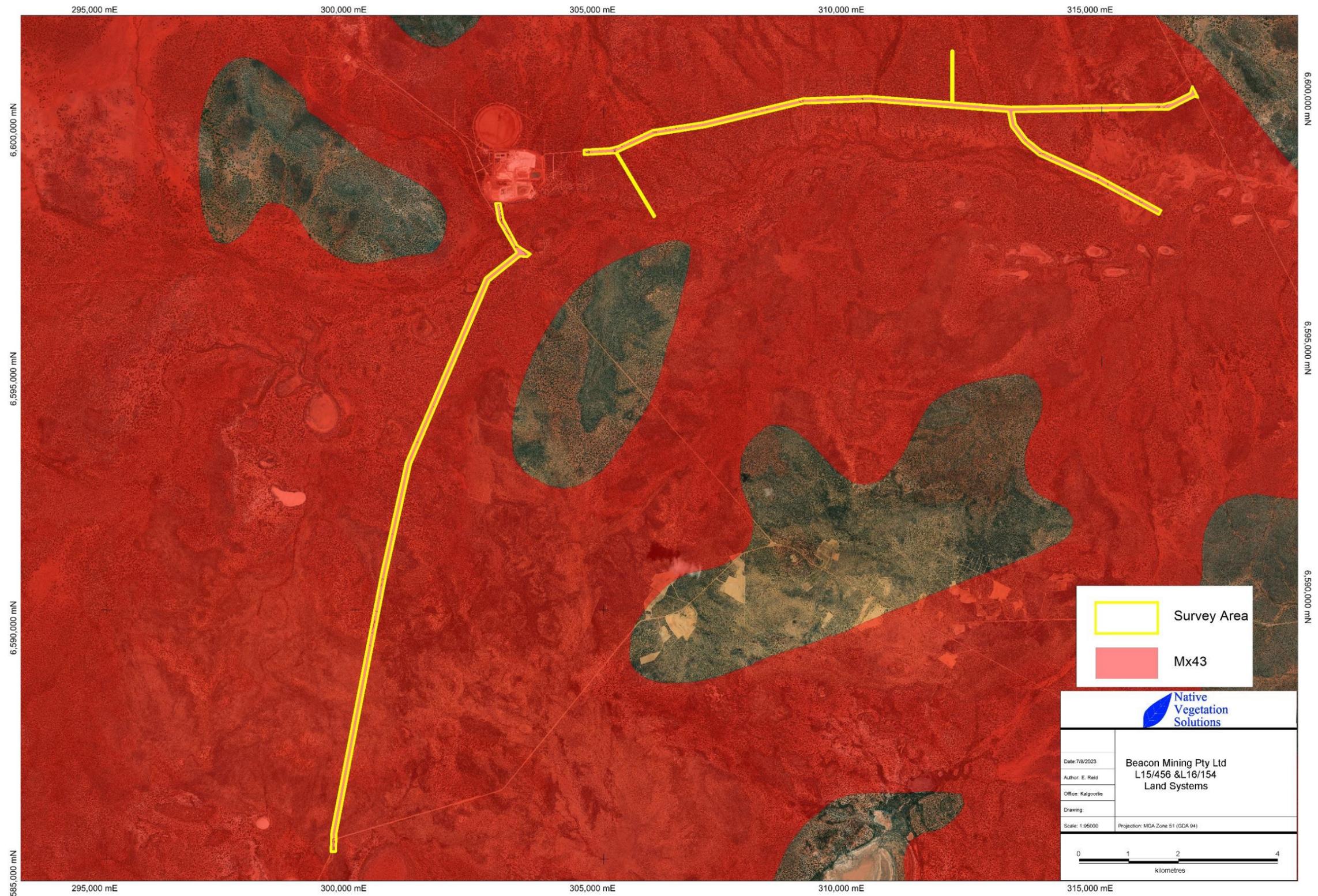
Appendix 4: Vegetation Mapping



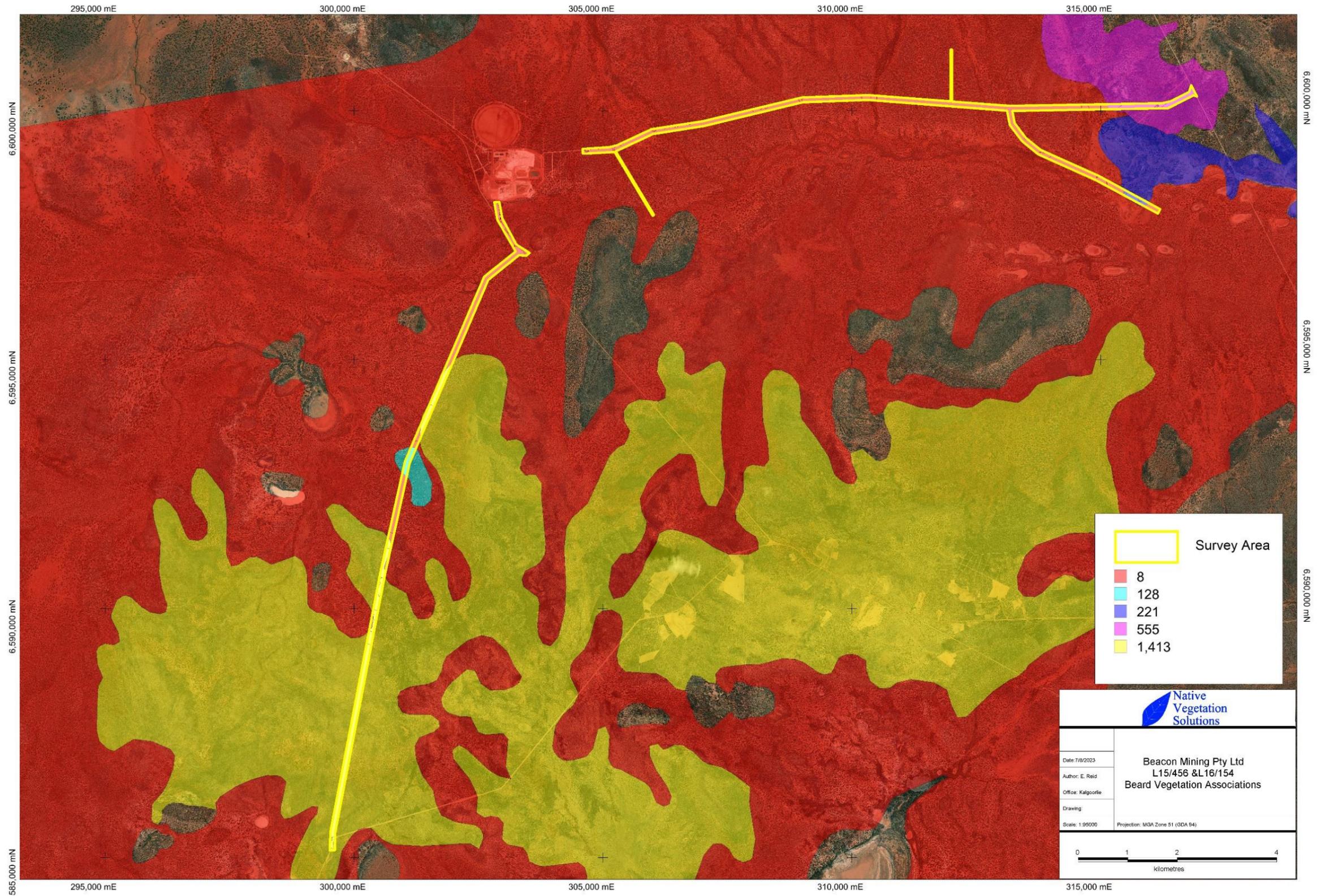
Map 1: Survey Area



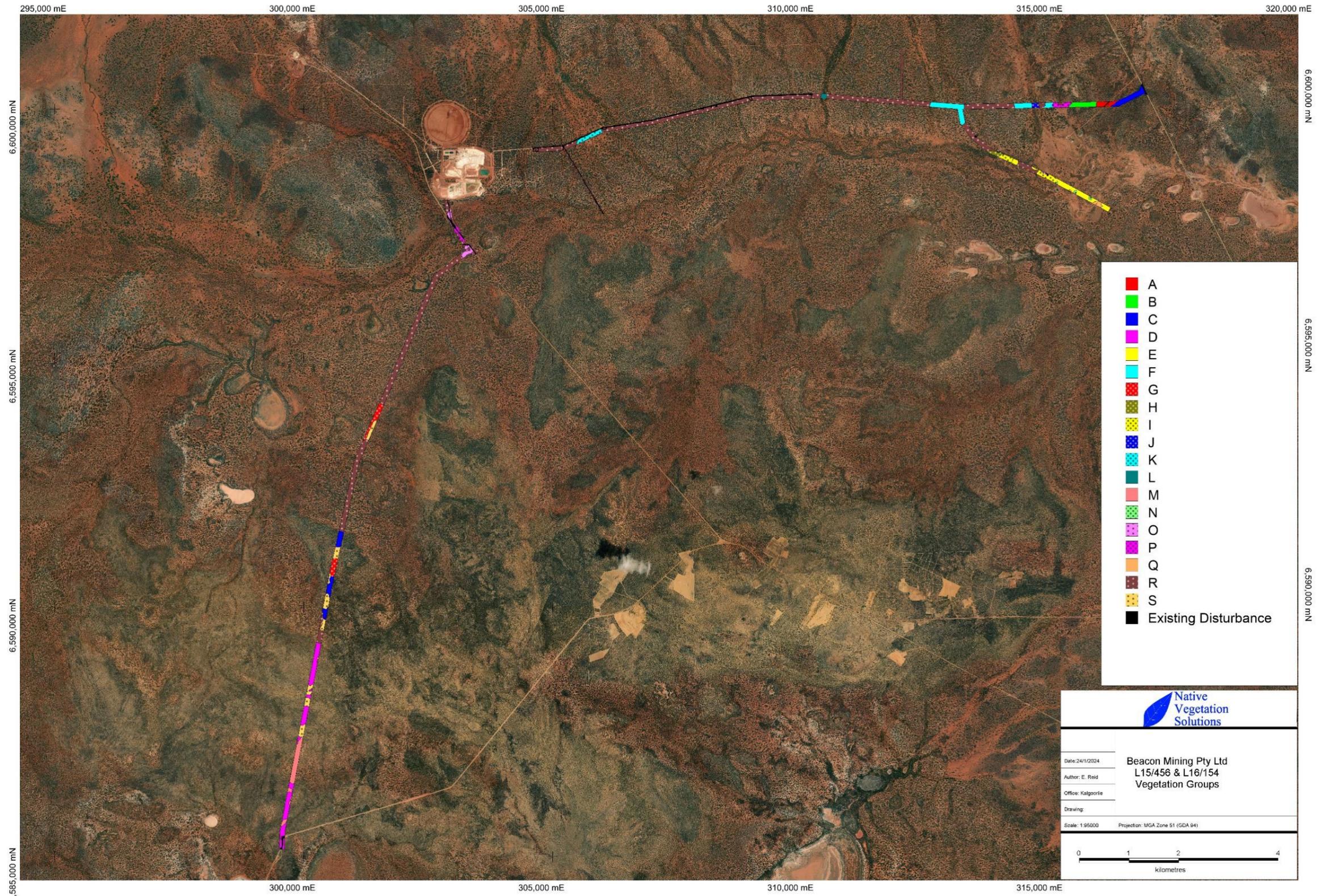
Map 2: NVS GP Data



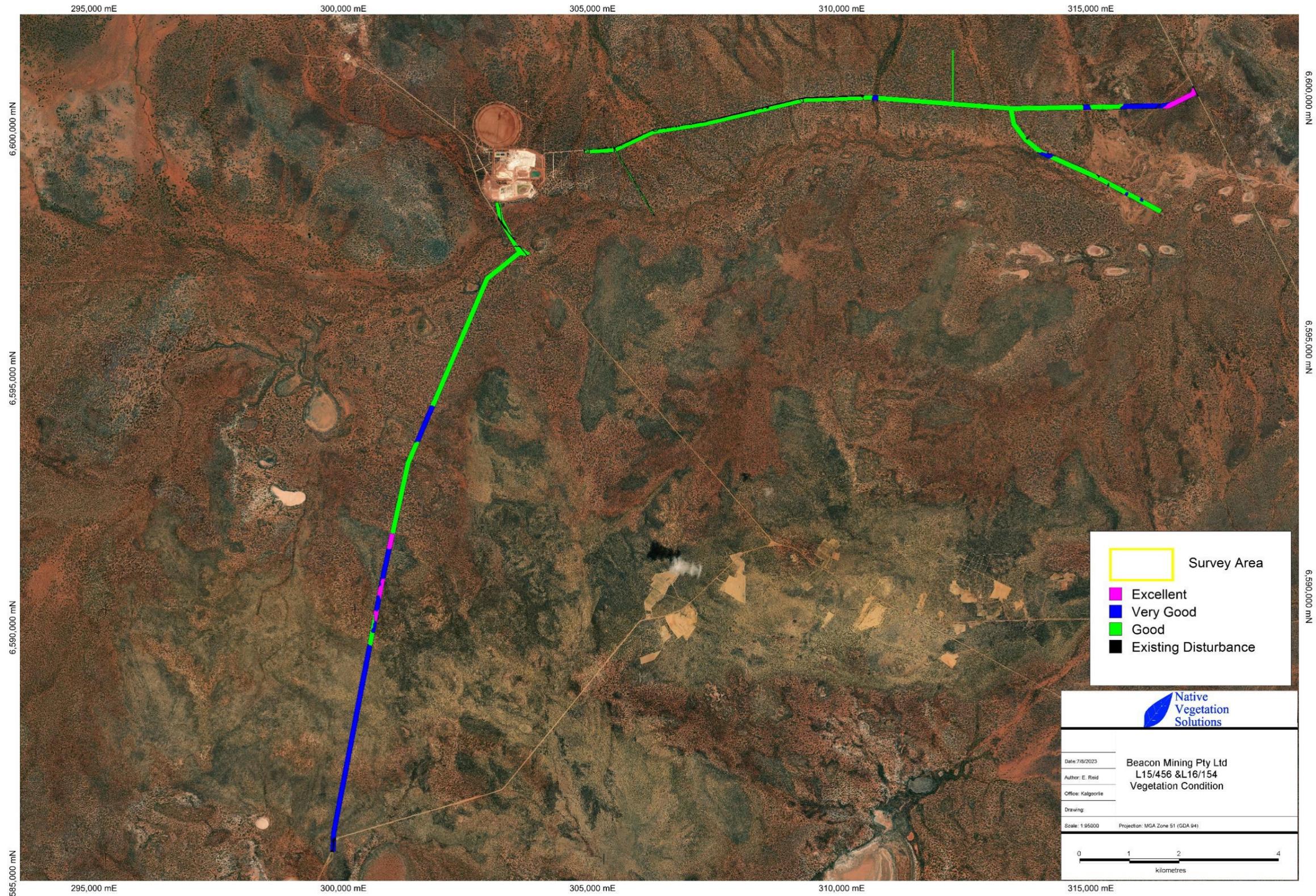
Map 3: Land Systems



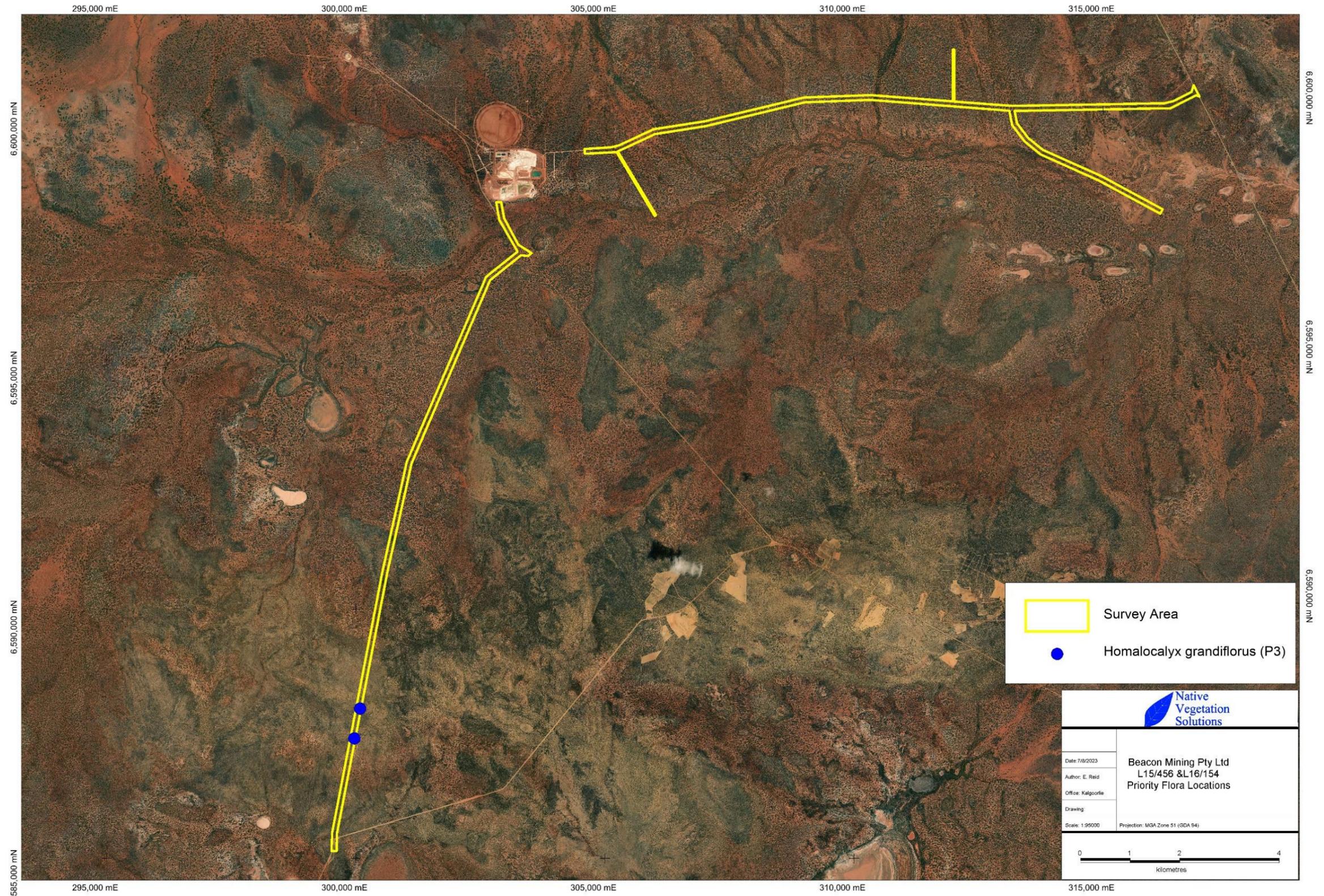
Map 4: Beard Vegetation Associations



Map 5: Vegetation Groups



Map 6: Vegetation Condition



Map 7: Priority Flora Locations

Appendix 5: Species List

Species List per Vegetation Group

Family	Genus	TAXONNAME	Annual (A) or Perennial (P)	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
Aizoaceae	<i>Disphyma</i>	<i>Disphyma crassifolium</i>	P					*					*				*			*		
Aizoaceae	<i>Gunningsia</i>	<i>Gunningsia quadrifida</i>	P					*									*			*		
Amaranthaceae	<i>Ptilotus</i>	<i>Ptilotus obovatus</i>	P	*	*			*		*			*						*		*	
Apocynaceae	<i>Alyxia</i>	<i>Alyxia buxifolia</i>	P			*										*					*	
Apocynaceae	<i>Leichhardtia</i>	<i>Leichhardtia australis</i>	P		*													*	*		*	
Asphodelaceae	<i>Asphodelus</i>	<i>Asphodelus fistulosus*</i>	A																			
Asteraceae	<i>Centaurea</i>	<i>Centaurea melitensis*</i>	A															*				
Asteraceae	<i>Chrysocephalum</i>	<i>Chrysocephalum puteale</i>	P	*																		
Asteraceae	<i>Cratystylis</i>	<i>Cratystylis conocephala</i>	P					*	*												*	
Asteraceae	<i>Cratystylis</i>	<i>Cratystylis microphylla</i>	P					*	*		*						*	*	*	*	*	*
Asteraceae	<i>Cratystylis</i>	<i>Cratystylis subspinescens</i>	P					*	*		*						*	*	*	*	*	*
Asteraceae	<i>Olearia</i>	<i>Olearia incana</i>	P													*						*
Asteraceae	<i>Olearia</i>	<i>Olearia minor</i>	P													*						*
Asteraceae	<i>Olearia</i>	<i>Olearia muelleri</i>	P					*	*					*								*
Asteraceae	<i>Olearia</i>	<i>Olearia pimeleoides</i>	P		*			*	*						*				*	*	*	*
Asteraceae	<i>Podolepis</i>	<i>Podolepis rugata</i>	P																		*	*
Asteraceae	<i>Senecio</i>	<i>Senecio glossanthus</i>	A																		*	
Asteraceae	<i>Siemssenia</i>	<i>Siemssenia capillaris</i>	A	*																	*	
Asteraceae	<i>Sonchus</i>	<i>Sonchus oleraceus*</i>	A															*				
Boraginaceae	<i>Halgania</i>	<i>Halgania cyanea</i> var. <i>Charleville</i>	P							*												
Boraginaceae	<i>Heliotropium</i>	<i>Heliotropium curassavicum</i>	A															*				
Boraginaceae	<i>Heliotropium</i>	<i>Heliotropium europaeum*</i>	A															*				
Casuarinaceae	<i>Allocasuarina</i>	<i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i>	P			*																*
Casuarinaceae	<i>Allocasuarina</i>	<i>Allocasuarina corniculata</i>	P			*																
Casuarinaceae	<i>Casuarina</i>	<i>Casuarina pauper</i>	P																*			
Chenopodiaceae	<i>Atriplex</i>	<i>Atriplex bunburyana</i>	P														*	*	*	*	*	*
Chenopodiaceae	<i>Atriplex</i>	<i>Atriplex codonocarpa</i>	P																		*	*
Chenopodiaceae	<i>Atriplex</i>	<i>Atriplex holocarpa</i>	A																			*
Chenopodiaceae	<i>Atriplex</i>	<i>Atriplex nummularia</i> subsp. <i>spathulata</i>	P									*	*					*	*	*	*	*
Chenopodiaceae	<i>Atriplex</i>	<i>Atriplex stipitata</i>	P					*									*	*	*	*	*	*
Chenopodiaceae	<i>Atriplex</i>	<i>Atriplex vesicaria</i>	P					*			*	*	*				*	*	*	*	*	*
Chenopodiaceae	<i>Enchylaena</i>	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	P	*				*	*	*	*	*	*				*	*	*	*	*	*
Chenopodiaceae	<i>Eriochiton</i>	<i>Eriochiton sclerolaenoides</i>	P					*									*	*	*	*	*	*
Chenopodiaceae	<i>Maireana</i>	<i>Maireana amoena</i>	P								*						*	*	*	*	*	*
Chenopodiaceae	<i>Maireana</i>	<i>Maireana georgei</i>	P							*							*	*	*	*	*	*
Chenopodiaceae	<i>Maireana</i>	<i>Maireana glomerifolia</i>	P					*									*	*	*	*	*	*
Chenopodiaceae	<i>Maireana</i>	<i>Maireana pentatropis</i>	P														*	*	*	*	*	*
Chenopodiaceae	<i>Maireana</i>	<i>Maireana pyramidata</i>	P				*			*							*	*	*	*	*	*
Chenopodiaceae	<i>Maireana</i>	<i>Maireana sedifolia</i>	P																		*	*
Chenopodiaceae	<i>Maireana</i>	<i>Maireana thesioides</i>	P														*	*	*	*	*	*
Chenopodiaceae	<i>Maireana</i>	<i>Maireana tomentosa</i>	P							*							*	*	*	*	*	*
Chenopodiaceae	<i>Maireana</i>	<i>Maireana triptera</i>	P					*		*	*	*	*				*	*	*	*	*	*
Chenopodiaceae	<i>Rhagodia</i>	<i>Rhagodia drummondii</i>	P					*	*	*	*	*	*	*	*		*	*	*	*	*	*
Chenopodiaceae	<i>Rhagodia</i>	<i>Rhagodia eremaea</i>	P					*	*	*	*	*	*	*	*		*	*	*	*	*	*
Chenopodiaceae	<i>Salsola</i>	<i>Salsola australis</i>	A																		*	*
Chenopodiaceae	<i>Sclerolaena</i>	<i>Sclerolaena cuneata</i>	P					*									*	*	*	*	*	*
Chenopodiaceae	<i>Sclerolaena</i>	<i>Sclerolaena densiflora</i>	P					*		*	*	*	*	*	*		*	*	*	*	*	*
Chenopodiaceae	<i>Sclerolaena</i>	<i>Sclerolaena diacantha</i>	P					*	*	*	*	*	*	*	*		*	*	*	*	*	*
Chenopodiaceae	<i>Sclerolaena</i>	<i>Sclerolaena patenticuspis</i>	P					*	*	*	*	*	*	*	*		*	*	*	*	*	*
Chenopodiaceae	<i>Tecticornia</i>	<i>Tecticornia disarticulata</i>	P					*						*			*	*	*	*	*	*
Chenopodiaceae	<i>Tecticornia</i>	<i>Tecticornia halocnemoides</i> subsp. <i>halocnemoides</i>	P					*									*	*	*	*	*	*
Chenopodiaceae	<i>Tecticornia</i>	<i>Tecticornia indica</i> subsp. <i>bidens</i>	P					*									*	*	*	*	*	*
Chenopodiaceae	<i>Tecticornia</i>	<i>Tecticornia pergranulata</i> subsp. <i>pergranulata</i>	P					*									*	*	*	*	*	*
Cyperaceae	<i>Callitris</i>	<i>Callitris preissii</i>	P			*	*		*													*
Cyperaceae	<i>Lepidosperma</i>	<i>Lepidosperma drummondii</i>	P														*					
Cyperaceae	<i>Lepidosperma</i>	<i>Lepidosperma sanguinolentum</i>	P						*													
Ericaceae	<i>Leucopogon</i>	<i>Leucopogon</i> sp. <i>Clyde Hill</i>	P			*																*
Euphorbiaceae	<i>Bertya</i>	<i>Bertya dimerostigma</i>	P						*													*
Euphorbiaceae	<i>Beyeria</i>	<i>Beyeria sulcata</i> var. <i>sulcata</i>	P			*	*		*							*					*	*
Fabaceae	<i>Daviesia</i>	<i>Daviesia aphylla</i>	P							*						*					*	*
Fabaceae	<i>Glycyrrhiza</i>	<i>Glycyrrhiza acanthocarpa</i>	P															*				
Fabaceae	<i>Jacksonia</i>	<i>Jacksonia arida</i>	P					*									*					
Fabaceae	<i>Mirbelia</i>	<i>Mirbelia depressa</i>	P		*																	*
Fabaceae	<i>Senna</i>	<i>Senna artemisioides</i> subsp. <i>artemisioides</i>	P		*										*						*	*
Fabaceae	<i>Senna</i>	<i>Senna artemisioides</i> subsp. <i>filifolia</i>	P	*	*			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Fabaceae	<i>Senna</i>	<i>Senna cardiosperma</i>	P					*	*								*	*	*	*	*	*
Fabaceae	<i>Swainsona</i>	<i>Swainsona canescens</i>	P					*	*		*				*					*	*	*
Frankeniaceae	<i>Frankenia</i>	<i>Frankenia interioris</i>	P					*			*	*	*	*	*		*	*	*	*	*	*
Frankeniaceae	<i>Frankenia</i>	<i>Frankenia pauciflora</i>	P					*			*	*	*	*	*		*	*	*	*	*	*
Frankeniaceae	<i>Frankenia</i>	<i>Frankenia setosa</i>	P					*			*	*	*	*	*		*	*	*	*	*	*
Goodeniaceae	<i>Goodenia</i>	<i>Goodenia berardiana</i>	A					*			*	*	*	*	*		*	*	*	*	*	*
Goodeniaceae	<i>Scaevola</i>	<i>Scaevola spinescens</i>	P					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hemerocallidaceae	<i>Dianella</i>	<i>Dianella revoluta</i> var. <i>divaricata</i>	P	*	*			*		*					*		*	*	*	*	*	*
Lamiaceae	<i>Prostanthera</i>	<i>Prostanthera campbellii</i>	P	*																		*
Lamiaceae	<i>Prostanthera</i>	<i>Prostanthera grylloana</i>	P	*		*	*															*
Lamiaceae	<i>Salvia</i>	<i>Salvia verbenaca*</i>	A					*											*			*
Lamiaceae	<i>Westringia</i>	<i>Westringia cephalantha</i>	P			*	*			*						*			*	*	*	*
Lamiaceae	<i>Westringia</i>	<i>Westringia rigida</i>	P					*		*						*			*	*	*	*
Loranthaceae	<i>Amyema</i>	<i>Amyema preissii</i>	P																		*	*
Malvaceae	<i>Acacia</i>	<i>Acacia acuminata</i>	P	*	*	*			*		*	*	*	*	*		*	*	*	*	*	*
Malvaceae	<i>Acacia</i>	<i>Acacia caesaneura</i>	P	*	*	*			*		*	*	*	*	*		*	*	*	*	*	*
Malvaceae	<i>Acacia</i>	<i>Acacia calcarata</i>	P		*																*	*
Malvaceae	<i>Acacia</i>	<i>Acacia colletioides</i>	P			*			*	*						*			*	*	*	*
Malvaceae	<i>Acacia</i>	<i>Acacia consanguinea</i>	P			*		*		*						*			*	*	*	*
Malvaceae	<i>Acacia</i>	<i>Acacia desertorum</i> var. <i>desertorum</i>	P			*		*		*						*			*	*	*	*

Family	Genus	TAXONNAME	Annual (A) or Perennial (P)																			
				A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
Malvaceae	Acacia	Acacia effusifolia	P	*																		
Malvaceae	Acacia	Acacia eremophila var. eremophila	P				*															
Malvaceae	Acacia	Acacia erinacea	P																	*		
Malvaceae	Acacia	Acacia hemiteles	P		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
Malvaceae	Acacia	Acacia heteroneura var. heteroneura	P				*															
Malvaceae	Acacia	Acacia heteroneura var. jutsonii	P				*							*								
Malvaceae	Acacia	Acacia kalgoorliensis	P					*			*	*				*				*		
Malvaceae	Acacia	Acacia ligulata	P					*										*	*	*		
Malvaceae	Acacia	Acacia lineolata subsp. lineolata	P									*							*	*		
Malvaceae	Acacia	Acacia masliniana	P					*												*		
Malvaceae	Acacia	Acacia merrallii	P																	*		
Malvaceae	Acacia	Acacia mulganeura	P	*		*														*		
Malvaceae	Acacia	Acacia prainii	P							*										*		
Malvaceae	Acacia	Acacia resinimarginea	P			*				*										*		
Malvaceae	Acacia	Acacia tetragonophylla	P		*	*				*			*					*		*		
Myrtaceae	Baeckea	Baeckea muricata	P			*														*		
Myrtaceae	Calothamnus	Calothamnus gilesii	P																	*		
Myrtaceae	Calytrix	Calytrix birdii	P	*		*														*		
Myrtaceae	Ericomyrtus	Ericomyrtus serpyllifolia	P				*													*		
Myrtaceae	Eucalyptus	Eucalyptus clelandiorum	P																	*		
Myrtaceae	Eucalyptus	Eucalyptus concinna	P																	*		
Myrtaceae	Eucalyptus	Eucalyptus eremophila subsp. eremophila	P												*					*		
Myrtaceae	Eucalyptus	Eucalyptus griffithii	P	*		*			*	*					*					*		
Myrtaceae	Eucalyptus	Eucalyptus horistes	P			*														*		
Myrtaceae	Eucalyptus	Eucalyptus leptopoda subsp. subluta	P			*	*													*		
Myrtaceae	Eucalyptus	Eucalyptus lesouefii	P																	*		
Myrtaceae	Eucalyptus	Eucalyptus moderata	P												*					*		
Myrtaceae	Eucalyptus	Eucalyptus oleosa subsp. oleosa	P					*		*	*	*		*						*		
Myrtaceae	Eucalyptus	Eucalyptus platycarys	P																	*		
Myrtaceae	Eucalyptus	Eucalyptus rigidula	P																	*		
Myrtaceae	Eucalyptus	Eucalyptus salmonophloia	P					*			*	*		*						*		
Myrtaceae	Eucalyptus	Eucalyptus salubris	P				*			*	*	*		*						*		
Myrtaceae	Eucalyptus	Eucalyptus transccontinentalis	P																	*		
Myrtaceae	Eucalyptus	Eucalyptus yilgarnensis	P														*	*	*	*		
Myrtaceae	Euryomyrtus	Euryomyrtus maidenii	P	*			*													*		
Myrtaceae	Homalocalyx	Homalocalyx grandiflorus (P3)	P																	*		
Myrtaceae	Homalocalyx	Homalocalyx thryptomenoides	P			*	*													*		
Myrtaceae	Leptospermopsis	Leptospermopsis erubescens	P			*	*													*		
Myrtaceae	Melaleuca	Melaleuca adnata	P						*											*		
Myrtaceae	Melaleuca	Melaleuca cordata	P																	*		
Myrtaceae	Melaleuca	Melaleuca lateriflora	P					*								*				*		
Myrtaceae	Melaleuca	Melaleuca sheathiana	P																	*		
Myrtaceae	Melaleuca	Melaleuca uncinata	P												*					*		
Myrtaceae	Melaleuca	Melaleuca zeteticorum	P				*							*						*		
Myrtaceae	Thryptomene	Thryptomene kochii	P				*													*		
Myrtaceae	Thryptomene	Thryptomene urceolaris	P			*	*													*		
Myrtaceae	Verticordia	Verticordia helmsii	P			*	*													*		
Poaceae	Aristida	Aristida contorta	A			*	*									*				*		
Poaceae	Austrostipa	Austrostipa elegantissima	P	*	*			*	*	*	*	*	*	*	*	*	*	*	*	*		
Poaceae	Austrostipa	Austrostipa nitida	P																	*		
Poaceae	Enteropogon	Enteropogon ramosus	P				*										*	*	*	*		
Poaceae	Eragrostis	Eragrostis eriopoda	P	*																*		
Poaceae	Triodia	Triodia rigida	P						*											*		
Poaceae	Triodia	Triodia rigidissima	P						*									*		*		
Poaceae	Triodia	Triodia scariosa	P			*	*		*					*						*		
Polygonaceae	Duma	Duma florulenta	P							*				*	*	*	*	*	*	*		
Primulaceae	Lysimachia	Lysimachia arvensis*	P							*				*						*		
Proteaceae	Grevillea	Grevillea acacioides	P			*														*		
Proteaceae	Grevillea	Grevillea acuarria	P			*	*		*	*	*	*	*	*	*	*	*	*	*	*		
Proteaceae	Grevillea	Grevillea berryana	P			*														*		
Proteaceae	Grevillea	Grevillea cagiana	P																	*		
Proteaceae	Grevillea	Grevillea huegelii	P						*											*		
Proteaceae	Grevillea	Grevillea pterosperma	P	*													*	*	*	*		
Proteaceae	Hakea	Hakea francisiana	P			*	*													*		
Proteaceae	Hakea	Hakea recurva subsp. recurva	P			*														*		
Rhamnaceae	Cryptandra	Cryptandra aridicola	P	*																*		
Rhamnaceae	Cryptandra	Cryptandra distigma	P																	*		
Rhamnaceae	Cryptandra	Cryptandra micrantha	P				*													*		
Rhamnaceae	Stenanthemum	Stenanthemum stipulosum	P																	*		
Rutaceae	Phebalium	Phebalium filifolium	P			*	*													*		
Rutaceae	Philotheca	Philotheca tomentella	P	*		*	*							*						*		
Santalaceae	Exocarpos	Exocarpos ophyllus	P	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
Santalaceae	Santalum	Santalum acuminatum	P				*	*	*	*	*	*	*	*	*	*	*	*	*	*		
Santalaceae	Santalum	Santalum spicatum	P							*							*	*	*	*		
Sapindaceae	Dodonaea	Dodonaea bursariifolia	P																	*		
Sapindaceae	Dodonaea	Dodonaea stenozya	P																	*		
Sapindaceae	Dodonaea	Dodonaea viscosa subsp. angustissima	P			*	*			*	*	*	*	*	*	*	*	*	*	*		
Scrophulariaceae	Eremophila	Eremophila alternifolia	P			*	*		*	*	*	*	*	*	*	*	*	*	*	*		
Scrophulariaceae	Eremophila	Eremophila caperata	P			*	*		*	*	*	*	*	*	*	*	*	*	*	*		
Scrophulariaceae	Eremophila	Eremophila decipiens subsp. decipiens	P	*		*	*		*	*	*	*	*	*	*	*	*	*	*	*		
Scrophulariaceae	Eremophila	Eremophila dempsteri	P			*	*		*	*	*	*	*	*	*	*	*	*	*	*		
Scrophulariaceae	Eremophila	Eremophila granitica	P	*		*	*		*	*	*	*	*	*	*	*	*	*	*	*		
Scrophulariaceae	Eremophila	Eremophila interstans subsp. virgata	P			*	*		*	*	*	*	*	*	*	*	*	*	*	*		
Scrophulariaceae	Eremophila	Eremophila ionantha	P	*		*	*		*	*	*	*	*	*	*	*	*	*	*	*		
Scrophulariaceae	Eremophila	Eremophila maculata subsp. brevifolia	P			*	*		*	*	*	*	*	*	*	*	*	*	*	*		
Scrophulariaceae	Eremophila	Eremophila oppositifolia subsp. angustifolia	P			*	*		*	*	*	*	*	*	*	*	*	*	*	*		
Scrophulariaceae	Eremophila	Eremophila parvifolia subsp. auricampa	P			*	*		*	*	*	*	*	*	*	*	*	*	*	*		

Family	Genus	TAXONNAME	Annual (A) or Perennial (P)	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
				Scrophulariaceae	<i>Eremophila</i>	<i>Eremophila scoparia</i>	P					*	*				*	*			*	*
Solanaceae	<i>Lycium</i>	<i>Lycium australe</i>	P					*			*	*					*	*				
Solanaceae	<i>Solanum</i>	<i>Solanum hoplopetalum</i>	P																			*
Solanaceae	<i>Solanum</i>	<i>Solanum nummularium</i>	P																			*
Solanaceae	<i>Solanum</i>	<i>Solanum orbiculatum</i>	P								*								*			*
Thymelaeaceae	<i>Pimelea</i>	<i>Pimelea microcephala</i> subsp. <i>microcephala</i>	P										*		*							*
Zygophyllaceae	<i>Roepera</i>	<i>Roepera aurantiaca</i>	P																			*
Zygophyllaceae	<i>Roepera</i>	<i>Roepera eremaea</i>	P											*								*

Appendix 2: Fauna Survey Report

Basic and Targeted Vertebrate Fauna Survey

Beacon Haul Roads

Prepared for: Beacon Mining Pty Ltd

Version 1. November, 2023



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Electronic	2023-0058-002-GT V1	DRAFT	10 August 2023	Beacon Mining Pty Ltd	GT
Electronic	2023-0058-002-GT V1	FINAL	5 November 2023	Beacon Mining Pty Ltd	ST

Suggested Citation: Terrestrial Ecosystems 2023 *Basic and Targeted Vertebrate Fauna Survey for the Beacon Haul Roads*, Unpublished report for Beacon Mining Pty Ltd, Perth.

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EXECUTIVE SUMMARY

Beacon Mining Pty Ltd (i.e. Beacon) is proposing to clear native vegetation to construct haul roads in L15/453 and L16/154 near its Jaurdi Gold mining operations (i.e. project area). There are two discrete sections to these haul roads, with the westerly route running north-south (140.65ha) and the easterly (171.23ha) section running east-west. The extremities of the two proposed haul roads are ~27km north-west and north of Coolgardie.

Excluding the disturbed, cleared and rehabilitated areas, there are four broad fauna habitats in the project area: a) Eucalypt woodland over mixed shrubs, b) Mallee over shrubs, c) mixed shrubland and d) chenopod and salt pan habitats.

Malleefowl tracks were recorded in the more densely vegetated areas mid-way along the proposed north-south route, but there are no inactive or active mounds in the project area. There is a possibility that the Southern Whiteface (listed as vulnerable), Peregrine Falcon (listed as other specially protected fauna), the mallee form of the Western Rosella (Priority 4) and the Central Long-eared Bat (Priority 4) may infrequently be seen in the project area. The area does not support old growth spinifex in a form and height suitable for roosting and nesting sites for Night Parrots, so it is highly improbable that they are in the project area. Except for the Malleefowl, vegetation clearing and driving along the haul are unlikely to significantly impact on these threatened species as they will readily move to adjacent areas if disturbed.

Clearing native vegetation in the project area is likely to result in the loss of small vertebrate fauna on-site that are unable to 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 of the birds will move into adjacent areas once vegetation clearing commences, so potential impacts will be low. There may be an on-going loss of small native fauna to vehicle strikes on the proposed haul roads, but overall, this impact will be low. Forced fauna migrants resulting from vegetation clearing will increase competition for resources, which may result in the subsequent loss of migrants or local individuals. Individuals shifted out of their established activity areas are also vulnerable to predation until they have become established in their new areas. Overall, impacts on vertebrate fauna associated with clearing vegetation in the project area in a landscape or bioregional context are likely to be low as there are vast tracts of similar fauna habitat in adjacent areas.

Managing vehicle speed limits in the vicinity of the more densely vegetated areas will minimise potential impacts on Malleefowl from vehicle strikes.

It is recommended that:

- an induction program that includes a component on managing fauna in the project area;
- information on protecting fauna and reporting deaths and sightings of Malleefowl and other conservation significant species should be incorporated into the induction program;
- the speed limit in the more densely vegetated areas on the proposed north-south route is limited; and
- the impact of dust on adjacent vegetation and fauna habitat is managed against appropriate KPIs and in accordance with the site processes and procedures.

1. INTRODUCTION

1.1 BACKGROUND

Beacon Mining Pty Ltd (i.e. Beacon) is intending to clear native vegetation to construct haul roads near its Jaurdi Gold mining operations (i.e. project area). There are two discrete sections of proposed haul roads, with the westerly route running north-south and the easterly section running east-west (Figures 1 and 2). Each proposed haul road assessment area was ~100m wide. The area of each haul road area assessed is:

- Western haul road (L15/453) 140.65ha
- Eastern haul road (L16/154) 171.23ha

Beacon requested a Basic vertebrate fauna survey and targeted survey for Malleefowl in the proposed haul road routes (i.e. project area). The extremities of the two haul roads are ~27km north-west and north of Coolgardie (Figures 1 and 2) and they are west and east of the Mount Burges operations.

1.2 PROJECT OBJECTIVES AND SCOPE OF WORKS

Terrestrial Ecosystems undertook a Basic vertebrate fauna survey and targeted survey for Malleefowl mounds to support future environmental approval applications. The methodology broadly follows that described in the Environmental Protection Authority (EPA; 2020) *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment*.

A Basic vertebrate fauna survey and Malleefowl survey involved undertaking a desktop review and site visit. The objectives of this assessment were to:

- provide an indication of the vertebrate fauna assemblage (reptiles, amphibians, mammals and birds) in and near the project area, so that potential impacts on the fauna and fauna assemblage might be adequately assessed;
- locate and record recently active Malleefowl mounds; and
- describe the major vertebrate fauna habitats present.

To achieve these objectives, Terrestrial Ecosystems:

- searched Terrestrial Ecosystems' database (includes Atlas of Living Australia) to identify potential vertebrate fauna in the surrounds of the project area;
- searched the Commonwealth Governments 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 (EPBC) Act 1999* or international migratory bird agreements (JAMBA/CAMBA);
- undertook a site reconnaissance survey and a search for active and recently active Malleefowl mounds in the project area;
- reviewed previous fauna surveys conducted near the project area in similar habitat types; and
- discussed the likelihood of *EPBC Act 1999* and *Biodiversity Conservation (BC) Act 2016* listed species being present in the project area.

1.2.1 Conservation significant invertebrates

This assessment has not included an assessment of the potential for conservation significant invertebrate species (e.g. *Ogyris subterrestris petrina*, *Jalmenus aridus*).

2. EXISTING ENVIRONMENT

2.1 LOCATION OF PROJECT AREA

The project area is in the Eastern Goldfields (COO3) Interim Biogeographic Regionalisation of Australia (IBRA) subregion. This subregion lies on the Yilgarn Craton and has subdued relief, internally draining, and gently undulating plains with low hills and ridges of Archaean greenstone in the western section (Cowan 2002). The vegetation in the subregion is typically mallee, Acacia thickets and shrubland on the sandplains and eucalypt woodlands around salt lakes, ranges and in the broad valleys. The surrounds of salt lakes support a variety of chenopods.

2.2 LAND USE HISTORY

The dominant land uses in the IBRA subregion are unallocated Crown land and reserves, grazing on native vegetation pastures and mining and exploration activity.

2.3 CLIMATE

The project area is characterised as warm Mediterranean. Coolgardie which is ~27km to the south-east has an annual rainfall of ~270mm, although this varies considerably from year-to-year. The highest mean maximum and minimum temperatures in Coolgardie are in December to February (Bureau of Meteorology 2023). The lowest mean daily maximum and minimum temperatures occur in July (Chart 1). Rainfall predominantly occurs between May and June because of low-pressure cells moving in an easterly direction and summer thunderstorms typically in January to March.

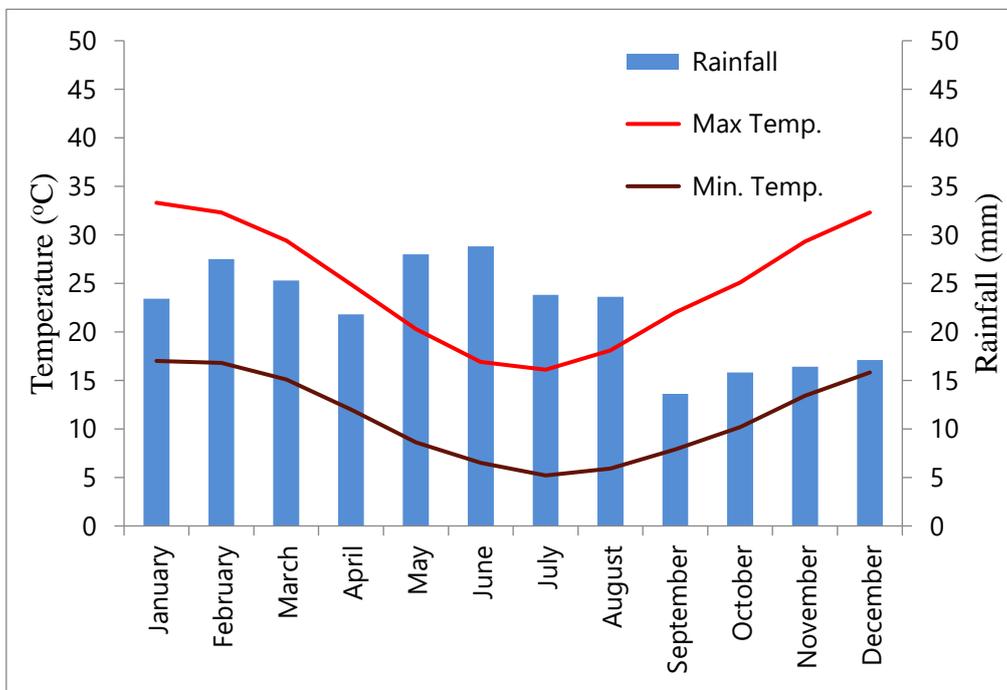


Chart 1. Climatic averages for Coolgardie

2.4 REGIONAL BIOLOGICAL FAUNA CONTEXT OF PROJECT AREA

The frogs, reptiles, mammals and birds in the vicinity of the project area have been surveyed for other environmental assessments and research purposes and are therefore known. Fauna surveys and assessments undertaken in the vicinity of the project area or within the project area that have been reviewed for this assessment include:

- 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*. Perth.
- Barrett, G. (1991) *A Biological Survey of Victoria Rock Nature Reserve*, Unpublished report for the Goldfields Naturalist Club, Perth.
- Bell, D.T., Bell, R.C. and Loneragan, W.A. (2007) Winter bird assemblages across an arid gradient in south-west Western Australia, *Journal of the Royal Society of Western Australia*, 90, 219-227.
- Chapman, A., Kealley, I., McMillan, D., McMillan, P., Rolland, G. (1991) Biological surveys of four Goldfields Reserves: Kurrawang Nature Reserve, Burra Rock Nature Reserve, Cave Hill Nature Reserve and Dordie Rocks Nature Reserve, *Landnote*, 1/91, 1-26.
- Dell, J., How, R.A., Newbey, K.R. and Hnatiuk, R.J. (1985) The Biological Survey of the Eastern Goldfields of Western Australia Part 3; Jackson – Kalgoorlie, *Records of the Australian Museum*, Supplement No 23.
- 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.
- GHD (2008) *Bullabulling Gold Project Fauna Survey of Eileen and Bacchus Pits*, Unpublished report for Jervois Mining, Perth.
- Harewood, G. (2014) *Malleefowl (Leipoa ocellata) Assessment Bullabulling Gold Project*, Unpublished report for Botanica Consulting on behalf of Bullabulling Gold Ltd/Significant Environmental Services, Perth.
- Keighery, B.J., McKenzie, N.L. and Hall, B. (1995) The Biological Survey of the Eastern Goldfields of Western Australia. Part 11. Boorabbin-Southern Cross Study Area, *Records of the Western Australian Museum*, Supplement No. 49.
- McKenzie, N.L. and Hall, B. (1992) The Biological Survey of the Eastern Goldfields of Western Australia. Part 8. Kurnalpi-Kalgoorlie Study Area, *Records of the Western Australian Museum*, Supplement No. 41.
- Ninox Wildlife Consulting (1995) *Vertebrate Fauna Studies Kambalda Area (1993) Widgiemooltha Area (1994)*, Unpublished report for Western Mining Corporation, Perth.
- Ninox Wildlife Consulting (1999) *Survey for the White Foil Gold Project*, Unpublished report for Mines and Resources Australia Pty Ltd, Perth.
- 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 Australia Pty Ltd, Perth.
- Phoenix Environmental Services (2014) *Level 2 Flora and Vegetation Survey and Level1 fauna Survey for the Bullabulling Gold Project*, Unpublished report for Bullabulling Gold Ltd, Perth.
- RPS (2012) *Spring Level 2 Flora and Vegetation Survey and Level1 Fauna Assessment Bullabulling Gold Project*, Unpublished report for Bullabulling Gold Ltd, Perth.
- Thompson, S. (2004) *Mine site rehabilitation index using reptile assemblage as a bio-indicator*, PhD Thesis, Edith Cowan University, Perth Ora Banda Thompson PHD and other data, Perth and additional data collected after submission of the thesis.

Data in the Atlas of Living Australia (including the Western Australian Museum collection) have also been added to the information contained in Appendix B, and the compilation of the species lists for the project area. There are many other desktop and Basic vertebrate fauna assessments (Level 1) completed in the region, but most do not have any quantitative data that would assist with the report.

2.4.1 Fauna species at risk

Cowan (2002) reported multiple vertebrate fauna species at risk in the subregion [i.e. Malleefowl (*Leipoa ocellata*), Carpet Python (*Morelia imbricata*), Peregrine Falcon (*Falco peregrinus*), Chuditch (*Dasyurus geoffroii*) and Freckled Duck (*Stictonetta naevosa*)]. Since then, the Night Parrot (*Pezoporus occidentalis*), Grey Falcon (*Falco hypoleucos*) and the Sothern Whiteface (*Aphelocephala leucopsis*) have been added to the list of conservation significant vertebrate species potentially in the project area.

3. METHODOLOGY

3.1 DATABASE SEARCHES

A review of the *EPBC* list of protected species was undertaken to identify species of conservation interest to the Commonwealth Government. The search polygon included an area within 25km of all proposed haul roads (Appendix A). In addition, a desktop search of the 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 vertebrate fauna in the bioregion, including Tyler et al. (2000) for frogs; Storr et al. (1983, 1990, 1999, 2002) and Thompson and Thompson (2006) for reptiles; Johnstone and Storr (1998, 2004) for birds; and Van Dyck and Strahan (2008) for mammals.

Collectively these sources of information were used to create lists of species expected to utilise the project area and broader subregion. It should be noted that these lists will include species that have been recorded in the general region but are possibly vagrants and they will not generally be found in the project area due to a lack of suitable habitat (e.g. water and shore birds). Vagrants can be recorded almost anywhere. Many of the records are historical and the species is no longer present in the area. Many of the bird, mammal, reptile and amphibian species have specific habitat requirements that may be present in the general area but not in the project area. Also, the ecology of many of these species is often not well understood and it can sometimes be difficult to indicate those species whose specific habitat requirements are not present in the project area. Therefore, many species will be included in the lists produced from database searches but will not be present in the actual project area.

There are errors in most databases, including the Atlas of Living Australia and the Western Australian Museum collection. These errors occur because of a misidentification of individuals, taxonomic name changes and incorrect coordinates being entered into the database. Terrestrial Ecosystems was unable to verify the primary records, so it has used the information provided. Obvious errors have been removed but readers should appreciate that species lists, and fauna surveys reported in the appendices may include these errors.

3.2 SITE INSPECTION AND FAUNA HABITAT ASSESSMENT

A site visit was undertaken on 26-28 July 2023 to assess fauna habitat types and condition in the project area and to search relevant sections of the project area for active and recently active Malleefowl mounds and their tracks. The fauna habitat assessment had two foci:

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

Dr Scott Thompson undertook the site assessment, stopping at multiple locations within the project area to record 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 last fire. The following data were assessed at each location as part of the habitat assessment (Table 1):

Table 1. Rapid habitat assessment tool

Observer's Name:	
Coordinates of the location as UTM (GDA94):	
Fire history – options	
<input type="checkbox"/> > 5 years	
<input type="checkbox"/> 1-5 years	
<input type="checkbox"/> < 1 year	
Landform – options	
<input type="checkbox"/> Beach	<input type="checkbox"/> Lower slope
<input type="checkbox"/> Clay plain	<input type="checkbox"/> Mid slope
<input type="checkbox"/> Cliff	<input type="checkbox"/> Ridge
<input type="checkbox"/> Creek line	<input type="checkbox"/> River
<input type="checkbox"/> Dam	<input type="checkbox"/> Rocky outcrop / breakaway
<input type="checkbox"/> Drainage line	<input type="checkbox"/> Salt lake
<input type="checkbox"/> Dune crest	<input type="checkbox"/> Sand dune
<input type="checkbox"/> Dune slope	<input type="checkbox"/> Sand plain
<input type="checkbox"/> Dune swale	<input type="checkbox"/> Stony plain
<input type="checkbox"/> Escarpment	<input type="checkbox"/> Swamp
<input type="checkbox"/> Flat	<input type="checkbox"/> Undulating
<input type="checkbox"/> Gorge	<input type="checkbox"/> Upper slope
<input type="checkbox"/> Gully	<input type="checkbox"/> Wetland
<input type="checkbox"/> Intertidal / mangrove	<input type="checkbox"/> Water hole
<input type="checkbox"/> Lake / lake edge	
Habitat quality – options	
<input type="checkbox"/> <i>High quality fauna habitat</i> – These areas closely approximate the vegetation mix and quality that would have been in the area prior to any disturbance. The habitat has connectivity with other habitats and is likely to contain the most natural vertebrate fauna assemblage.	
<input type="checkbox"/> <i>Very good fauna habitat</i> - 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 has connectivity with other habitats and fauna assemblages in these areas are likely to be minimally affected by disturbance.	
<input type="checkbox"/> <i>Good fauna habitat</i> – These areas showed signs of disturbance (e.g. grazing, clearing, fragmentation, weeds) but generally retain 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.	
<input type="checkbox"/> <i>Disturbed fauna habitat</i> – These areas showed signs of significant disturbance. Many of the trees, shrubs and undergrowth are cleared. These areas may be in the early succession and regeneration stages. Areas may show signs of significant grazing, containing weeds or have been damaged by vehicle or machinery. Habitats are fragmented or have limited connectivity with other fauna habitats. Fauna assemblages in these areas are likely to differ significantly from what might be expected in the area had the disturbance not occurred.	
<input type="checkbox"/> <i>Highly degraded fauna habitat</i> – These areas often have a significant loss of vegetation, an abundance of weeds, and a large number of vehicle tracks or are completely cleared. Limited or no fauna habitat connectivity. Fauna	

assemblages in these areas are likely to be significantly different to what might have been in the area pre-disturbance.

Habitat structure – combined into habitat description

Upper stratum

<input type="checkbox"/> Tall open woodland	<input type="checkbox"/> Scattered tall trees
<input type="checkbox"/> Tall woodland	<input type="checkbox"/> Scattered trees
<input type="checkbox"/> Open woodland	<input type="checkbox"/> Scattered low trees
<input type="checkbox"/> Woodland	<input type="checkbox"/> Low closed forest
<input type="checkbox"/> Open forest	<input type="checkbox"/> Low open forest
<input type="checkbox"/> Closed forest	<input type="checkbox"/> Low woodland
<input type="checkbox"/> Tall closed forest	<input type="checkbox"/> Low open woodland
<input type="checkbox"/> Tall open forest	

Middle stratum

<input type="checkbox"/> Shrubland	<input type="checkbox"/> Open heath
<input type="checkbox"/> Tall shrubland	<input type="checkbox"/> Low closed heath
<input type="checkbox"/> Tall open shrubland	<input type="checkbox"/> Low open heath
<input type="checkbox"/> Low shrubland	<input type="checkbox"/> Tall closed scrub
<input type="checkbox"/> Scattered low shrubs	<input type="checkbox"/> Tall open scrub
<input type="checkbox"/> Low open shrubland	<input type="checkbox"/> Scattered tall shrubs
<input type="checkbox"/> Scattered tall shrubs	<input type="checkbox"/> Open shrubland
<input type="checkbox"/> Closed heath	<input type="checkbox"/> Scattered shrubs

Lower stratum

<input type="checkbox"/> Closed hummock grassland	<input type="checkbox"/> Closed tussock grassland / sedgeland / herbland
<input type="checkbox"/> Mid-dense hummock grassland	<input type="checkbox"/> Tussock grass land / sedgeland / herbland
<input type="checkbox"/> Hummock grassland	<input type="checkbox"/> Open tussock grassland / sedgeland / herbland
<input type="checkbox"/> Open hummock grassland	<input type="checkbox"/> Scattered tussock / grasses / sedges / herbs
<input type="checkbox"/> Scattered hummock grassland	<input type="checkbox"/> Very open tussock grassland / herbland

Soil Type – options

<input type="checkbox"/> Sand	<input type="checkbox"/> Silty loam
<input type="checkbox"/> Loamy sand	<input type="checkbox"/> Sand clay loam
<input type="checkbox"/> Clayey sand	<input type="checkbox"/> Clay
<input type="checkbox"/> Clay loam	<input type="checkbox"/> Peat / organic
<input type="checkbox"/> Silty clay loam	<input type="checkbox"/> Stony
<input type="checkbox"/> Sandy loam	

Soil colour - options

<input type="checkbox"/> Black	<input type="checkbox"/> Red
<input type="checkbox"/> Brown	<input type="checkbox"/> White

<input type="checkbox"/> Grey	<input type="checkbox"/> Yellow
<input type="checkbox"/> Orange	
Surface stones – options	
<input type="checkbox"/> None	<input type="checkbox"/> Boulders (>250mm)
<input type="checkbox"/> Pebbles (0-50mm)	<input type="checkbox"/> Rocks
<input type="checkbox"/> Cobbles (51-250)	

3.3 MALLEEFOWL MOUNDS

The project area was searched using an all-terrain utility vehicle (UTV). The following Malleefowl mound profiles are used by the national Malleefowl monitoring program (National Malleefowl Recovery Team 2016) and are used in this report to classify mounds:

Profile 1 (Typical crater with raised rim) – this is the typical mound shape of an inactive (dormant) mound and without any accumulated vegetation in the crater.

Profile 2 (mound dug out) – this is a recently fully dug out mound with steep sides to the crater, with the base forming a box like structure with the sides normally 20-30cm deep. Sometimes litter has been raked into windrows in readiness to be placed in the mound.

Profile 3 (mound filled with litter) – this mound contains litter in the crater and is the next construction stage after profile 2. Layers of litter are evident on the surface and there may or may not be sand mixed with the litter.

Profile 4 (active mound with no crater) – this active mound is closed, and dome shaped. Note that some mounds have a dome and no crater but are not active.

Profile 5 (mound with crater and often a peak at the centre) – this is an active mound that is being opened or closed by Malleefowl.

Profile 6 (disused or extinct mound) – this mound has not been used for some time and weathering and erosion have 'flattened' the original mound.

Profile 7 (very large flat mound) – this mound is very broad and flat and generally measures in excess of 10m in diameter. The mounds are thought to have been made by a species of mega-fauna (bird similar to a Malleefowl) or in Western Australia are likely to be extinct Burrowing Bettong or Boodie warrens.

For mounds that could potentially be used again, crossed sticks would have been placed at the centre of the mound, so if they were moved, then there was a method of indicating use.

3.4 SURVEY AND REPORTING STAFF

Dr Scott Thompson undertook the site survey and fauna habitat assessment. Dr Graham Thompson drafted this report and Dr Scott Thompson reviewed the report before it was sent to the client. Both senior scientists have appropriate relevant post-graduate qualifications (Table 2), extensive experience in conducting fauna assessments on the Goldfields, have published research articles on biodiversity, fauna assemblages, conservation significant species, trapping techniques and temporal variations in trapped fauna assemblages 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 post-graduate 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. The qualifications and experience of the survey personnel are shown in Table 2.

Table 2. Staff qualifications, role and experience

Staff	Relevant qualifications	Experience and project role
Dr Scott Thompson	CEnvP (Ecology Specialist); BSc (Env. Sci); MSc (Env. Sci/Mng); PhD (Env. Mng); Cert IV (WHS); Cert III (Vert. Pest Mng).	Project manager; field work, analysis and reporting; >20yrs experience
Dr Graham Thompson	Post Grad Dip (Zool); MEd; PhD (Zool); Cert III (Vert. Pest Mng).	Analysis and reporting; >20yrs experience

3.5 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 in reports used to provide local and regional comparative data are correct and we have only corrected obvious records where the nomenclature was known to be incorrect.

3.6 LIMITATIONS

This Basic vertebrate fauna survey is based on information contained in the Commonwealth Government’s database and other published and unpublished fauna survey data for the bioregion and a site visit. It is acknowledged that multiple surveys conducted in different seasons, repeated over several years are necessary to fully appreciate the fauna assemblage in the project area.

Lists of species potentially in and around the project area have been compiled from records in the WAM records, Atlas of Living Australia and reports of fauna surveys undertaken nearby. Some records in the Atlas of Living Australia and the WAM are very old, and those species are no longer present in the area. Terrestrial Ecosystems has not been able to verify the primary data and is therefore not able to vouch for the accuracy of these records. All these sources of data are known to contain errors, and this should be considered when reading this assessment. These errors occur because of a misidentification of individuals, taxonomic name changes and incorrect coordinates being entered into the database.

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 fully appreciate the fauna assemblage in a project area. The EPA (2020) *Technical Guidance Terrestrial Fauna Surveys* suggested that fauna surveys may be limited by many variables. Limitations associated with each of these variables are assessed in Table 3.

Table 3. Fauna survey limitations and constraints

Possible limitations	Constraint (yes/no); significant, moderate or negligible	Comment
Availability of data and information	No	There is a substantial amount of vertebrate fauna survey data available for similar habitats near the project area.
Competency/experience of the survey team, including experience in the bioregion surveyed	No	The field assessors and authors of this report have appropriate post-graduate qualifications, undertaken multiple surveys and assessments in the Goldfields, have 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	No	The targeted search for Malleefowl was adequate.
Timing, weather and season	No	Weather was suitable for a site visit.
Disturbance that may have affected results, 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 vertebrate fauna survey requirements were met.
Access problems	No	The project area was accessible.
Problems with data and analysis, including sampling biases	N/A	

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

4. RESULTS

4.1 FAUNA HABITAT

One hundred and ninety-two habitat assessments were completed in the project area (Appendix D; Figure 2). Excluding the disturbed, cleared and rehabilitated areas, there are four broad fauna habitats in the project area:

- Eucalypt woodland over mixed shrubs;
- Mallee over shrubs;
- Mixed shrubland; and
- Chenopod and salt pan habitats.

Plates 1 to 16 provide representative images of the fauna habitat types in the project area. There are also areas devoid of vegetation from earlier mining and exploration activity, and anthropogenic disturbance (Plates 17 and 18). The density of trees and shrubs in the relatively undisturbed areas varied across the project area. The fauna habitat quality varies in condition from degraded to good with the more degraded areas due to anthropogenic disturbance and some disturbed areas have been rehabilitated.



Plate 1. Eucalypt woodland over mixed shrubs



Plate 2. Eucalypt woodland over mixed shrubs



Plate 3. Eucalypt woodland over mixed shrubs



Plate 4. Eucalypt woodland over mixed shrubs



Plate 5. Mallee over shrubs



Plate 6. Mallee over shrubs



Plate 7. Mallee over shrubs



Plate 8. Mallee over shrubs



Plate 9. Mixed shrubland



Plate 10. Mixed shrubland



Plate 11. Mixed shrubland



Plate 12. Mixed shrubland



Plate 13. Chenopod and salt pan habitats



Plate 14. Chenopod and salt pan habitats



Plate 15. Chenopod and salt pan habitats



Plate 16. Chenopod and salt pan habitats



Plate 17. Disturbed



Plate 18. Disturbed

Feral pests

There were rabbit (Plate 19) and a low density of feral cats (Plate 20) in the project area. Wild dogs are also present in adjacent areas so likely to be in the project area.



Plate 19. Rabbit scats



Plate 20. Cat tracks

4.1.1 Malleefowl

There were no Malleefowl mounds in the project area, but Malleefowl tracks (Plates 21-22) were recorded in the sandy areas that are more densely vegetated in the western haul road that runs north-south. Eren Reid from Native Vegetation Solutions also observed Malleefowl tracks in the eastern alignment during his botanical assessments (pers. comm.).

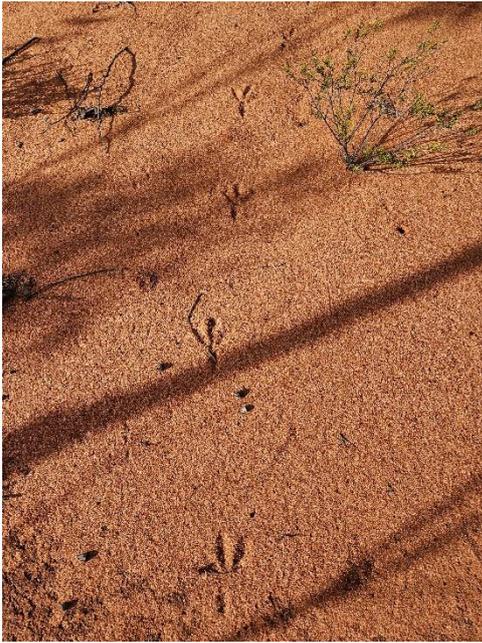


Plate 21. Malleefowl tracks



Plate 22. Malleefowl tracks

4.2 BIOREGIONAL VERTEBRATE FAUNA ASSEMBLAGE

Appendix B provides a summary of the fauna survey data that are 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 varying survey effort deployed by some of the surveys and they also reflect variations in soils and vegetation as well as 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	Family	Species	Common Name
Casuariidae	<i>Dromaius novaehollandiae</i>	Emu	Caprimulgidae	<i>Eurostopodus argus</i>	Spotted Nightjar
Anatidae	<i>Cygnus atratus</i>	Black Swan	Recurvirostridae	<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet
	<i>Tadorna tadornoides</i>	Australian Shelduck	Charadriidae	<i>Vanellus tricolor</i>	Banded Lapwing
	<i>Anas gracilis</i>	Grey Teal	Turnicidae	<i>Turnix varius</i>	Painted Buttonquail
Megapodiidae	<i>Leipoa ocellata</i>	Malleefowl*	Phalacrocoracidae	<i>Microcarbo melanoleucos</i>	Little Pied Cormorant
Columbidae	<i>Phaps chalcoptera</i>	Common Bronzewing	Accipitridae	<i>Lophoictinia isura</i>	Square-tailed Kite
	<i>Phaps elegans</i>	Brush Bronzewing		<i>Hieraetus morphnoides</i>	Little Eagle
	<i>Ocyphaps lophotes</i>	Crested Pigeon		<i>Aquila audax</i>	Wedge-tailed Eagle
Cuculidae	<i>Chrysococcyx basalis</i>	Horsfield's Bronze-Cuckoo		<i>Accipiter fasciatus</i>	Brown Goshawk
	<i>Chrysococcyx osculans</i>	Black-eared Cuckoo		<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk
	<i>Chrysococcyx lucidus</i>	Shining Bronze-Cuckoo	Cuculidae	<i>Heteroscenes pallidus</i>	Pallid Cuckoo
	<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo	Strigidae	<i>Ninox boobook</i>	Southern Boobook
Aegothelidae	<i>Aegotheles cristatus</i>	Australian Owlet-nightjar	Alcedinidae	<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher
Podargidae	<i>Podargus strigoides</i>	Tawny Frogmouth	Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater

Family	Species	Common Name	Family	Species	Common Name
Falconidae	<i>Falco cenchroides</i>	Nankeen Kestrel		<i>Pardalotus rubricatus</i>	Red-browed Pardalote
	<i>Falco longipennis</i>	Australian Hobby		<i>Pardalotus striatus</i>	Striated Pardalote
	<i>Falco berigora</i>	Brown Falcon	Acanthizidae	<i>Pyrrholaemus brunneus</i>	Redthroat
Timaliidae	<i>Zosterops lateralis</i>	Silvereye		<i>Calamanthus campestris</i>	Rufous Fieldwren
Cacatuidae	<i>Eolophus roseicapilla</i>	Galah		<i>Hylacola cauta</i>	Shy Heathwren
	<i>Nymphicus hollandicus</i>	Cockatiel		<i>Acanthiza iredalei</i>	Slender-billed Thornbill (Western)
Psittaculidae	<i>Polytelis anthopeplus</i>	Regent Parrot		<i>Acanthiza apicalis</i>	Inland Thornbill
	<i>Neophema elegans</i>	Elegant Parrot		<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill
	<i>Barnardius zonarius</i>	Australian Ringneck		<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill
Psittacidae	<i>Platycercus icterotis</i>	Western Rosella*		<i>Acanthiza robustirostris</i>	Slaty-backed Thornbill
	<i>Psephotus varius</i>	Mulga Parrot		<i>Smicromis brevirostris</i>	Weebill
	<i>Glossopsitta porphyrocephala</i>	Purple-crowned Lorikeet		<i>Gerygone fusca</i>	Western Gerygone
Ptilonorhynchidae	<i>Chlamydera guttata</i>	Western Bowerbird		<i>Aphelocephala leucopsis</i>	Southern Whiteface
	<i>Ptilonorhynchus maculata</i>	Spotted Bowerbird		<i>Pomatostomus superciliosus</i>	White-browed Babbler
Climacteridae	<i>Climacteris rufus</i>	Rufous Treecreeper	Cinclosomatidae	<i>Cinclosoma castanotum</i>	Chestnut Quail-thrush
Maluridae	<i>Malurus pulcherrimus</i>	Blue-breasted Fairywren	Campephagidae	<i>Coracina maxima</i>	Ground Cuckooshrike
	<i>Malurus lamberti</i>	Variagated Fairywren		<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike
	<i>Malurus splendens</i>	Splendid Fairywren		<i>Lalage tricolor</i>	White-winged Triller
	<i>Malurus leucopterus</i>	White-winged Fairywren	Neosittidae	<i>Daphoenositta chrysoptera</i>	Varied Sittella
Meliphagidae	<i>Certhionyx variegatus</i>	Pied Honeyeater		<i>Daphoenositta chrysoptera</i>	Varied Sittella
	<i>Purnella albifrons</i>	White-fronted Honeyeater	Oreoicidae	<i>Oreoica gutturalis</i>	Crested Bellbird
	<i>Lichenostomus cratitius</i>	Purple-gaped Honeyeater	Pachycephalidae	<i>Colluricincla harmonica</i>	Grey Shrikethrush
	<i>Manorina flavigula</i>	Yellow-throated Miner		<i>Pachycephala inornata</i>	Gilbert's Whistler
	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater		<i>Pachycephala pectoralis</i>	Golden Whistler
	<i>Anthochaera carunculata</i>	Red Wattlebird		<i>Pachycephala simplex</i>	Grey Whistler
	<i>Gavicalis virescens</i>	Singing Honeyeater		<i>Pachycephala rufiventris</i>	Rufous Whistler
	<i>Ptilotula ornata</i>	Yellow-plumed Honeyeater	Artamidae	<i>Artamus personatus</i>	Masked Woodswallow
	<i>Ptilotula penicillata</i>	White-plumed Honeyeater (Western)		<i>Artamus cinereus</i>	Black-faced Woodswallow
	<i>Ptilotula keartlandi</i>	Grey-headed Honeyeater		<i>Artamus cyanopterus</i>	Dusky Woodswallow
	<i>Epthianura tricolor</i>	Crimson Chat		<i>Cracticus torquatus</i>	Grey Butcherbird
	<i>Epthianura aurifrons</i>	Orange Chat		<i>Cracticus nigrogularis</i>	Pied Butcherbird
	<i>Epthianura albifrons</i>	White-fronted Chat		<i>Gymnorhina tibicen</i>	Australian Magpie
	<i>Sugomel nigrum</i>	Black Honeyeater		<i>Strepera versicolor</i>	Grey Currawong
	<i>Gliciphila melanops</i>	Tawny-crowned Honeyeater	Rhipiduridae	<i>Rhipidura leucophrys</i>	Willie Wagtail
	<i>Lichmera indistincta</i>	Brown Honeyeater		<i>Rhipidura albiscapa</i>	Grey Fantail
	<i>Nesoptilotis leucotis</i>	White-eared Honeyeater	Monarchidae	<i>Grallina cyanoleuca</i>	Magpie-lark
	<i>Nesoptilotis flavicollis</i>	Yellow-throated Honeyeater	Corvidae	<i>Corvus orru</i>	Torresian Crow
	<i>Melithreptus chloropsis</i>	Gilbert's Honeyeater		<i>Corvus bennetti</i>	Little Crow
	<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater		<i>Corvus coronoides</i>	Australian Raven
Pardalotidae	<i>Pardalotus punctatus</i>	Spotted Pardalote	Petroicidae	<i>Microeca fascinans</i>	Jacky Winter

Family	Species	Common Name	Family	Species	Common Name
	<i>Petroica goodenovii</i>	Red-capped Robin		<i>Petrochelidon ariel</i>	Fairy Martin
	<i>Melanodryas cucullata</i>	Hooded Robin		<i>Petrochelidon nigricans</i>	Tree Martin
	<i>Eopsaltria griseogularis</i>	Western Yellow Robin		<i>Cheramoeca leucosterna</i>	White-backed Swallow
	<i>Drymodes superciliaris</i>	Northern Scrub-Robin	Zosteropidae	<i>Zosterops lateralis</i>	Silveryeye (Western)
	<i>Drymodes brunneopygia</i>	Southern Scrub-Robin	Dicaeidae	<i>Dicaeum hirundinaceum</i>	Mistletoebird
Locustellidae	<i>Cincloramphus mathewsi</i>	Rufous Songlark	Estrildidae	<i>Taeniopygia guttata</i>	Zebra Finch
Hirundinidae	<i>Hirundo neoxena</i>	Welcome Swallow	Motacillidae	<i>Anthus novaeseelandiae</i>	Australasian Pipit

Table 5. Amphibians potentially found near the project area

Family	Species	Common Name	Family	Species	Common Name
Limnodynastidae	<i>Neobatrachus albipes</i>	White-footed Trilling Frog		<i>Neobatrachus sutor</i>	Shoemaker Frog
	<i>Neobatrachus kunapalari</i>	Wheatbelt Frog		<i>Neobatrachus wilsmorei</i>	Plonking Frog
	<i>Neobatrachus pelobatoideis</i>	Humming Frog	Myobatrachidae	<i>Pseudophryne occidentalis</i>	Western Toadlet

Table 6. Mammals potentially found in the project area

Family	Species	Common Name	Family	Species	Common Name
Tachyglossidae	<i>Tachyglossus aculeatus</i>	Short-beaked Echidna		<i>Ningai ridei</i>	Wongai Ningai
Bovidae	<i>Capra hircus</i>	Goat		<i>Ningai yvonneae</i>	Mallee Ningai
	<i>Ovis aries</i>	Sheep		<i>Sminthopsis crassicaudata</i>	Fat-tailed Dunnart
Canidae	<i>Canis lupus</i>	Dingo		<i>Sminthopsis dolichura</i>	Little Long-tailed Dunnart
Canidae	<i>Vulpes vulpes</i>	Red Fox		<i>Sminthopsis gilberti</i>	Gilbert's Dunnart
Felidae	<i>Felis catus</i>	Cat		<i>Sminthopsis hirtipes</i>	Hairy-footed Dunnart
Molossidae	<i>Austronomus australis</i>	White-striped Freetail Bat	Burramyidae	<i>Cercartetus concinnus</i>	Southwestern Pygmy Possum
	<i>Mormopterus planiceps</i>	Southern Free-tail Bat	Macropodidae	<i>Macropus fuliginosus</i>	Western Grey Kangaroo
Vespertilionidae	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat		<i>Osphranter robustus</i>	Euro
	<i>Chalinolobus morio</i>	Chocolate Wattled Bat		<i>Osphranter rufus</i>	Red Kangaroo
	<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat	Leporidae	<i>Oryctolagus cuniculus</i>	Rabbit
	<i>Nyctophilus hitorum</i>	Holt's Long-eared Bat	Muridae	<i>Mus musculus</i>	House Mouse
	<i>Nyctophilus major</i>	Greater Long-eared Bat		<i>Notomys mitchellii</i>	Mitchell's Hopping Mouse
	<i>Nyctophilus major tor</i>	Central Long-eared Bat*		<i>Pseudomys albocinereus</i>	Ash-grey Mouse
	<i>Scotorepens balstoni</i>	Inland Broad-nosed Bat		<i>Pseudomys bolami</i>	Bolam's Mouse
	<i>Vespadelus baverstocki</i>	Inland Forest Bat		<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse
	<i>Vespadelus regulus</i>	Southern Forest Bat		<i>Pseudomys nanus</i>	Western Chestnut Mouse
Dasyuridae	<i>Antechinomys laniger</i>	Kultarr			

Table 7. Reptiles potentially found near the project area

Family	Species	Common Name	Family	Species	Common Name
Agamidae	<i>Ctenophorus chapmani</i>	Chapman's Dragon		<i>Ctenophorus cristatus</i>	Crested Dragon

Family	Species	Common Name
	<i>Ctenophorus fordi</i>	Mallee Dragon
	<i>Ctenophorus isolepis</i>	Central Military Dragon
	<i>Ctenophorus maculatus</i>	Spotted Dragon
	<i>Ctenophorus ornatus</i>	Ornate Crevice Dragon
	<i>Ctenophorus reticulatus</i>	Western Netted Dragon
	<i>Ctenophorus salinarum</i>	Saltpan Dragon
	<i>Ctenophorus scutulatus</i>	Lozenge-marked Dragon
	<i>Moloch horridus</i>	Thorny Devil
	<i>Pogona minor</i>	Western Bearded Dragon
	<i>Tympanocryptis cephalus</i>	Pebble Dragon
	<i>Tympanocryptis lineata</i>	Lined Earless Dragon
Carphodactylidae	<i>Nephurus laevisimus</i>	Smooth Knob-tail
	<i>Nephurus vertebralis</i>	Midline Knob-tail
	<i>Underwoodisaurus milii</i>	Barking Gecko
Diplodactylidae	<i>Amalosa reticulata</i>	Reticulated Velvet Gecko
	<i>Crenadactylus ocellatus</i>	Clawless Gecko
	<i>Diplodactylus conspicillatus</i>	Fat-tailed Gecko
	<i>Diplodactylus granariensis</i>	Wheatbelt Stone Gecko
	<i>Diplodactylus pulcher</i>	Beautiful Gecko
	<i>Hesperoedura reticulata</i>	Reticulated Velvet Gecko
	<i>Lucasium maini</i>	Main's Ground Gecko
	<i>Oedura marmorata</i>	Marbled Velvet Gecko
	<i>Rhynchoedura ornata</i>	Beaked Gecko
	<i>Strophurus assimilis</i>	Goldfields Spiny-tailed Gecko
	<i>Strophurus elderi</i>	Jewelled Gecko
	<i>Strophurus wellingtonae</i>	Western Shield Spiny-tailed Gecko
Elapidae	<i>Acanthophis pyrrhus</i>	Desert Death Adder
	<i>Acanthophis antarcticus</i>	Southern Death Adder*
	<i>Brachyuropsis semifasciata</i>	Half-girdled Snake
	<i>Demansia psammophis</i>	Yellow-faced Whipsnake
	<i>Furina ornata</i>	Orange-naped Snake
	<i>Neelaps bimaculatus</i>	Black-naped Burrowing Snake
	<i>Suta gouldii</i>	Gould's Snake
	<i>Suta monachus</i>	Hooded Snake
	<i>Pseudechis australis</i>	Mulga Snake
	<i>Pseudonaja affinis</i>	Dugite
	<i>Pseudonaja mengdeni</i>	Western Brown Snake
	<i>Pseudonaja modesta</i>	Ringed Brown Snake

Family	Species	Common Name
	<i>Simoselaps bertholdi</i>	Jan's Banded Snake
	<i>Suta fasciata</i>	Rosen's Snake
Gekkonidae	<i>Gehyra purpurascens</i>	Purplish Dtella
	<i>Gehyra variegata</i>	Variiegated Gehyra
	<i>Heteronotia binoei</i>	Bynoe's Gecko
Pygopodidae	<i>Delma australis</i>	Marble-faced Delma
	<i>Delma butleri</i>	Unbanded Delma
	<i>Delma fraseri</i>	Fraser's Delma
	<i>Lialis burtonis</i>	Burton's Legless Lizard
	<i>Pygopus lepidopodus</i>	Common Scaly-foot
	<i>Pygopus nigriceps</i>	Western Hooded Scaly-foot
Pythonidae	<i>Morelia spilota</i>	Carpet Python
	<i>Aspidities ramsayi</i>	Woma*
Scincidae	<i>Cryptoblepharus australis</i>	Inland Snake-eyed Skink
	<i>Cryptoblepharus buechananii</i>	Buchanan's Snake-eyed Skink
	<i>Ctenotus atlas</i>	Southern Mallee Ctenotus
	<i>Ctenotus brooksi</i>	Wedgesnout Ctenotus
	<i>Ctenotus leonhardii</i>	Leonhardi's Ctenotus
	<i>Ctenotus pantherinus</i>	Leopard Ctenotus
	<i>Ctenotus schomburgkii</i>	Barred Wedgesnout Ctenotus
	<i>Ctenotus uber</i>	Spotted Ctenotus
	<i>Ctenotus xenopleura</i>	Wide-striped Ctenotus
	<i>Cyclodomorphus branchialis</i>	Common Slender Bluetongue
	<i>Cyclodomorphus melanops</i>	Spinifex Slender Blue-tongue
	<i>Egernia depressa</i>	Southern Pygmy Spiny-tailed Skink
	<i>Egernia formosa</i>	Goldfields Crevice Skink
	<i>Egernia richardi</i>	Bright Crevice-skink
	<i>Eremiascincus richardsonii</i>	Broad-banded Sand-swimmer
	<i>Hemiergis gracilipes</i>	South-western Mulch-skink
	<i>Hemiergis initialis</i>	South-western Earless Skink
	<i>Lerista kingi</i>	King's Slider
	<i>Lerista muelleri</i>	Wood Mulch-slider
	<i>Lerista picturata</i>	Southern Robust Slider
	<i>Lerista timida</i>	Timid Slider
	<i>Liopholis inornata</i>	Desert Skink
	<i>Liopholis striata</i>	Nocturnal Desert Skink
	<i>Menetia greyii</i>	Common Dwarf Skink
	<i>Morethia adelaidensis</i>	Saltbush Morethia Skink

Family	Species	Common Name
	<i>Morethia butleri</i>	Woodland Morethia Skink
	<i>Morethia obscura</i>	Shrubland Pale-flecked Morethia
	<i>Tiliqua occipitalis</i>	Western Blue-tongued Lizard
	<i>Tiliqua rugosa</i>	Bobtail
Typhlopidae	<i>Anilius australis</i>	Austral Blind Snake
	<i>Anilius bicolor</i>	Dark-spined Blind Snake

Family	Species	Common Name
	<i>Anilius bituberculatus</i>	Prong-snouted Blind Snake
	<i>Anilius hamatus</i>	Pale-headed Blind Snake
Varanidae	<i>Varanus caudolineatus</i>	Stripe-tailed Monitor
	<i>Varanus gouldii</i>	Gould's Goanna
	<i>Varanus tristis</i>	Black-headed Monitor

These lists include species commonly found in mulga and eucalypt woodlands in the Goldfields.

4.3 CONSERVATION SIGNIFICANT FAUNA

Conservation significant fauna 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 Western Australia (WA) *BC Act 2016*. The *BC Act 2016* provides for the publishing of the *Wildlife Conservation (Specially Protected Fauna) Notice* that lists species under multiple categories. In addition, 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 the management of 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 Threatened and Priority species. Definitions of the significant fauna under the *BC Act 2016* are provided in Appendix C

The fauna species that have 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. Although they were recorded in the search of the MNES online database, migratory species that typically would be found around the edge of salt lakes, clay pans, estuaries and marshes have been excluded from Table 8 as there is no suitable habitat nearby.

One threatened species of fauna (Malleefowl) identified under the *EPBC Act 1999* and *BC Act 2016* is in the project area or surrounds. Five other species (Southern Whiteface – Vulnerable; Peregrine Falcon - Schedule 7; Central Long-eared Bat – Priority 3; Western Rosella – Priority 4; Woma Python – Priority 4) potentially occur in the project area or surrounds. The following is an assessment of the likelihood of each of the species listed in Table 8 being found in the project area.

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

Species	Status under Commonwealth EPBC Act	BC Act/ DBCA Schedule / Priority	Comment on the potential presence of a species
Night Parrot <i>Pezoporus occidentalis</i>	Endangered	Critically Endangered	Not present in the project area due to a lack of suitable habitat.
Grey Falcon <i>Falco hypoleucos</i>	Vulnerable	Vulnerable	Unlikely to be present.
Malleefowl <i>Leipoa ocellata</i>	Vulnerable	Vulnerable	Tracks recorded at multiple locations, however there are no Malleefowl mounds in the project area.

Species	Status under Commonwealth EPBC Act	BC Act/ DBCA Schedule / Priority	Comment on the potential presence of a species
Southern Whiteface <i>Aphelocephala leucopsis</i>	Vulnerable		Recorded at Kangaroo Hills and Calooli Timber Reserves, so it is potentially in the project area, but will readily move if disturbed.
Chuditch <i>Dasyurus geoffroii</i>	Vulnerable	Vulnerable	Unlikely to be present.
Fork-tailed Swift <i>Apus pacificus</i>	Migratory	Migratory	May infrequently be seen flying in the region.
Grey Wagtail <i>Motacilla cinerea</i>	Migratory	Migratory	Highly unlikely to be seen in the project area.
Peregrine Falcon <i>Falco peregrinus</i>		OS	May very infrequently be seen in the project area.
Central Long-eared Bat <i>Nyctophilus major tor</i>		Priority 3	The project area is on the northern extremity of its known geographic distribution, and any impacts are likely to be non-significant.
Western Rosella <i>Platycercus icterotis xanthogenys</i>		Priority 4	Potentially in the project area but will move when disturbed and any impacts are likely to be non-significant.
Woma <i>Aspidites ramsayi</i>		Priority 4	Very low possibly it is in the project area, and if present in the areas to be cleared would be lost during vegetation clearing.

Results of the Commonwealth EPBC Act 1999 protected matters database search is provided in Appendix A.

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 originally distributed 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, Palaszczuk 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 there were between 50-250 mature individuals 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 and then flew to more floristically diverse habitats dominated by large-seeded, prolifically seeding species to feed.

There are patches of mature spinifex hummocks that die in the centre to form rings in the project area, but they are not 40cm and above high which the Department of Biodiversity, Conservation and Attractions (Department of Parks and Wildlife 2017) indicates is the preferred roosting and nesting sites for Night Parrots. In addition, there is a significant threatening process for the species in the area (i.e. feral cats), so it is highly unlikely Night Parrots are present in the project area. They will therefore not be impacted by any proposed development.

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

This is Australia's rarest falcon, and it is mostly found in areas of less than 500mm rainfall north of latitude 26°S in Western Australia (Schoenjahn et al. 2019, Threatened Species Scientific Committee 2020). It is mostly found in timbered lowland plains, particularly *Acacia* shrublands that are crossed by tree-lined water courses (Threatened Species Scientific Committee 2020). However, this species has been observed in treeless areas and frequents tussock grassland and open woodland (Threatened Species Scientific Committee 2020).

This species was not seen during the site visit, has not been recorded in other fauna surveys in the project or adjacent areas, and if it was present, would move away once disturbed.

Malleefowl (*Leipoa ocellata*) - Vulnerable under the *BC Act 2016* and *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. Prior to vegetation clearing for agriculture, Malleefowl were abundant in the WA Wheatbelt. Vegetation clearing for agriculture also opened adjacent bushland to predators, and in the south-west 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).

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 they are sparsely distributed, favouring those areas that are more densely vegetated. 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 can span more than five metres and may be up to one metre high. Malleefowl are generally monogamous and once breeding commences, they pair for life. The presence of nest mounds provides an indication of the presence of Malleefowl in the area.

No mounds were recorded, but Malleefowl tracks were recorded at multiple locations (UTM zone 51, 300370mE 6589498mS; 300694mE 6591119mS; 300303mE 6589404mS; and 300271mE 6589286mS), all near each other on the western north-south proposed haul road route. Malleefowl in the Goldfields have a strong preference

for the relatively dense shrubby vegetated areas, so avoiding these areas will reduce the potential impact on these birds.

Southern Whiteface (*Aphelocephala leucopsis*) - Vulnerable 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 and the Environment and Water 2023).

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

Surveys in adjacent areas (e.g. Bamford et al. 1990, Barrett 1991) recorded the presence of this species in low abundance. This bird will readily move to adjacent areas if it was disturbed. There is an abundance of similar fauna habitats present in adjacent areas, so the proposed clearing of vegetation and exploration activity is unlikely to be a significant impact on this bird.

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 south-west WA and other isolated areas. The closest known recent populations of Chuditch are over 100km south-west of the project area.

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, bird and reptile eggs but the majority is a mixture of large invertebrates (e.g. spiders, scorpions and crickets).

None of the fauna surveys in the adjacent areas have recorded the presence of Chuditch, and the presence of feral predators indicates that it is highly unlikely to be present in the project area.

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

This species breeds in the 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 an almost exclusively 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 23), so it is unlikely to be impacted by the proposed development. It was not present in the DBCA's threatened species database search.

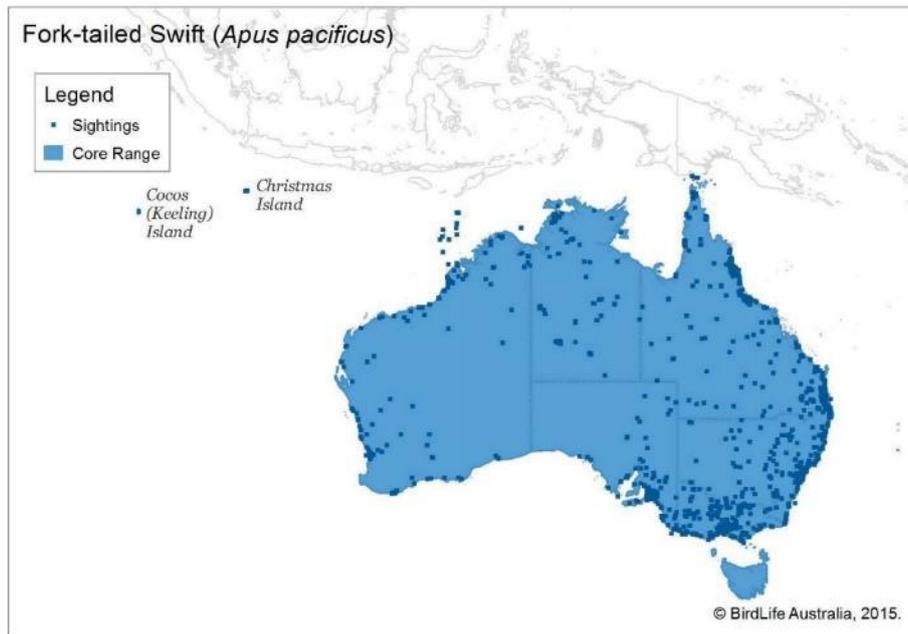


Plate 23. Range and actual reported sightings of the Fork-tailed Swift

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

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 and 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.

The Peregrine Falcon may infrequently be seen in the project area, although it had not been recorded in other surveys. The proposed 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.

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

Online web references also call this the Western Long-eared Bat. Records in the Atlas of Living Australia indicated this species has been found around in the general area, although the project area is on the northern extremity of its known geographic distribution. It roosts in tree cavities, foliage and under loose bark, so it is potentially in the project area.

The project area is on the northern extremity of its geographic range, so the probability of it being present in the project area is low. Given that project area represents a small fraction of similar habitat in the general area, vegetation clearing in the project area is unlikely to have a significant impact on this species.

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

The mallee form of the Western Rosella is found mostly in eucalypt and *Casuarina* woodland and shrub lands, 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, Dell and How (1984) in the biological survey of Widgiemooltha, Phoenix Environmental Services (2014) at Bullabulling, Keighery et al. (1995) in the survey

of Boorabbin-Southern Cross survey and Barrett (1991) at Victoria Rock, so it could infrequently be recorded in the project area.

Given that the project area represents a small fraction of similar habitat in adjacent areas, it is unlikely that vegetation clearing will have a significant impact on this species, as it will readily move to adjacent areas if disturbed.

Woma (*Aspidites ramsayi*) - Priority 1 species with DBCA

The southern Woma python was once recorded in a crescent shaped geographic distribution from Shark Bay to Kitchener in WA. However, it is now mostly only found on the two extremes of this distribution with a small population east of the wheatbelt in relatively dense shrubs on a sandy substrate.

In Western Australia it is found in arid woodland or shrubland areas, typically on sand plains. It was recorded a few years ago on the Boorrabin sand plains and near Coolgardie. It is rarely encountered and common. Due to the presence of feral cats is improbable the Woma python is present in the project area and therefore unlikely to impacted by the proposed development.

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.

Surveys undertaken in the adjacent areas (Bamford et al. 1990, Chapman et al. 1991, McKenzie and Hall 1992, Keighery et al. 1995, Thompson 2004) include vertebrate fauna data in habitats like that in the project area. Additional surveys in the project area are unlikely to add to the species list and will not impact on the regulators' assessment of potential impacts. The proposed haul road routes do not include habitat of environmental significance, so no additional surveys are required.

5.2 AMPHIBIANS

Amphibians typically found in eucalypt mulga-mallee woodlands in the Goldfields are listed in Table 5. Frogs are normally only detected immediately after rainfall or around semi-permanent pools. It is likely that *Neobatrachus sutor*, *Pseudophryne occidentalis* and *Neobatrachus kunapalari* could be found in the general area. These species, other than *P. occidentalis*, burrow into the ground and aestivate between rainfall events. *Pseudophryne occidentalis* find shelter under rocks and in 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, is unlikely to have a significant impact on these species when assessed in a regional context.

There are no conservation significant amphibians in the Goldfields.

5.3 REPTILES

Reptile species richness in the project area will be comparable with similar eucalypt woodlands elsewhere in the bioregion. The list provided in Table 7 represents species likely to be found over a large area of diverse habitat types. Eucalypt-mulga woodlands over patches of spinifex would typically support up to 40 species of reptiles, but many of these would be in low abundance. There are no characteristics of the reptile assemblage anticipated to be in the project area that indicated that there are reptiles of conservation significance or different to that in the neighbouring areas and given that there were large expanses of similar habitat in adjacent areas, development of the project area is unlikely to have 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.

5.4 BIRDS

Avian species richness in the Goldfields is influenced by rainfall (Craig and Chapman 2003) and is generally higher in woodlands compared with 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 and mallee woodlands would typically support up to 50-70 species of birds, but many of these would be in very low numbers 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 that is followed by flowering and seeding of many plant species is often sufficient to draw many of these 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.

Predation by feral cats and foxes has significantly reduced the abundance of Malleefowl in the Goldfields and there are a few remaining small populations, mostly in areas of dense shrubland, as the dense vegetation provides the adult birds with some protection from predators. There were Malleefowl tracks recorded in the dense vegetation mid-way down the proposed north-south route, so Malleefowl are likely to be in very low abundance in the area.

The Southern Whiteface, Western Rosella and Peregrine Falcon, if present, would 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 the Peregrine Falcon will normally have a very large home range. Clearing vegetation and hauling ore in large trucks in the project area, is unlikely to significantly impact on any conservation significant species of bird. All birds will readily shift to other areas when there is a disturbance.

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

5.5 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 presence of feral and pest fauna. It was noted during the site visit that rabbits and feral cats, and possibly wild dogs are in the project area and surrounds.

There is a low probability that the Central Long-eared Bat is present in the project area, but it would normally move if its roost site were disturbed. There are no other mammals that are conservation significance in the project area, and the loss of small mammals during vegetation clearing is unlikely to be significant in a bioregional context.

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

5.6 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. There are inadequate data to assess the ecological value at the genetic level, however, this is not an issue as there are no conservation significant species potentially in the project area that require this level of analysis.

Fauna habitat represented in the project area is abundant and in similar condition in adjacent areas. Therefore, the fauna assemblage that is present in the project area will also be present in adjacent areas. The available fauna survey data (Appendix B) provides an indication of the vertebrate fauna that are potentially in the project area.

5.6.1 Ecological functional value at the ecosystem level

Small sections of the project area have been disturbed by previous anthropogenic activity (i.e. exploration, tracks, rehabilitated areas, etc), with the consequence that these areas are almost depleted of vertebrate terrestrial fauna. Other than these areas of disturbance, most significant impact on vertebrate fauna in the project area and surrounds will have been feral cats and wild dogs, and possibly foxes.

This project area supports a low density of Malleefowl but does not support a conservation significant ecosystem.

5.6.2 Maintenance of threatened ecological communities

Other than the presence of Malleefowl, and possibly Southern Whiteface, Peregrine Falcon and Western Rosella, there are no threatened vertebrate ecological communities identified in the project area.

5.6.3 Condition of fauna habitat

The quality of the fauna habitat varied from degraded (e.g. tracks and recently rehabilitated areas) to very good. There is also evidence of disturbance by rabbits and feral cats, and it is probable there is a low abundance of wild dogs.

Our assessment is that the uncleared fauna habitat present in the project area is generally in good to very good condition and 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.

5.6.4 Ecological linkages

The project area does not provide an important ecological linkage or fauna movement corridor as the surrounding bioregion is largely intact. Construction of haul roads will fragment the fauna habitat, and the width of these roads will restrict the movement of some small vertebrate fauna but not the larger animals. Although there will be some fragmentation of the habitat it is not likely to result in a significant impact at a bioregional level.

5.6.5 Size and scale of the proposed disturbance

The assessed project area is small and linear, and represents a small proportion of similar fauna habitat found in the adjacent areas and the bioregion. The narrowness of the likely disturbance area (e.g. haul road) is appreciably less than the area assessed.

5.6.6 Abundance and distribution of similar habitat in the adjacent areas

Fauna habitats present in the project area are abundant in adjacent areas. It is therefore likely that the fauna assemblage in the project area is like the many square kilometres of similar habitat in adjacent areas and the bioregion.

6. POTENTIAL ENVIRONMENTAL IMPACTS

Development of the area will potentially affect vertebrate fauna in numerous ways, including death/injury of fauna during vegetation clearing, impacts with vehicles and the loss of habitat.

Although there are anticipated short term impacts on fauna, they are not likely to result in significant impacts on fauna habitat and the fauna assemblages in the long term when considered in a bioregional context. The overall impact on fauna species and species of conservation significance will be minimal.

6.1 ANIMAL DEATHS DURING THE CLEARING PROCESS AND DISPLACEMENT OF FAUNA

Clearing vegetation and activities associated with 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, and this could result in the temporary displacement of resident species.

6.2 REDUCTION OR LOSS OF ACTIVITY AREAS AND CLOSURE OF BURROWS

Clearing vegetation and associated infrastructure are likely to remove reptile and mammal burrows or foraging habitat that are currently in use or could be used again. Clearing vegetation that forms part of the activity area of individuals 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.

6.3 EDGE EFFECTS

Clearing linear corridors 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.

Edge effects can lead to the disruption of ecological processes such as predation and dispersal, animal movements and can change assemblage structure. The consequence is that the impact area will always be much larger than the cleared area.

6.4 HABITAT FRAGMENTATION

In addition to direct impacts of vegetation clearing, infrastructure including tracks, has the potential to fragment habitat. These clearings can isolate sections of established communities and may alter long and medium-term patterns of movement around established home ranges particularly for small mammals and reptiles. A reduction in the population because of vegetation clearing would be difficult to detect given our current knowledge of the spatial ecology for most of the small mammals known to be in the area.

The clearing vegetation for the construction of haul roads will limit the movement of a few small vertebrate fauna (e.g. dragon lizards, skinks, dunnarts), but the larger fauna (e.g. kangaroos, wild dogs, emus, etc) will readily cross the haul roads. This impact is unlikely to be significant in a regional context given the abundance of fauna habitat in the project area, in the adjacent area.

6.5 INTRODUCED WEEDS

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 the structure of vegetation will alter the fauna habitat and consequently may influence fauna species composition. Linear haul roads also have the propensity to move weeds longer distances on vehicles. Preparing and implementing a weed management plan will largely reduce their threat to native fauna species.

6.6 ROAD FAUNA DEATHS

An increase in road fauna deaths is likely to occur where new roads / tracks are constructed or upgraded. This will particularly affect kangaroos, nocturnal birds and large, ground-dwelling carnivorous predators. Species such as goannas and raptors are attracted to carrion on road verges and therefore, there will be an increased propensity for these species to be killed by vehicles. This impact will decrease over time as the most vulnerable animals closest to the haul roads are killed on the roads during the first couple of years of operation.

6.7 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 form of disturbance is likely to occur during the initial vegetation clearing and haul road construction. The overall impact is likely to be confined to a relatively small area and is unlikely to be a significant impact.

6.8 DUST

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

6.9 POTENTIAL IMPACTS ON ECOSYSTEM FUNCTION

Clearing native vegetation is likely to result in the loss of small vertebrate fauna on-site that are unable to move away during the clearing process. The few larger animals, such as kangaroos and large goannas, and most of the birds will move into adjacent areas once clearing commences. Shifting animals into adjacent areas will increase the pressure on resources in those areas and it is likely that there will be some disruption to the ecosystems in these areas for a short period until a balance is restored.

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

7. VERTEBRATE FAUNA RISK ASSESSMENT

7.1 RISK ASSESSMENT

Fauna surveys to support environmental approval are part of the environmental risk assessment undertaken to consider what potential impacts a development might have on the biodiversity on a particular area and region. Potential impacts on fauna from the proposed development are identified and briefly described above. Tables 9, 10 and 11 provide a summary of 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 have an impact on the fauna at 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 impact 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 to 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.	A	1	Low				
Clearing vegetation	Loss of fauna habitat – local scale	Loss of terrestrial fauna in the project area.	E	2	Moderate	Where possible, reduce the extent of clearing and leave large Eucalypt trees.	E	2	Moderate
	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 restricted resulting in the death of fauna and a loss of biodiversity.	B	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				
	Malleefowl	Loss of a Malleefowl or small population of Malleefowl	C	3	Moderate	Regulate the speed of vehicles on the haul road through the more densely vegetation to reduce collisions with Malleefowl	B	2	Low

			Before management			With management			
	Southern Whiteface	Loss of a Southern Whiteface or small population of Southern Whiteface	A	2	Low				
	Chuditch	Loss of a Chuditch or small population of Chuditch	A	2	Low				
	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	B	2	Low				
	Oriental Plover	Loss of a 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	Moderate	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 fauna; specifically the fox, wild dog and cat	Increased predation on the native fauna	C	3	Moderate	Implementation of a feral animal control program(s)	C	2	Low
	Dust	Increased potential for dust	E	2	Moderate	Implementation of a dust management plan.	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 any of the following principles are comprised.

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

Principle	Response
It comprises a high level of biological diversity.	The presence of Malleefowl means that this species could potentially be impacted without appropriate management. Regulating the speed of vehicles on the haul road will reduce potential impacts on Malleefowl.
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 project area does not include habitat, that if it was lost would threaten the survival of Malleefowl, but given this species' low abundance in the Goldfields, all populations of Malleefowl should be managed and conserved. Malleefowl are in low abundance and widely dispersed in the Goldfields. Any loss of individuals would be regrettable, and every effort should be made to minimise the possibility of this occurring.
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.	There are no threatened ecological (fauna) communities.
It is significant as a remnant of native vegetation in an area that has been extensively cleared.	The area contains no remnant vegetation communities that are significant.
It is growing in, or in association with, an environment associated with a watercourses or wetland.	There is no water course or wetland near the project area, other than ephemeral creek lines.
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 of vegetation is unlikely to impact on 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 REFERRAL UNDER THE EPBC ACT

As discussed above, the project area does not support old growth spinifex with a structure and height which would be used as both retreat and nesting sites by the Night Parrot, so it is highly unlikely this species is present.

Malleefowl are present in the project area, however, that does not automatically mean a referral under the *EPBC Act* is required. Such a referral is only necessary if the proposed vegetation clearing, and infrastructure development and intended operations were potentially going to have a significant impact on this species. Tracks were recorded during the field assessment but no active or inactive Malleefowl mounds were recorded.

There is a very low potential impact on Southern Whiteface due to vegetation clearing moving them out of their established home ranges, however, they are likely to adjust, and any impacts would be low.

8. SUMMARY

Beacon Mining Pty Ltd (i.e. Beacon) is proposing to clear native vegetation to construct haul roads near its Jaurdi Gold mining operations (i.e. project area). There are two discrete sections to these haul roads, with the westerly route (L15/453) running north-south (140.65ha) and the easterly (171.23ha) section (L16/154) running east-west. The extremities of the two proposed haul roads are ~27km north-west and north of Coolgardie.

Excluding the disturbed, cleared and rehabilitated areas, there are four broad fauna habitats in the project area: a) Eucalypt woodland over mixed shrubs, b) Mallee over shrubs, c) mixed shrubland and d) chenopod and salt pan habitats.

Malleefowl tracks were recorded in the more densely vegetated areas mid-way along the proposed north-south route, but there are no inactive or active mounds in the project area. There is a possibility that the Southern Whiteface (listed as vulnerable), Peregrine Falcon (listed as other specially protected fauna), the mallee form of the Western Rosella (Priority 4) and the Central Long-eared Bat (Priority 4) may infrequently be seen in the project area. The area does not support old growth spinifex in a form and height suitable for roosting and nesting sites for Night Parrots, so it is highly improbable that they are in the project area. Except for the Malleefowl, vegetation clearing and driving along the haul are unlikely to significantly impact on these threatened species as they will readily move to adjacent areas if disturbed.

Clearing native vegetation in the project area is likely to result in the loss of small vertebrate fauna on-site that are unable to 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 of the birds will move into adjacent areas once vegetation clearing commences, so potential impacts will be low. There may be an on-going loss of small native fauna to vehicle strikes on the proposed haul roads, but overall, this impact will be low. Forced fauna migrants resulting from vegetation clearing will increase competition for resources, which may result in the subsequent loss of migrants or local individuals. Individuals shifted out of their established activity areas are also vulnerable to predation until they have become established in their new areas. Overall, impacts on vertebrate fauna associated with clearing vegetation in the project area in a landscape or bioregional context are likely to be low as there are vast tracts of similar fauna habitat in adjacent areas.

Managing vehicle speed limits in the vicinity of the more densely vegetated areas will minimise potential impacts on Malleefowl from vehicle strikes. Use of the haul road is unlikely to be considered a significant impact on Malleefowl, so a referral under the *EPBC Act* is not recommended.

9. MANAGEMENT STRATEGIES

The purpose of this section is to identify generic management and mitigation strategies to address the potential impacts of development in the project area. Specific management and mitigation strategies to address potential impacts should be addressed in the recommended Vertebrate Fauna Management Plan and Construction Environmental Management Plan.

9.1 INDUCTION AND AWARENESS

All contractors and staff involved in vegetation clearing, development and ongoing operations in the project area should be made aware of the possible presence and issues associated with terrestrial fauna in the area through the induction process.

Recommendation 1: An induction program that includes a component on managing fauna in the project area.

Recommendation 2: Information on protecting fauna and reporting deaths and sightings of Malleefowl and other conservation significant species should be incorporated into the induction program.

9.2 CONSERVATION SIGNIFICANT FAUNA

To minimise the potential impacts on Malleefowl the speed of all vehicles should be regulated.

Recommendation 3: The speed limit in the more densely vegetated areas on the proposed haul roads is limited to 60km/hr.

9.3 DUST

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

Recommendation 4: The impact of dust on adjacent vegetation and fauna habitat is managed against appropriate KPIs and in accordance with the site processes and procedures.

10. REFERENCES

- AG staff. 2017. Night parrot feather discovered in South Australia gives hope to ecologists. Australian Geographic **September**.
- AG staff. 2018. Critically endangered night parrot fledging photographed on Queensland reserve. Australian Geographic **February**.
- Baker, J., R. L. Goldingay, and R. J. Whelan. 1998. Powerline easement through forests: a case study of impacts on avifauna. *Pacific Conservation Biology* **4**:79-89.
- Bamford, M. J., S. J. J. F. Davies, and P. G. Ladd. 1990. Biological Survey of the Kangaroo Hills and Calooli Timber Reserves, Coolgardie, Western Australia.
- Barrett, G. 1991. A Biological Survey of Victoria Rock Nature Reserve. Kalgoorlie.
- Bell, D. T., R. C. Bell, and W. A. Loneragan. 2007. Winter bird assemblages across an arid gradient in south-west Western Australia. *Winter bird assemblages across an arid gradient in south-west Western Australia* **90**:219-227.
- Benshemesh, J. 2007. National Recovery Plan for Malleefowl. South Australia.
- Benshemesh, J., and P. Burton. 1999. Fox predation on Malleefowl three years after the spread of RCD in Victoria. Unpublished report for Parks Victoria and Department of Natural Resources and Environment, Mildura.
- Boles, W. E., N. W. Longmore, and M. C. Thompson. 2016. A Recent Specimen of the Night Parrot *Geopsittacus occidentalis*. *Emu* **94**:37-40.
- Chapman, A., I. Kealley, D. McMillan, P. McMillan, and G. Rolland. 1991. Biological surveys of four Goldfields Reserves: Kurrawang Nature Reserve, Burra Rock Nature Reserve, Cave Hill Nature Reserve and Dordie Rocks Nature Reserve. *Landnote* **1/91**:1-26.
- Charalambous, S. 2016. First night parrot fledgling spotted in 100 years spotted in western Queensland. Australian Geographic **November**.
- Clarke, M. F., and J. M. Oldland. 2007. Penetration of remnant edges by noisy miners (*Manorina melanocphala*) and implications for habitat restoration. *Wildlife Research* **34**:253-261.
- Cowan, M. 2002. Coolgardie 3 (COO3 - Eastern Goldfields subregion). Pages 156-169 *A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002*. Department of Conservation and Land Management, Perth.
- Craig, M. D., and A. Chapman. 2003. Effects of short-term drought on the avifauna of Wanjarri Nature Reserve: What do they tell us about drought refugia? *Journal of the Royal Society of Western Australia* **86**:133-137.
- Cupitt, R., and S. Cupitt. 2008. Another recent specimen of the Night Parrot *Pezoporus occidentalis* from Western Queensland. *Australian Field Ornithology* **25**:69-75.
- Dames and Moore. 1999. Public Environmental Review - Gold Mine Developments on Lake Lefroy. Unpublished report to WMC Resources Ltd (St Ives Gold), Perth.
- Davis, R. A., and B. M. Metcalf. 2008. The Night Parrot (*Pezoporus occidentalis*) in northern Western Australia: a recent sighting from the Pilbara region. *Emu* **108**:233-236.
- Dell, J., and R. A. How. 1984. Vertebrate Fauna in 'The Biological Survey of the Eastern Goldfields of Western Australia. Part 2. Widgiemooltha-Zanthus Area'. *Records of the Western Australian Museum* **18**:21-157.
- Dell, J., R. A. How, K. R. Newbey, and R. J. Hnatiuk. 1985. The Biological Survey of the Eastern Goldfields of Western Australia Part 3; Jackson - Kalgoorlie. *Records of the Western Australian Museum* **Supplement No 23**:168.
- Department of Climate Change Energy and the Environment and Water. 2023. Conservation Advice for *Aphelocephala leucopsis* (southern whiteface). Canberra.
- Department of Parks and Wildlife. 2017. Interim guideline for preliminary surveys of night parrot (*Pezoporus occidentalis*) in Western Australia. Perth.
- Eco Logical Australia. 2016. Biological Assessment - Binduli Expansion Project. Level 1 vertebrate fauna and Short-range Endemic invertebrate survey. Perth.

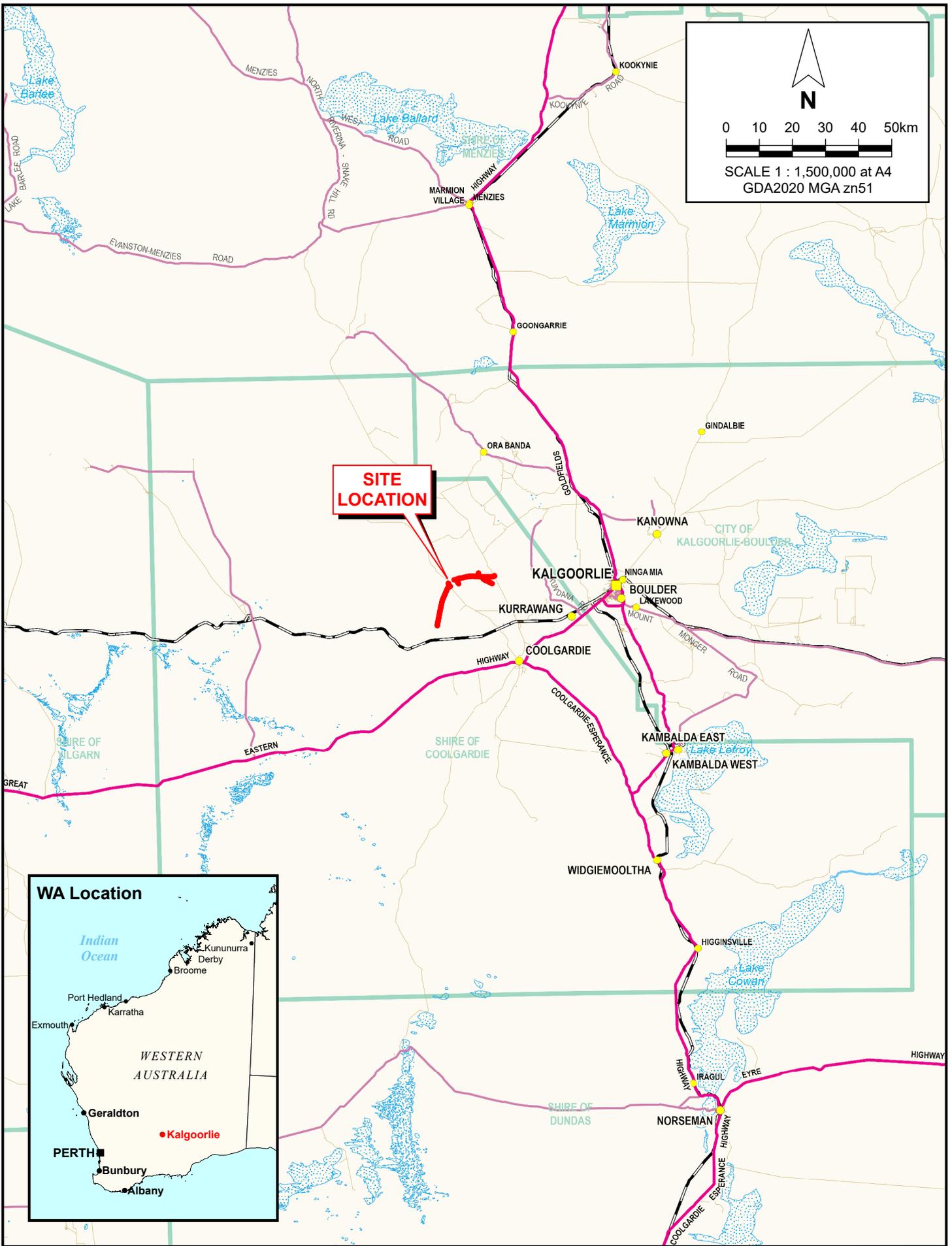
- Environmental Protection Authority. 2020. Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment. Western Australia.
- Garnett, S., G. Crowley, R. Duncan, N. Baker, and P. Doherty. 1993. Notes on live Night Parrot sightings in north-western Queensland. *Emu* **93**:292-296.
- Garnett, S. T., J. K. Szabo, and G. Dutson. 2011. The Action Plan for Australian Birds 2010. CSIRO, Collingwood, Melbourne.
- GHD. 2008. Bullabulling Gold Project Fauna Survey of Eileen and Bacchus Pits. Perth.
- Goldingay, R. L., and R. J. Whelan. 1997. Powerline easements: do they promote edge effects in eucalypt forest for small mammals? *Wildlife Research* **24**:737-744.
- Goosem, M. 2000. Effects of tropical rainforest roads on small mammals: Edge changes in community composition. *Wildlife Research* **27**:151-163.
- Goosem, M., Y. Izumi, and S. Turton. 2001. Efforts to restore habitat connectivity for an upland tropical rainforest fauna: A trial of underpasses below roads. *Ecological Management and Restoration* **2**:196-202.
- Goosem, M. W., and H. Marsh. 1997. Fragmentation of small mammal community by a powerline corridor through tropical rainforest. *Wildlife Research* **24**:613-629.
- Hamilton, N., A. Burbidge, T. Douglas, and L. Gilbert. 2017. Piecing the puzzle together: the fate of the Night Parrot nest found in Western Australia by Jackett et al. (2017). *Australian Field Ornithology* **34**:151-154.
- Harewood, G. 2014. Malleefowl (*Leipoa ocellata*) Assessment Bullabulling Gold Project. Perth.
- Jackett, N., B. Greatwich, G. Swann, and A. Boyle. 2017. A nesting record and vocalisations of the Night Parrot *Pezoporus occidentalis* from the East Murchison, Western Australia. *Australian Field Ornithology* **34**:144-150.
- Johnstone, R. E., and G. M. Storr. 1998. Handbook of Western Australian Birds. Volume I - Non-Passerines (Emu to Dollarbird). Western Australian Museum, Perth.
- Johnstone, R. E., and G. M. Storr. 2004. Handbook of Western Australian Birds. Volume II - Passerines (Blue-winged Pitta to Goldfinch). Western Australian Museum, Perth.
- Jones, A. 2017. Night parrot sighting in Western Australia shocks birdwatching world. ABC News.
- Keighery, B. J., N. L. McKenzie, and B. Hall. 1995. The Biological Survey of the Eastern Goldfields of Western Australia. Part 11. Boorabbin-Southern Cross Study Area. Records of the Western Australian Museum **Supplement No. 49**:31-66.
- Laurance, W. F. 1991. Edge effects in tropical forest fragments: application of a model for design of nature reserves. *Biological Conservation* **57**:205-219.
- Laurance, W. F. 1994. Rainforest fragmentation and the structure of small mammal communities in tropical Queensland. *Biological Conservation* **69**:23-32.
- Lewis, M., and M. Hines. 2014. Malleefowl activity at nesting sites increase fox and other feral animal visitation rates. Pages 242-247 Proceedings of the 5th National Malleefowl Forum 2014.
- Luck, G. W., H. P. Possingham, and D. C. Paton. 1999. Bird responses at inherent and induced edges in the Murray Mallee, South Australia. 1. Differences in abundance and diversity. *Emu* **99**:157-169.
- McCarthy, M. 2017. Night parrot feather discovery proves Australia's most elusive bird is alive in South Australia. ABC News.
- McKenzie, N. L., and N. J. Hall. 1992. The Biological Survey of the Eastern Goldfields of Western Australia. Part 8. Kurnalpi-Kaloorlie Study Area. Records of the Western Australian Museum **Supplement No. 41**.
- Murphy, S. 2015. Shining a light: The research unlocking the secrets of the mysterious Night Parrot. *Australian Birdlife* **4**:30-35.
- Murphy, S. A., J. J. Austin, R. K. Murphy, J. Silcock, L. Joseph, S. T. Garnett, N. P. Leseberg, J. E. M. Watson, and A. H. Burbidge. 2017a. Observations on breeding Night Parrots (*Pezoporus occidentalis*) in western Queensland. *Emu* **117**:107-113.
- Murphy, S. A., J. Silcock, R. Murphy, J. Reid, and J. J. Austin. 2017b. Movements and habitat use of the night parrot *Pezoporus occidentalis* in south-western Queensland. *Austral Ecology*.
- National Malleefowl Recovery Team. 2016. National Malleefowl Monitoring Manual.

- Ninox Wildlife Consulting. 1995. Vertebrate Fauna Studies Kambalda Area (1993) Widgiemooltha Area (1994). Perth.
- Ninox Wildlife Consulting. 1999. Fauna Survey for the White Foil Gold Project. Perth.
- Ninox Wildlife Consulting. 2002. A Vertebrate Fauna Assessment of the Proposed White Foil Haul Road Route near Kalgoorlie, Western Australia. Perth.
- Outback Ecology Services. 2009. Integra Mining Limited Randalls Gold Project, Fauna Survey.
- Oxley, D. J., M. B. Fenton, and G. R. Carmody. 1974. The effects of roads on populations of small mammals. *Journal of Applied Ecology* **11**:51-59.
- Palaszczuk, A., and S. Miles. 2017. New night parrot community discovered in central west Queensland.
- Paton, P. W. C. 1994. The effect of edge on avian nest success: How strong is the evidence? *Conservation Biology* **8**:17-26.
- Phoenix Environmental Sciences. 2014. Level 2 Flora and Vegetation Survey and Level 1 Fauna Survey for the Bullabulling Gold Project. Perth.
- Pickrell, J. 2016. The night parrot's secret sanctuary. *Australian Geographic* **August**.
- Priddel, D., and R. Wheeler. 1990. Survival of Malleefowl *Leipoa ocellata* chicks in the absence of ground-dwelling predators. *Emu* **90**:81-87.
- RPS. 2012. Spring Level 2 Flora and Vegetation Survey and Level 1 Fauna Assessment Bullabulling Gold Project. Perth.
- Rykers, E. 2017. Night parrot call recordings released online for first time. *Australian Geographic* **February**.
- Schoenjahn, J., C. R. Pavey, and G. H. Walter. 2019. Ecology of the Grey Falcon *Falco hypoleucos* – current and required knowledge. *Emu - Austral Ornithology* **120**:74-82.
- Spectrum Ecology. 2020. Binduli Expansion Report Desktop Report Review. Perth.
- Storr, G. M., L. A. Smith, and R. E. Johnstone. 1983. Lizards of Western Australia. II: Dragons and Monitors. Western Australian Museum, Perth, Western Australia.
- Storr, G. M., L. A. Smith, and R. E. Johnstone. 1990. Lizards of Western Australia. III: Geckos and Pygopods. Western Australian Museum, Perth.
- Storr, G. M., L. A. Smith, and R. E. Johnstone. 1999. Lizards of Western Australia. I: Skinks. Western Australian Museum, Perth.
- Storr, G. M., L. A. Smith, and R. E. Johnstone. 2002. Snakes of Western Australia. Western Australian Museum, Perth.
- Temple, S. A. 1998. The edge of the cut: implications for wildlife populations. *Journal of Forestry* **96**:22-26.
- Thompson, S. A. 2004. Mine site rehabilitation index using reptile assemblage as a bio-indicator. PhD. Edith Cowan University, Perth.
- Thompson, S. A., and G. G. Thompson. 2006. Reptiles of the Western Australian Goldfields. Goldfields Environmental Management Group, Kalgoorlie, WA.
- Threatened Species Scientific Committee. 2016. Conservation Advice *Pezoporus occidentalis* Night Parrot. Canberra.
- Threatened Species Scientific Committee. 2020. Conservation Advice *Falco hypoleucos* Grey Falcon. Canberra.
- Tyler, M. J., L. A. Smith, and R. E. Johnstone. 2000. Frogs of Western Australia. Western Australian Museum, Perth.
- Van Dyck, S., and R. Strahan. 2008. The Mammals of Australia. Reed New Holland, Sydney.
- Wilson, H. 1937. Notes on the Night Parrot, with references to recent occurrences. *Emu* **37**:79-87.

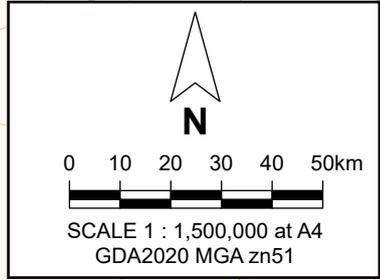
Figures

Basic and Targeted Vertebrate Fauna Survey
Beacon Haul Roads





SITE LOCATION



PINPOINT CARTOGRAPHICS (08) 9562 7136 2023-0058-f01.pagx

TERRESTRIAL ECOSYSTEMS

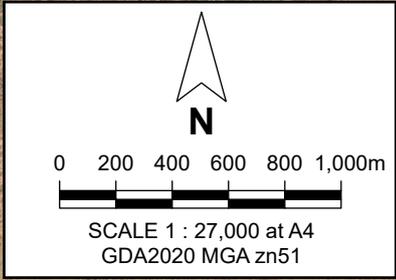
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Beacon Mining Pty Ltd
 BASIC AND TARGETED VERTEBRATE FAUNA SURVEY
 BEACON HAUL ROADS

REGIONAL LOCATION

Figure 1

Job: 2023-0058



6,590,000 mN

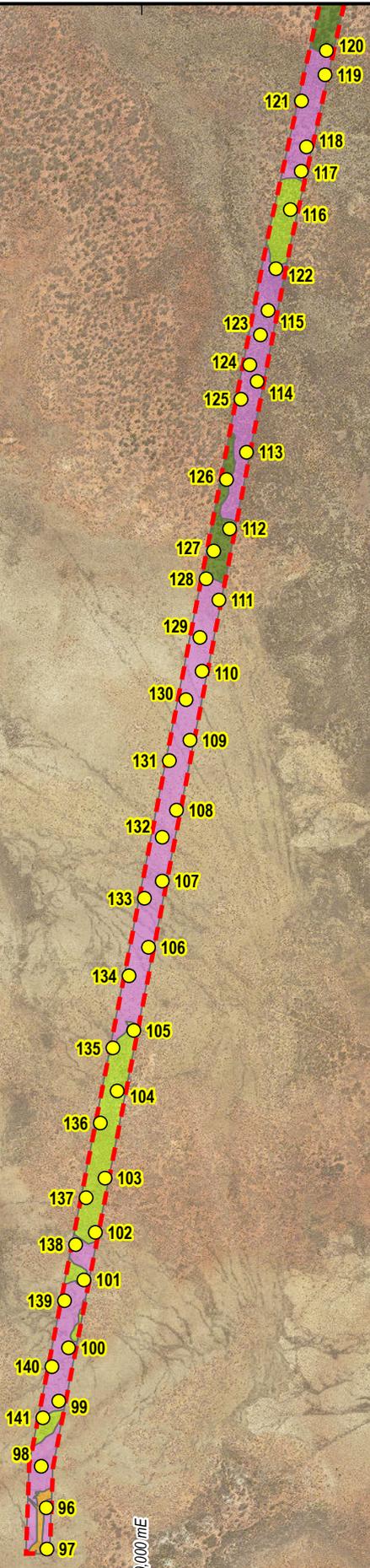
6,588,000 mN

6,586,000 mN

298,000 mE

300,000 mE

302,000 mE



Legend

-  Site Boundary
-  Habitat Assessment Location

Fauna Habitats

-  Disturbed
-  Eucalypt woodland over mixed shrubs
-  Chenopod and salt pan habitats
-  Mixed shrubland
-  Mallee over shrubs

PINPOINT CARTOGRAPHICS (08) 9562 7136 2023-0058-f02a.pagx



TERRESTRIAL ECOSYSTEMS

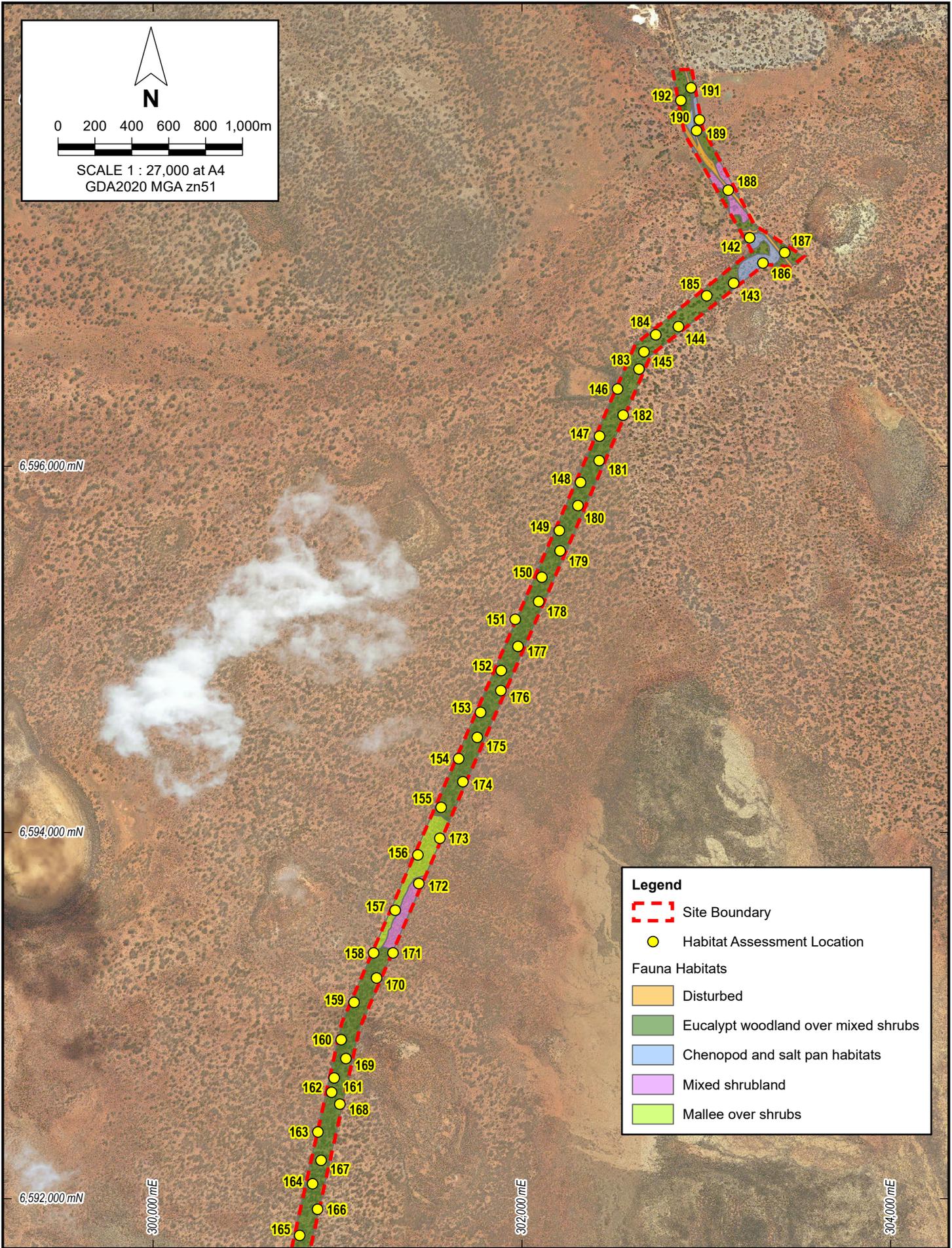
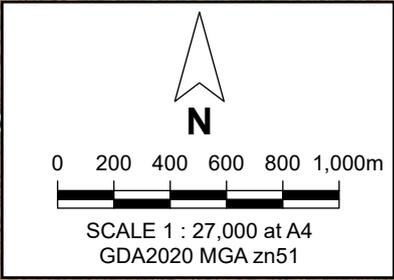
Drawn: G. Thompson Date: 24 Aug 2023

Beacon Mining Pty Ltd
 BASIC AND TARGETED VERTEBRATE FAUNA SURVEY
 BEACON HAUL ROADS

FAUNA HABITATS AND HABITAT ASSESSMENT LOCATIONS

Figure 2a

Job: 2023-0058



Legend

- Site Boundary
- Habitat Assessment Location

Fauna Habitats

- Disturbed
- Eucalypt woodland over mixed shrubs
- Chenopod and salt pan habitats
- Mixed shrubland
- Mallee over shrubs

PINPOINT CARTOGRAPHICS (08) 9562 7136 2023-0058-f02b.pagx

TERRESTRIAL ECOSYSTEMS

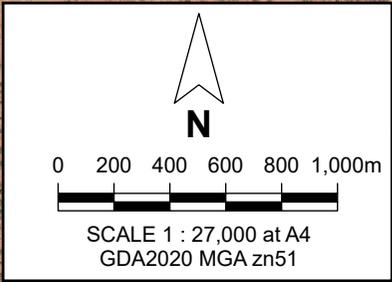
Drawn: G. Thompson Date: 24 Aug 2023

Beacon Mining Pty Ltd
 BASIC AND TARGETED VERTEBRATE FAUNA SURVEY
 BEACON HAUL ROADS

FAUNA HABITATS AND HABITAT ASSESSMENT LOCATIONS

Figure 2b

Job: 2023-0058



6,600,000 mN

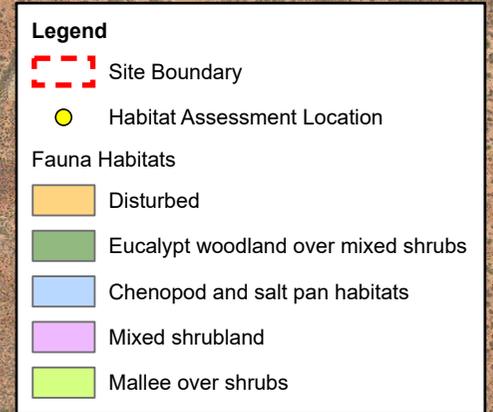
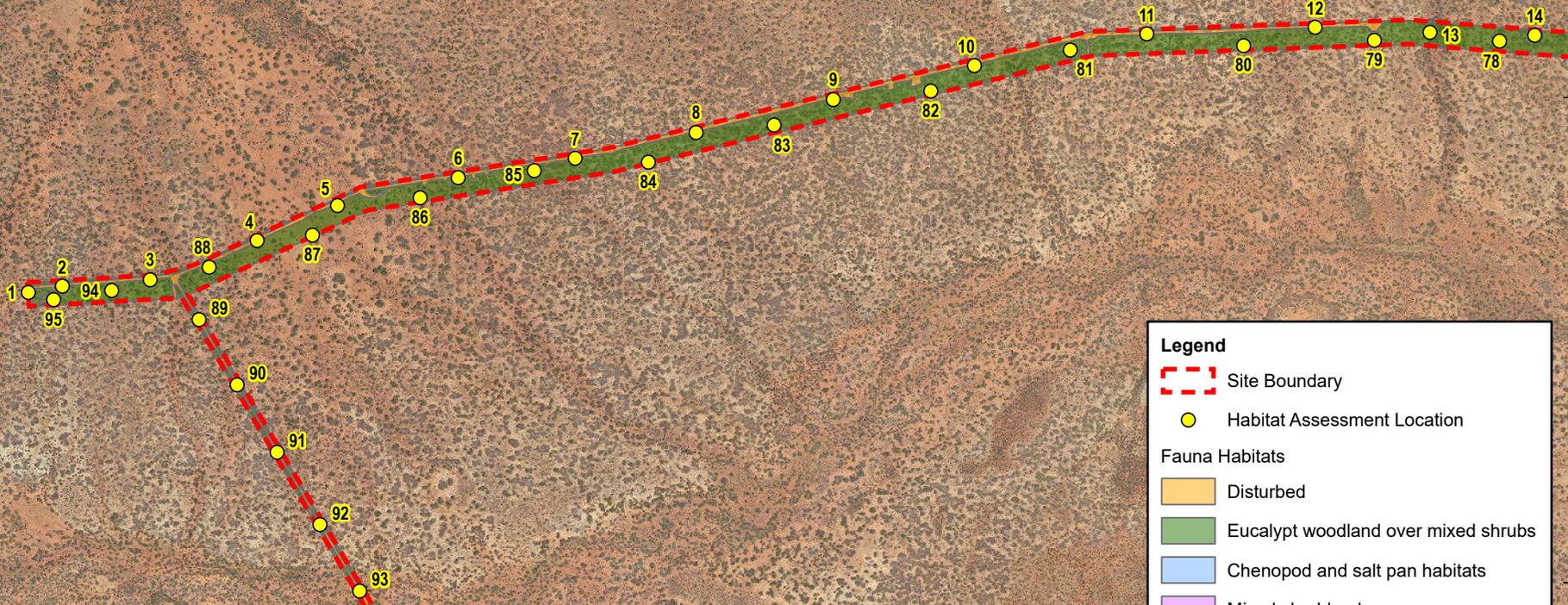
6,598,000 mN

304,000 mE

306,000 mE

308,000 mE

310,000 mE



TERRESTRIAL ECOSYSTEMS

Drawn: G. Thompson Date: 24 Aug 2023

Beacon Mining Pty Ltd
BASIC AND TARGETED VERTEBRATE FAUNA SURVEY
BEACON HAUL ROADS

FAUNA HABITATS AND HABITAT ASSESSMENT LOCATIONS

Figure 2c

Job: 2023-0058

Appendix A.

Results of the EPBC Act Protected Matters Search

Basic and Targeted Vertebrate Fauna Survey
Beacon Haul Roads





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: 08-Aug-2023

[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:	8
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:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	4
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
Historic		
Goldfields Water Supply Scheme, Western Australia	WA	Listed place

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 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
--	------------	--

MAMMAL

Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area
---	------------	--

PLANT

Scientific Name	Threatened Category	Presence Text
Gastrolobium graniticum Granite Poison [14872]	Endangered	Species or species habitat likely to occur within area
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat may 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]		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]		Species or species habitat likely to 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 - [52183]	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]		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 may occur within area overfly marine area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area overfly marine area

Extra Information

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Goldfields Water Supply Scheme Project	2019/8547	Controlled Action	Post-Approval
Nava-1 Cable System	2001/510	Controlled Action	Completed
Not controlled action			
Focus, Greenfields and Carins Intersection Upgrade, Great Eastern Highway, WA	2014/7171	Not Controlled Action	Completed
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	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 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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Appendix B.

Vertebrate Fauna Recorded in Biological Surveys in the Region

Basic and Targeted Vertebrate Fauna Survey
Beacon Haul Roads



Family	Species	Common name	Surveys																									
			A						B						C													
			Site BN2	Site BN4	Site BN6	Site 7E	Site 7E02	Site 7E03	Site 7E03A	Site 7E04	Site 7E06	Site 7E01A	Site 7E05	South	Pools on	Site 7E06A	Site 1	Site 10	Site 2	Site 5	Site 6	Site 9	Site 12	Site 3	Site 8	Site 7	Site 11	Site 13
	<i>Diplodactylus pulcher</i>	Beautiful Gecko	X	1	1													1		2	1	2					2	
	<i>Hesperoedura reticulata</i>	Reticulated Velvet Gecko	X																									
	<i>Lucasium maini</i>	Main's Ground Gecko	X		1	1	2			2															2			
	<i>Oedura marmorata</i>	Marbled Velvet Gecko	X																									
	<i>Rhynchoedura ornata</i>	Beaked Gecko	X															1										
	<i>Strophurus assimilis</i>	Goldfields Spiny-tailed Gecko	X			1					1							5										
	<i>Strophurus elderi</i>	Jewelled Gecko	X																									
	<i>Strophurus wellingtonae</i>	Western Shield Spiny-tailed Gecko	X																									
Elapidae	<i>Acanthophis pyrrhus</i>	Desert Death Adder	X																									
	<i>Brachyuropis semifasciata</i>	Half-girdled Snake	X																									
	<i>Demansia psammophis</i>	Yellow-faced Whipsnake	X															1										
	<i>Echiopsis curta</i>	Bardick	X																									
	<i>Furina ornata</i>	Orange-naped Snake	X																									
	<i>Neelaps bimaculatus</i>	Black-naped Burrowing Snake	X																									
	<i>Suta gouldii</i>	Gould's Snake	X	1																								
	<i>Suta monachus</i>	Hooded Snake	X																									
	<i>Pseudechis australis</i>	Mulga Snake	X																								1	
	<i>Pseudonaja affinis</i>	Dugite	X			1																						
	<i>Pseudonaja mengdeni</i>	Western Brown Snake	X																									
	<i>Pseudonaja modesta</i>	Ringed Brown Snake	X			1																						
	<i>Simoselaps bertholdi</i>	Jan's Banded Snake	X	1			2																					
	<i>Suta fasciata</i>	Rosen's Snake	X			1																						
Gekkonidae	<i>Gehyra purpurascens</i>	Purplish Dtella	X																				1					
	<i>Gehyra variegata</i>	Variiegated Gehyra	X	1	1	1	1		2								1	2	1	1								
	<i>Heteronotia binoei</i>	Bynoe's Gecko	X	1		1																1						
Pygopodidae	<i>Delma australis</i>	Marble-faced Delma	X	1	1	1		1	1								1		1									
	<i>Delma butleri</i>	Unbanded Delma	X	1		1																						
	<i>Lialis burtonis</i>	Burton's Legless Lizard	X			1														1								
	<i>Pygopus lepidopodus</i>	Common Scaly-foot	X	1									1					1										
	<i>Pygopus nigriceps</i>	Western Hooded Scaly-foot	X																									
Pythonidae	<i>Morelia spilota</i>	Carpet Python	X																									
Scincidae	<i>Cryptoblepharus australis</i>	Inland Snake-eyed Skink	X																									
	<i>Cryptoblepharus buchanani</i>	Buchanan's Snake-eyed Skink	X		1	1				1		1						1		1		1						
	<i>Ctenotus atlas</i>	Southern Mallee Ctenotus	X	1		1	5										1											

Family	Species	Common name	Surveys																									
			A						B						C													
			Site BN2	Site BN4	Site BN6	Site 7E	Site 7E02	Site 7E03	Site 7E03A	Site 7E04	Site 7E06	Site 7E01A	Site 7E05	South	Pools on	Site 7E06A	Site 1	Site 10	Site 2	Site 5	Site 6	Site 9	Site 12	Site 3	Site 8	Site 7	Site 11	Site 13
	<i>Ctenotus australis</i>	Western Limestone Ctenotus	X																									
	<i>Ctenotus brooksi</i>	Wedgsnout Ctenotus	X																									
	<i>Ctenotus leonhardii</i>	Leonhardi's Ctenotus	X																									
	<i>Ctenotus pantherinus</i>	Leopard Ctenotus	X	1			1																					
	<i>Ctenotus schomburgkii</i>	Barred Wedgesnout Ctenotus	X				1	1	2																			
	<i>Ctenotus uber</i>	Spotted Ctenotus	X			1																			1	1		
	<i>Ctenotus xenopleura</i>	Wide-striped Ctenotus	X	1																								
	<i>Cyclodomorphus branchialis</i>	Common Slender Bluetongue		1			1																					
	<i>Cyclodomorphus melanops</i>	Spinifex Slender Blue-tongue	X																									
	<i>Egernia depressa</i>	Southern Pygmy Spiny-tailed Skink	X																									
	<i>Egernia formosa</i>	Goldfields Crevice Skink	X					1																				
	<i>Egernia richardi</i>	Bright Crevice-skink	X				1																					
	<i>Eremiascincus richardsonii</i>	Broad-banded Sand-swimmer	X																									
	<i>Hemiergis initialis</i>	South-western Earless Skink	X					1			1			1														
	<i>Lerista kingi</i>	King's Slider	X																									
	<i>Lerista muelleri</i>	Wood Mulch-slider	X																									
	<i>Lerista picturata</i>	Southern Robust Slider	X					1						2											1	1		
	<i>Lerista timida</i>	Timid Slider	X																									
	<i>Liopholis inornata</i>	Desert Skink	X				1																					
	<i>Menetia greyii</i>	Common Dwarf Skink	X		1	1	1	1	1	1	1									3				1	1	1	2	1
	<i>Morethia adelaidensis</i>	Saltbush Morethia Skink	X																									
	<i>Morethia butleri</i>	Woodland Morethia Skink	X		1		1	1		1	1																	
	<i>Morethia obscura</i>	Shrubland Pale-flecked Morethia	X	1			1		1																			
	<i>Tiliqua occipitalis</i>	Western Blue-tongued Lizard																2										
	<i>Tiliqua rugosa</i>	Bobtail	X		1	1	1	1																			1	1
Typhlopidae	<i>Anilius australis</i>	Austral Blind Snake	X						1																	1		
	<i>Anilius bituberculatus</i>	Prong-snouted Blind Snake	X																									
Varanidae	<i>Varanus caudolineatus</i>	Stripe-tailed Monitor	X																									
	<i>Varanus gouldii</i>	Gould's Goanna	X				1		1	1	1										2					1	1	
	<i>Varanus tristis</i>	Black-headed Monitor	X																								3	
Birds																												
Casuariidae	<i>Dromaius novaehollandiae</i>	Emu						2																				1
Megapodiidae	<i>Leipoa ocellata</i>	Malleefowl																										

Family	Species	Common name	Surveys A														Surveys B														Surveys C													
			Site BN2	Site BN4	Site BN6	Site 7E	Site 7E02	Site 7E03	Site 7E03A	Site 7E04	Site 7E06	Site 7E01A	Site 7E05	South	Pools on	Site 7E06A	Site 1	Site 10	Site 2	Site 5	Site 6	Site 9	Site 12	Site 3	Site 8	Site 7	Site 11	Site 13																
Columbidae	<i>Phaps chalcoptera</i>	Common Bronzewing			2		2			3							5			2		2																						
	<i>Phaps elegans</i>	Brush Bronzewing																								2																		
	<i>Ocyphaps lophotes</i>	Crested Pigeon																				2																						
Cuculidae	<i>Chrysococcyx basalis</i>	Horsfield's Bronze-Cuckoo				1																																						
	<i>Chrysococcyx osculans</i>	Black-eared Cuckoo																	1	1			3	1	2	1																		
Aegothelidae	<i>Aegotheles cristatus</i>	Australian Owlet-nightjar								1																																		
Podargidae	<i>Podargus strigoides</i>	Tawny Frogmouth					1															2			1																			
Caprimulgidae	<i>Eurostopodus argus</i>	Spotted Nightjar					1											1																										
Charadriidae	<i>Vanellus tricolor</i>	Banded Lapwing																				1																						
Turnicidae	<i>Turnix varius</i>	Painted Buttonquail			1																																							
Accipitridae	<i>Lophoictinia isura</i>	Square-tailed Kite														2							1			1																		
	<i>Hieraaetus morphnoides</i>	Little Eagle									1															1																		
	<i>Aquila audax</i>	Wedge-tailed Eagle																							1																			
	<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk						1	1																																			
Cuculidae	<i>Heteroscenes pallidus</i>	Pallid Cuckoo					2														2	1	1																					
Strigidae	<i>Ninox boobook</i>	Southern Boobook				1												1																										
Alcedinidae	<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher		4			1	2																																				
Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater					5	13	19	30							1				1	6		1																				
Falconidae	<i>Falco cenchroides</i>	Nankeen Kestrel				1																																						
	<i>Falco berigora</i>	Brown Falcon				1														1			1	1																				
Cacatuidae	<i>Eolophus roseicapilla</i>	Galah																					1																					
	<i>Nymphicus hollandicus</i>	Cockatiel				1																																						
Psittaculidae	<i>Polytelis anthopeplus</i>	Regent Parrot		2				1	14																	8																		
	<i>Neophema elegans</i>	Elegant Parrot								1																																		
	<i>Barnardius zonarius</i>	Australian Ringneck		1	1		6	14	5	1							2			6	6	2	6	3	31	3																		
Psittacidae	<i>Platycercus icterotis</i>	Western Rosella (Inland)								1																																		
Psittaculidae	<i>Psephotus varius</i>	Mulga Parrot		20																	5																							
	<i>Glossopsitta porphyrocephala</i>	Purple-crowned Lorikeet						8	6		1									10			31	4	13	6																		
Ptilonorhynchidae	<i>Chlamydera guttata</i>	Western Bowerbird	X																																									
Climacteridae	<i>Climacteris rufus</i>	Rufous Treecreeper	X	20						29													26	4																				
Maluridae	<i>Malurus pulcherrimus</i>	Blue-breasted Fairywren	X																							5																		
	<i>Malurus splendens</i>	Splendid Fairywren	X														5																											
	<i>Malurus splendens</i>	Splendid Fairywren	X																																									
	<i>Malurus leucopterus</i>	White-winged Fairywren	X			1																																						

Family	Species	Common name	Surveys																									
			A							B							C											
			Site BN2	Site BN4	Site BN6	Site 7E	Site 7E02	Site 7E03	Site 7E03A	Site 7E04	Site 7E06	Site 7E01A	Site 7E05	South	Pools on	Site 7E06A	Site 1	Site 10	Site 2	Site 5	Site 6	Site 9	Site 12	Site 3	Site 8	Site 7	Site 11	Site 13
Meliphagidae	<i>Certhionyx variegatus</i>	Pied Honeyeater	X																									
	<i>Purnella albifrons</i>	White-fronted Honeyeater	X		1		6	12		3			3					25	8		6	5	28	21		12	28	
	<i>Lichenostomus cratitius</i>	Purple-gaped Honeyeater	X																									
	<i>Manorina flavigula</i>	Yellow-throated Miner	X																			8	11	2	6	8		
	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater	X	1	23	11	2	1	1									7	1		3	2	4	5		2	4	
	<i>Anthochaera carunculata</i>	Red Wattlebird	X		1			2		3			1					1			3	4	8	3	2	14	10	
	<i>Gavicalis virescens</i>	Singing Honeyeater	X				2	2																				
	<i>Ptilotula ornata</i>	Yellow-plumed Honeyeater	X	125	6		31			102			54					2	1		30	19	6	52	94	14	16	
	<i>Ptilotula penicillata</i>	White-plumed Honeyeater (Western)	X																									
	<i>Epthianura tricolor</i>	Crimson Chat	X																									
	<i>Epthianura aurifrons</i>	Orange Chat	X																									
	<i>Epthianura albifrons</i>	White-fronted Chat	X			1																						
	<i>Sugomel nigrum</i>	Black Honeyeater	X																									
	<i>Gliciphila melanops</i>	Tawny-crowned Honeyeater	X	2			2																					
	<i>Lichmera indistincta</i>	Brown Honeyeater	X	1	1		8											1				2				1	5	
	<i>Nesoptilotis leucotis</i>	White-eared Honeyeater	X		5		7	5										4	6		3	4	16	2	3	1	14	
	<i>Nesoptilotis flavicollis</i>	Yellow-throated Honeyeater		1	4			12		1			1															
	<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater					4											2			1		4	1		5	4	
Pardalotidae	<i>Pardalotus punctatus</i>	Spotted Pardalote	X																									
	<i>Pardalotus rubricatus</i>	Red-browed Pardalote	X																									
	<i>Pardalotus striatus</i>	Striated Pardalote	X	28	17		12	7		8			16					1			5	1	2	1	1	9	1	
Acanthizidae	<i>Pyrrholaemus brunneus</i>	Redthroat	X	2			6	1										9			11	6		1		5	6	
	<i>Calamanthus campestris</i>	Rufous Fieldwren	X																									
	<i>Hylacola cauta</i>	Shy Heathwren	X	3			1											2										
	<i>Acanthiza iredalei</i>	Slender-billed Thornbill (Western)	X																									
	<i>Acanthiza apicalis</i>	Inland Thornbill	X	20		7	6	4		5			4					4			2	2		3		6	5	
	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	X					10										5			5	2						
	<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill	X	6	13		24	4										45			41	35	1	1		23	8	
	<i>Acanthiza robustirostris</i>	Slaty-backed Thornbill	X																									
	<i>Smicrornis brevirostris</i>	Weebill	X	9	98		35	29		11		4	21					19	1		30	24	23	8		40	57	
	<i>Gerygone fusca</i>	Western Gerygone	X																			1						
	<i>Aphelocephala leucopsis</i>	Southern Whiteface	X																			1						
Pomatostomidae	<i>Pomatostomus superciliosus</i>	White-browed Babbler	X				12												6		15							
Cinlosomatidae	<i>Cinlosoma castanotum</i>	Chestnut Quail-thrush	X										1					1			4	1	1		1			

Family	Species	Common name	Surveys																									
			A					B							C													
			Site BN2	Site BN4	Site BN6	Site 7E	Site 7E02	Site 7E03	Site 7E03A	Site 7E04	Site 7E06	Site 7E01A	Site 7E05	South	Pools on	Site 7E06A	Site 1	Site 10	Site 2	Site 5	Site 6	Site 9	Site 12	Site 3	Site 8	Site 7	Site 11	Site 13
Campephagidae	<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike	X		1		5	1	2	1		3						3				1			6	7	2	2
	<i>Lalage tricolor</i>	White-winged Triller	X			9						4											1					
Neosittidae	<i>Daphoenositta chrysoptera</i>	Varied Sittella	X			1																				7		
Oreoicidae	<i>Oreoica gutturalis</i>	Crested Bellbird	X	3	1		4	1	7	3								2	2		6	2	2	5	4	2	2	
Pachycephalidae	<i>Colluricincla harmonica</i>	Grey Shrikethrush	X	7			2	3	9	4								3	3		2	1	1	1	3	1	1	
	<i>Pachycephala inornata</i>	Gilbert's Whistler	X	7			8						7								1			1				
	<i>Pachycephala pectoralis</i>	Golden Whistler	X																1			1						
	<i>Pachycephala simplex</i>	Grey Whistler																				1						
	<i>Pachycephala rufiventris</i>	Rufous Whistler	X			1												2										
Artamidae	<i>Artamus personatus</i>	Masked Woodswallow	X			1																						
	<i>Artamus cinereus</i>	Black-faced Woodswallow	X							1									1				1					
	<i>Artamus cyanopterus</i>	Dusky Woodswallow	X	35			3			21			3								2				6			
	<i>Cracticus torquatus</i>	Grey Butcherbird	X	1			1											1			3		2	4	2	3	1	
	<i>Cracticus nigrogularis</i>	Pied Butcherbird	X					1	6	1												1		3	1		1	
	<i>Gymnorhina tibicen</i>	Australian Magpie	X			1																	2	2	1		1	
	<i>Strepera versicolor</i>	Grey Currawong	X					1										4	1		4	2	1	2	3	3	5	
Rhipiduridae	<i>Rhipidura leucophrys</i>	Willie Wagtail	X	2				2	12	8												1		4				
	<i>Rhipidura albiscapa</i>	Grey Fantail	X																									
Monarchidae	<i>Grallina cyanoleuca</i>	Magpie-lark	X																									
Corvidae	<i>Corvus orru</i>	Torresian Crow	X																									
	<i>Corvus bennetti</i>	Little Crow	X																1		1			3	1			
	<i>Corvus coronoides</i>	Australian Raven	X	2														1			4	6	1	1	8	1	3	
Petroicidae	<i>Microeca fascinans</i>	Jacky Winter	X	3	1		2	1					7											11				
	<i>Petroica goodenovii</i>	Red-capped Robin	X		1		7	7		1								16					8			1		
	<i>Melanodryas cucullata</i>	Hooded Robin	X				4																					
	<i>Eopsaltria griseogularis</i>	Western Yellow Robin	X																2									
	<i>Drymodes brunneopygia</i>	Southern Scrub-Robin	X				2																					
Locustellidae	<i>Cincloramphus mathewsi</i>	Rufous Songlark	X																									
Hirundinidae	<i>Hirundo neoxena</i>	Welcome Swallow	X																							2		
	<i>Petrochelidon ariel</i>	Fairy Martin	X																									
	<i>Petrochelidon nigricans</i>	Tree Martin	X	48			7																					
	<i>Cheramoeca leucosterna</i>	White-backed Swallow	X																				1					
Zosteropidae	<i>Zosterops lateralis</i>	Silvereye (Western)	X																									
Dicaeidae	<i>Dicaeum hirundinaceum</i>	Mistletoebird	X	1																			1					

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Estrildidae	<i>Taeniopygia guttata</i>	Zebra Finch	X																									
Motacillidae	<i>Anthus novaeseelandiae</i>	Australasian Pipit	X					1				7																
Mammals																												
Tachyglossidae	<i>Tachyglossus aculeatus</i>	Short-beaked Echidna				1				1																		
Canidae	<i>Canis lupus</i>	Dingo	X					1																				
Felidae	<i>Felis catus</i>	Cat				1					1																	
Molossidae	<i>Auromomys australis</i>	White-striped Freetail Bat	X	1		7				1				1	1													
	<i>Mormopterus planiceps</i>	Southern Free-tail Bat	X						1	2																		
Vespertilionidae	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	X			13			1	3																		
	<i>Chalinolobus morio</i>	Chocolate Wattled Bat	X			3			1	3				1														
	<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat	X			1																						
	<i>Nyctophilus major</i>	Greater Long-eared Bat				1									1													
	<i>Scotorepens balstoni</i>	Inland Broad-nosed Bat	X						1																			
	<i>Vespadelus baverstocki</i>	Inland Forest Bat	X																									
	<i>Vespadelus regulus</i>	Southern Forrest Bat	X			11				5				1	1													
Dasyuridae	<i>Antechinomys laniger</i>	Kultarr	X																									
	<i>Ningai ridei</i>	Wongai Ningai	X																				1					
	<i>Ningai yvonneae</i>	Mallee Ningai	X	2				3	1	1		1																
	<i>Sminthopsis crassicaudata</i>	Fat-tailed Dunnart	X		1							8																
	<i>Sminthopsis dolichura</i>	Little Long-tailed Dunnart	X	1			1		2	1	1		4				1	13	4		1				1	15	1	
	<i>Sminthopsis gilberti</i>	Gilbert's Dunnart	X																									
	<i>Sminthopsis hirtipes</i>	Hairy-footed Dunnart	X								1				1													
Burramyidae	<i>Cercartetus concinnus</i>	Southwestern Pygmy Possum	X								1	1						1	2	1		1	2	1		4	1	3
Macropodidae	<i>Macropus fuliginosus</i>	Western Grey Kangaroo	X				6		2		1	2																
	<i>Osphranter robustus</i>	Euro	X																									
Leporidae	<i>Oryctolagus cuniculus</i>	Rabbit				1	1	1	1	1		1																
Muridae	<i>Mus musculus</i>	House Mouse	X	2	3						1	1	10									4						9
	<i>Notomys mitchellii</i>	Mitchell's Hopping Mouse	X					1	1								42	1	29				2					
	<i>Pseudomys albocinereus</i>	Ash-grey Mouse	X	9						1																		
	<i>Pseudomys bolami</i>	Bolam's Mouse	X				2	2			2				1													
	<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse	X																	1					1	13	2	
	<i>Pseudomys nanus</i>	Western Chestnut Mouse	X																									

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- B Keighery, B.J., McKenzie, N.L. and Hall, B. (1995) The Biological Survey of the Eastern Goldfields of Western Australia. Part 11. Boorabbin-Southern Cross Study Area, *Records of the Western Australian Museum*, Supplement No. 49
- 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*. Perth.

Family	Species	Common name	Surveys																									
			A									B			C			D		E								
			Golden Arrow Trans	Rose Trans	Palace Rehab	Golden Arrow	Palace Undist	Crossroads	Golden Arrow	Palace Trans	Rose Rehab	Rose Undist	Wendy Gully Rehab	Wendy Gully Trans	Wendy Gully Undist	Binduli	MFM01	MFM02	KK4	KK1	KK2	KK11	Victoria Rock NR	KFS24	KFS23	KFS25	KFS26b	KFS26a
	<i>Suta gouldii</i>	Gould's Snake																			1							
	<i>Suta monachus</i>	Hooded Snake		2	3	3	11	2	1	3	1	3		1	6						1							
	<i>Pseudechis australis</i>	Mulga Snake		2	2	1						1	1			X							1					
	<i>Pseudonaja mengdeni</i>	Western Brown Snake							1					1	1							1						
	<i>Pseudonaja modesta</i>	Ringed Brown Snake				2						2			1						1							
	<i>Simoselaps bertholdi</i>	Jan's Banded Snake					2	1				1			2				1									
	<i>Suta fasciata</i>	Rosen's Snake												1														
Gekkonidae	<i>Gehyra purpurascens</i>	Purplish Dtella				1	9	6				6																
	<i>Gehyra variegata</i>	Variegated Gehyra		13	2	28	45	6	1	1	3	37	3	1	12	X			1		3	2	1					
	<i>Heteronotia binoei</i>	Bynoe's Gecko	53	27	19	12	28	1	43	42	34	13	42	27	8	X			1	2	6	6						2
Pygopodidae	<i>Delma australis</i>	Marble-faced Delma		1		2	9		1			2			6	X						1						
	<i>Delma butleri</i>	Unbanded Delma						2							2													
	<i>Delma fraseri</i>	Fraser's Delma						1																				
	<i>Lialis burtonis</i>	Burton's Legless Lizard		2											3				2									
	<i>Pygopus lepidopodus</i>	Common Scaly-foot													1													2
Pythonidae	<i>Morelia spilota</i>	Carpet Python																					1					
Scincidae	<i>Cryptoblepharus buchanani</i>	Buchanan's Snake-eyed Skink				1	5			1		7											1					
	<i>Cryptoblepharus plagiocephalus</i>	Peron's Snake-eyed Skink																	4									
	<i>Ctenotus atlas</i>	Southern Mallee Ctenotus					1							2	104				6									
	<i>Ctenotus schomburgkii</i>	Barred Wedgesnout Ctenotus													2			1				1						
	<i>Ctenotus uber</i>	Spotted Ctenotus	2			48	5	27	1			3	2	1	25						7							
	<i>Cyclodomorphus melanops</i>	Spinifex Slender Blue-tongue		2		6	2						2	2	24				1									
	<i>Egernia depressa</i>	Southern Pygmy Spiny-tailed Skink		1	1	2	3			2	2	3																
	<i>Egernia formosa</i>	Goldfields Crevice Skink					2	1				14									1		1					
	<i>Eremiascincus richardsonii</i>	Broad-banded Sand-swimmer				1	4		2				1		1								1					
	<i>Hemiergis gracilipes</i>	South-western Mulch-skink														X												
	<i>Lerista kingi</i>	King's Slider														X											3	1
	<i>Lerista picturata</i>	Southern Robust Slider				17	5	1				5			20						2	1						
	<i>Lerista sp.</i>		1	3	1	3	6					6			2			2			3	2						
	<i>Liopholis inornata</i>	Desert Skink					8					71			2	X			1	1	1		1					

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			A									B			C			D		E											
			Golden Arrow Trans	Rose Trans	Palace Rehab	Golden Arrow	Palace Undist	Crossroads	Golden Arrow	Palace Trans	Rose Rehab	Rose Undist	Wendy Gully Rehab	Wendy Gully Trans	Wendy Gully Undist	Binduli	MFM01	MFM02	KK4	KK1	KK2	KK11	Victoria Rock NR	KFS24	KFS23	KFS25	KFS26b	KFS26a			
	<i>Liopholis striata</i>	Nocturnal Desert Skink													1																
	<i>Menetia greyii</i>	Common Dwarf Skink		11	4	6	23	4	4	12	18				1	X						1		1	3						
	<i>Morethia adelaidensis</i>	Saltbush Morethia Skink																			1										
	<i>Morethia butleri</i>	Woodland Morethia Skink		4			6					17		1								2		1	1	2	1				
	<i>Tiliqua occipitalis</i>	Western Blue-tongued Lizard				2									4								1								
	<i>Tiliqua rugosa</i>	Bobtail	3	1				1	1	3	2				1	X		3		2	7	1				4					
Typhlopidae	<i>Anilius australis</i>	Austral Blind Snake			2		7	7		3	1	2		1	6																
	<i>Anilius bicolor</i>	Dark-spined Blind Snake													1																
	<i>Anilius bituberculatus</i>	Prong-snouted Blind Snake	2			2	2					1		1																	
	<i>Anilius hamatus</i>	Pale-headed Blind Snake	5	2	2	18	7	13	4	1		6	1	1	9																
Varanidae	<i>Varanus caudolineatus</i>	Stripe-tailed Monitor				1		9			2	1			9			1													
	<i>Varanus gouldii</i>	Gould's Goanna	2	3	3	9	3	2	4	1	3	7	2	1				1		2		1									
	<i>Varanus tristis</i>	Black-headed Monitor		1																											
Blrds																															
Casuariidae	<i>Dromaius novaehollandiae</i>	Emu														X		14		11		1									
Anatidae	<i>Cygnus atratus</i>	Black Swan														X															
	<i>Tadorna tadornoides</i>	Australian Shelduck														X															
	<i>Anas gracilis</i>	Grey Teal														X					10										
Megapodiidae	<i>Leipoa ocellata</i>	Malleefowl															X	X													
Columbidae	<i>Phaps chalcoptera</i>	Common Bronzewing														X					4	3	1					1	2		
	<i>Ocyphaps lophotes</i>	Crested Pigeon														X					2										
Cuculidae	<i>Chrysococcyx basalis</i>	Horsfield's Bronze-Cuckoo																1		2	1										
	<i>Chrysococcyx osculans</i>	Black-eared Cuckoo																					1								
	<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo																					1								
Aegothelidae	<i>Aegotheles cristatus</i>	Australian Owlet-nightjar																					1								
Podargidae	<i>Podargus strigoides</i>	Tawny Frogmouth														X		1				1									
Caprimulgidae	<i>Eurostopodus argus</i>	Spotted Nightjar																					1								
Recurvirostridae	<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet														X															
Charadriidae	<i>Vanellus tricolor</i>	Banded Lapwing																					1								
Accipitridae	<i>Hieraaetus morphnoides</i>	Little Eagle																					1								

Family	Species	Common name	Surveys																									
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			Golden Arrow Trans	Rose Trans	Palace Rehab	Golden Arrow	Palace Undist	Crossroads	Golden Arrow	Palace Trans	Rose Rehab	Rose Undist	Wendy Gully Rehab	Wendy Gully Trans	Wendy Gully Undist	Binduli	MFM01	MFM02	KK4	KK1	KK2	KK11	Victoria Rock NR	KFS24	KFS23	KFS25	KFS26b	KFS26a
	<i>Aquila audax</i>	Wedge-tailed Eagle														X						2						
	<i>Accipiter fasciatus</i>	Brown Goshawk																					1					
	<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk																					1					
Cuculidae	<i>Heteroscenes pallidus</i>	Pallid Cuckoo																	1		4	1	1					
Strigidae	<i>Ninox boobook</i>	Southern Boobook																				1	1					
Alcedinidae	<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher																				2						
Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater																			19	10	1					5
Falconidae	<i>Falco cenchroides</i>	Nankeen Kestrel														X							1					
	<i>Falco longipennis</i>	Australian Hobby														X												
	<i>Falco berigora</i>	Brown Falcon														X					1		1					
Timaliidae	<i>Zosterops lateralis</i>	Silvereye																					1					
Cacatuidae	<i>Eolophus roseicapilla</i>	Galah																			10		1					
	<i>Nymphicus hollandicus</i>	Cockatiel																			15							
Psittaculidae	<i>Polytelis anthopeplus</i>	Regent Parrot																					1					
	<i>Barnardius zonarius</i>	Australian Ringneck														X			11		63	16	1					
Psittacidae	<i>Platycercus icterotis</i>	Western Rosella																					1					
Psittaculidae	<i>Psephotus varius</i>	Mulga Parrot														X			7		1		1					
	<i>Glossopsitta porphyrocephala</i>	Purple-crowned Lorikeet														X					3	6	1				2	3
Climacteridae	<i>Climacteris rufus</i>	Rufous Treecreeper																			4							4
Maluridae	<i>Malurus pulcherrimus</i>	Blue-breasted Fairywren																										
	<i>Malurus lamberti</i>	Variiegated Fairywren																					1					
	<i>Malurus leucopterus</i>	White-winged Fairywren														X					10							
Meliphagidae	<i>Purnella albifrons</i>	White-fronted Honeyeater																	17		11	19	1				2	1
	<i>Lichenostomus cratitius</i>	Purple-gaped Honeyeater																					1					
	<i>Manorina flavigula</i>	Yellow-throated Miner														X		52		86	36	1						
	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater																20		10	14	1				6	1	
	<i>Anthochaera carunculata</i>	Red Wattlebird														X					31		1					9
	<i>Gavicalis virescens</i>	Singing Honeyeater														X		9				15	1		1			
	<i>Ptilotula ornata</i>	Yellow-plumed Honeyeater																			30	8	1				13	27
	<i>Ptilotula keartlandi</i>	Grey-headed Honeyeater														X												

Family	Species	Common name	Surveys														D												
			A									B			C		E												
			Golden Arrow Trans	Rose Trans	Palace Rehab	Golden Arrow	Palace Undist	Crossroads	Golden Arrow	Palace Trans	Rose Rehab	Rose Undist	Wendy Gully Rehab	Wendy Gully Trans	Wendy Gully Undist	Binduli	MFM01	MFM02	KK4	KK1	KK2	KK11	Victoria Rock NR	KFS24	KFS23	KFS25	KFS26b	KFS26a	
	<i>Lichmera indistincta</i>	Brown Honeyeater														X						30		1		6	1	1	
	<i>Nesoptilotis leucotis</i>	White-eared Honeyeater																			3		1			1	2	1	
	<i>Melithreptus chloropsis</i>	Gilbert's Honeyeater														X													
	<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater																				5	1					12	
Pardalotidae	<i>Pardalotus striatus</i>	Striated Pardalote														X					56	9	1					3	
Acanthizidae	<i>Pyrrholaemus brunneus</i>	Redthroat																	2			1	1						
	<i>Acanthiza apicalis</i>	Inland Thornbill																				14	1						
	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill																				4	1						
	<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill																	33		2	25	1	4			1		
	<i>Smicromis brevirostris</i>	Weebill									1					X		12		155	77	1	1		3				
	<i>Gerygone fusca</i>	Western Gerygone																					1						
	<i>Aphelocephala leucopsis</i>	Southern Whiteface																					1						
Pomatostomidae	<i>Pomatostomus superciliosus</i>	White-browed Babbler														X		1		5	28	1						1	
Campephagidae	<i>Coracina maxima</i>	Ground Cuckooshrike																			4								
	<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike														X		6		13	9	1							
	<i>Lalage tricolor</i>	White-winged Triller																2											
Neosittidae	<i>Daphoenositta chrysoptera</i>	Varied Sittella																			15						10		
Oreoicidae	<i>Oreoica gutturalis</i>	Crested Bellbird														X		5		5		1						1	
Pachycephalidae	<i>Colluricincla harmonica</i>	Grey Shrikethrush														X				1	1	1				1	2		
	<i>Pachycephala pectoralis</i>	Golden Whistler																					1						
	<i>Pachycephala rufiventris</i>	Rufous Whistler																					1						
Artamidae	<i>Artamus personatus</i>	Masked Woodswallow														X													
	<i>Artamus cinereus</i>	Black-faced Woodswallow														X					1	7	1						
	<i>Artamus cyanopterus</i>	Dusky Woodswallow																			3								
	<i>Cracticus torquatus</i>	Grey Butcherbird														X		5		3		1							
	<i>Cracticus nigrogularis</i>	Pied Butcherbird														X				9	2	1							
	<i>Gymnorhina tibicen</i>	Australian Magpie														X				30	4	1							
	<i>Strepera versicolor</i>	Grey Currawong														X		2		7	7	1						1	
Rhipiduridae	<i>Rhipidura leucophrys</i>	Willie Wagtail														X				1	2	1							
	<i>Rhipidura albiscapa</i>	Grey Fantail																					1						

Family	Species	Common name	Surveys													B					C			D		E				
			Golden Arrow Trans	Rose Trans	Palace Rehab	Golden Arrow	Palace Undist	Crossroads	Golden Arrow	Palace Trans	Rose Rehab	Rose Undist	Wendy Gully Rehab	Wendy Gully Trans	Wendy Gully Undist	Binduli	MFM01	MFM02	KK4	KK1	KK2	KK11	Victoria Rock NR	KFS24	KFS23	KFS25	KFS26b	KFS26a		
Monarchidae	<i>Grallina cyanoleuca</i>	Maggie-lark													X					6		1								
Corvidae	<i>Corvus coronoides</i>	Australian Raven													X							1								
Petroicidae	<i>Microeca fascians</i>	Jacky Winter													X			1	11	6	1							1		
	<i>Petroica goodenovii</i>	Red-capped Robin															5	5	6	1										
	<i>Melanodryas cucullata</i>	Hooded Robin																	1											
	<i>Eopsaltria griseogularis</i>	Western Yellow Robin																				1								
Hirundinidae	<i>Hirundo neoxena</i>	Welcome Swallow													X		4													
	<i>Petrochelidon nigricans</i>	Tree Martin													X				4		1									
Dicaeidae	<i>Dicaeum hirundinaceum</i>	Mistletoebird																			1									
Estrildidae	<i>Taeniopygia guttata</i>	Zebra Finch (Australian)																			1									
Motacillidae	<i>Anthus novaeseelandiae</i>	Australasian Pipit			4														1		1		1							
Mammals																														
Tachyglossidae	<i>Tachyglossus aculeatus</i>	Short-beaked Echidna													X															
Bovidae	<i>Capra hircus</i>	Goat													X															
Canidae	<i>Vulpes vulpes</i>	Red Fox													X						1									
Felidae	<i>Felis catus</i>	Cat													X															
Molossidae	<i>Austronomus australis</i>	White-striped Freetail Bat																5	17	1	1									
	<i>Mormopterus planiceps</i>	Southern Free-tail Bat																11	8											
Vespertilionidae	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat																				1								
	<i>Chalinolobus morio</i>	Chocolate Wattled Bat																1	3											
	<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat																1	2											
	<i>Nyctophilus holtorum</i>	Holt's Long-eared Bat																10	42											
	<i>Scotorepens balstoni</i>	Inland Broad-nosed Bat																2	11											
	<i>Vespadelus regulus</i>	Southern Forest Bat																1	5											
Dasyuridae	<i>Ningauai sp.</i>	Ningauai Sp.	3			22		1			4		2	17																
	<i>Sminthopsis sp.</i>	Dunnart Sp.					2																							
	<i>Antechinomys laniger</i>	Kultarr		1								1																		
	<i>Ningauai ridei</i>	Wongai Ningauai												2																
	<i>Ningauai yvonneae</i>	Mallee Ningauai																				1								
	<i>Sminthopsis crassicaudata</i>	Fat-tailed Dunnart	11	63	67	15	12	26	27	57	143	28	121	100	24			1	2	5	1									

Family	Species	Common name	Surveys																									
			A									B			C			D		E								
			Golden Arrow Trans	Rose Trans	Palace Rehab	Golden Arrow	Palace Undist	Crossroads	Golden Arrow	Palace Trans	Rose Rehab	Rose Undist	Wendy Gully Rehab	Wendy Gully Trans	Wendy Gully Undist	Binduli	MFM01	MFM02	KK4	KK1	KK2	KK11	Victoria Rock NR	KFS24	KFS23	KFS25	KFS26b	KFS26a
	<i>Sminthopsis dolichura</i>	Little Long-tailed Dunnart	16	5	2	25	36	11	17	4	2	28	7	4	32				7	1	3	4	1					
Burramyidae	<i>Cercartetus concinnus</i>	Southwestern Pygmy Possum	11	11	9	32	20	17	3	8	20	22	9	6	16				2		8	1						2
Macropodidae	<i>Macropus fuliginosus</i>	Western Grey Kangaroo														X			8		2	6	1					
	<i>Osphranter robustus</i>	Euro																					2	1				
	<i>Osphranter rufus</i>	Red Kangaroo																		1	15	8						
Leporidae	<i>Oryctolagus cuniculus</i>	Rabbit			1					1						X							1					
Muridae	<i>Mus musculus</i>	House Mouse	36	33	49	2	24	18	24	47	56	22	18 1	88	13				1		13	4	1		2	4		
	<i>Notomys mitchellii</i>	Mitchell's Hopping Mouse																					1					
	<i>Pseudomys albocinereus</i>	Ash-grey Mouse												1									1					
	<i>Pseudomys bolami</i>	Bolam's Mouse	39	19		3	13	8	35	4	25	24			5				9	2			1					
	<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse	9			3	4	2	7			14	2	1	5													
	<i>Pseudomys nanus</i>	Western Chestnut Mouse																										

- A Thompson, S. (2004) *Mine site rehabilitation index using reptile assemblage as a bio-indicator*, PhD Thesis, Edith Cowan University, Perth Ora Banda Thompson PHD and other data, Perth and additional data collected after submission of the thesis
- 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 McKenzie, N.L. and Hall, B. (1992) The Biological Survey of the Eastern Goldfields of Western Australia. Part 8. Kurnalpi-Kalgoorlie Study Area, *Records of the Western Australian Museum*, Supplement No. 41.
- D Barrett, G. (1991) A Biological Survey of Victoria Rock Nature Reserve, Unpublished report for the Goldfields Naturalist Club, Perth.
- E Ninnox Wildlife Consulting (1995) *Vertebrate Fauna Studies Kambalda Area (1993) Widgiemooltha Area (1994)*, Unpublished report for Western Mining Corporation, Perth

Family	Species	Common name	Surveys																									
			A											B	C	D	E	F	G	H	I							
			Burra Rock NR #6	Kurrawang NR #6	Kurrawang NR #4	Burra Rock NR #3	Kurrawang NR #7	Burra Rock NR #4	Kurrawang NR #2	Burra Rock NR #2	Kurrawang NR #1	Burra Rock NR #5	Kurrawang NR #5	Kurrawang NR #3	Burra Rock NR #1	White Foil	White Foil	Binduli North	Site 40a	Kurrawang								
Amphibians																												
Myobatrachidae	<i>Pseudophryne occidentalis</i>	Western Toadlet	1																									
Reptiles																												
Agamidae	<i>Ctenophorus chapmani</i>	Chapman's Dragon																										
	<i>Ctenophorus cristatus</i>	Crested Dragon	1	1												1												X
	<i>Ctenophorus fordi</i>	Mallee Dragon			1																							
	<i>Ctenophorus isolepis</i>	Military Dragon																										X
	<i>Ctenophorus ornatus</i>	Ornate Crevice Dragon	1																									
	<i>Ctenophorus reticulatus</i>	Western Netted Dragon															1											
	<i>Ctenophorus scutulatus</i>	Lozenge-marked Dragon				1										1												
	<i>Moloch horridus</i>	Thorny Devil					1																					X
	<i>Pogona minor</i>	Western Bearded Dragon	1													1												X
	<i>Tympanocryptis cephalus</i>	Pebble Dragon															1											
Carphodactylidae	<i>Underwoodisaurus milii</i>	Barking Gecko						1	1																			
Diplodactylidae	<i>Diplodactylus pulcher</i>	Beautiful Gecko					1																					
	<i>Lucasium maini</i>	Main's Ground Gecko				1			1	1	1																	
	<i>Strophurus assimilis</i>	Goldfields Spiny-tailed Gecko	1						2																			
Pygopodidae	<i>Delma australis</i>	Marble-faced Delma																										X
Elapidae	<i>Simoselaps bertholdi</i>	Jan's Banded Snake				1																						
Gekkonidae	<i>Gehyra variegata</i>	Variiegated Gehyra							1	1						1												X
	<i>Christinus marmoratus</i>	Marble Gecko																										X
	<i>Heteronotia binoei</i>	Bynoe's Gecko					1									1												X
Scincidae	<i>Cryptoblepharus buchananii</i>	Buchanan's Snake-eyed Skink	1													1												X
	<i>Ctenotus atlas</i>	Southern Mallee Ctenotus			1																							X
	<i>Ctenotus leonhardi</i>	Leonhard's Ctenotus																										X
	<i>Ctenotus schomburgkii</i>	Barred Wedgesnout Ctenotus			1																							X
	<i>Cyclodomorphus branchialis</i>	Common Slender Bluetongue							1																			
	<i>Egernia depressa</i>	Southern Pygmy Spiny-tailed Skink														1	1											
	<i>Lerista kingi</i>	King's Lerista																										X

Family	Species	Common name	Surveys																					
			A										B	C	D	E	F	G	H	I				
			Burra Rock NR #6	Kurrawang NR #6	Kurrawang NR #4	Burra Rock NR #3	Kurrawang NR #7	Burra Rock NR #4	Kurrawang NR #2	Burra Rock NR #2	Kurrawang NR #1	Burra Rock NR #5	Kurrawang NR #5	Kurrawang NR #3	Burra Rock NR #1	White Foil	White Foil	Binduli North	Site 40a	Kurrawang				
	<i>Lerista picturata</i>	Southern Robust Slider														1								
	<i>Lerista timida</i>	Timid Slider																						X
	<i>Menetia greyii</i>	Common Dwarf Skink				1																		X
	<i>Tiliqua occipitalis</i>	Western Blue-tongued Lizard	1			1																		
	<i>Tiliqua rugosa</i>	Bobtail				1																		X
Varanidae	<i>Varanus gouldii</i>	Gould's Goanna														1								X
Birds																						X		
Casuariidae	<i>Dromaius novaehollandiae</i>	Emu				1			1		1					1	1	X						X
Megapodiidae	<i>Leipoa ocellata</i>	Malleefowl																	2				X	
Columbidae	<i>Phaps chalcoptera</i>	Common Bronzewing							1		1					1								X
	<i>Ocyphaps lophotes</i>	Crested Pigeon				1										1	1			1				X
Cuculidae	<i>Chrysococcyx lucidus</i>	Shining Bronze-Cuckoo														1								
Aegothelidae	<i>Aegotheles cristatus</i>	Australian Owlet-nightjar		1																				
Podargidae	<i>Podargus strigoides</i>	Tawny Frogmouth	1	1												1								
Charadriidae	<i>Vanellus tricolor</i>	Banded Lapwing										1												
Phalacrocoracidae	<i>Microcarbo melanoleucos</i>	Little Pied Cormorant	1																					
Turnicidae	<i>Turnix varius</i>	Painted Buttonquail																						X
Accipitridae	<i>Lophoictinia isura</i>	Square-tailed Kite		1													1							
	<i>Hieraaetus morphnoides</i>	Little Eagle							1		1									1				
	<i>Haliastur sphenurus</i>	Whiting Kite																						X
	<i>Aquila audax</i>	Wedge-tailed Eagle									1							X	1	1				X
	<i>Accipiter fasciatus</i>	Brown Goshawk																		1				
	<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk									1													
Cuculidae	<i>Heteroscenes pallidus</i>	Pallid Cuckoo																			1			X
	<i>Chrysococcyx basalis</i>	Horsfield's Bronze-Cuckoo																						X
Climacteridae	<i>Climacteris rufus</i>	Rufous Treecreeper																						X
Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater	1	1							1	1	1		1									
Falconidae	<i>Falco cenchroides</i>	Nankeen Kestrel				1										1			1					X
	<i>Falco berigora</i>	Brown Falcon	1																					
Cacatuidae	<i>Eolophus roseicapilla</i>	Galah				1				1						1								X

Family	Species	Common name	Surveys																					
			A										B	C	D	E	F	G	H	I				
			Burra Rock NR #6	Kurrawang NR #6	Kurrawang NR #4	Burra Rock NR #3	Kurrawang NR #7	Burra Rock NR #4	Kurrawang NR #2	Burra Rock NR #2	Kurrawang NR #1	Burra Rock NR #5	Kurrawang NR #5	Kurrawang NR #3	Burra Rock NR #1	White Foil	White Foil	Binduli North	Site 40a	Kurrawang				
Psittaculidae	<i>Polytelis anthopeplus</i>	Regent Parrot	1			1	1	1	1	1				1					3					X
	<i>Neophema elegans</i>	Elegant Parrot																						
	<i>Barnardius zonarius</i>	Australian Ringneck	1			1		1				1				1	1	X		1				X
	<i>Psephotus varius</i>	Mulga Parrot					1														X			X
	<i>Glossopsitta porphyrocephala</i>	Purple-crowned Lorikeet	1					1		1							1	X		1				X
Psittacidae	<i>Platycercus icterotis</i>	Western Rosella (Inland)																						X
Ptilonorhynchidae	<i>Ptilonorhynchus maculata</i>	Spotted Bowerbird														1								
Maluridae	<i>Malurus pulcherrimus</i>	Blue-breasted Fairywren																		1				
	<i>Malurus lamberti</i>	Variiegated Fairywren	1			1								1										
	<i>Malurus splendens</i>	Splendid Fairywren					1										1		7					
	<i>Malurus leucopterus</i>	White-winged Fairywren														1	1							
Meliphagidae	<i>Certhionyx variegatus</i>	Pied Honeyeater																						X
	<i>Purnella albifrons</i>	White-fronted Honeyeater														1	1		5	1				
	<i>Lichenostomus cratitius</i>	Purple-gaped Honeyeater	1			1														1				
	<i>Manorina flavigula</i>	Yellow-throated Miner		1			1		1							1				1				
	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater	1						1				1			1	1	X	6	1	X			
	<i>Anthochaera carunculata</i>	Red Wattlebird	1				1		1		1	1	1			1	X			1	X			
	<i>Gavicalis virescens</i>	Singing Honeyeater													1	1	X	13	1					X
	<i>Ptilotula ornata</i>	Yellow-plumed Honeyeater	1		1		1		1		1	1				1				1	X			
	<i>Lichmera indistincta</i>	Brown Honeyeater	1								1	1				1	1			1	X			
	<i>Nesoptilotis leucotis</i>	White-eared Honeyeater	1					1		1						1	1			1	X			X
	<i>Nesoptilotis flavicollis</i>	Yellow-throated Honeyeater															1							X
	<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater						1													1	X		
Pardalotidae	<i>Pardalotus striatus</i>	Striated Pardalote	1		1	1			1	1	1			1		1	1	X		1	X			X
Acanthizidae	<i>Pyrrholaemus brunneus</i>	Redthroat				1		1							1	1			20					X
	<i>Acanthiza apicalis</i>	Inland Thornbill	1	1				1		1					1	1	1		45	1	X			
	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	1		1							1	1			1				1				
	<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill			1							1				1	1		2	1	X			
	<i>Smicronnis brevirostris</i>	Weebill	1		1	1		1	1	1	1		1	1			1	X	2	1	X			X
Pomatostomidae	<i>Pomatostomus superciliosus</i>	White-browed Babbler						1								1	1		5	1	X			

Family	Species	Common name	Surveys																					
			A										B	C	D	E	F	G	H	I				
			Burra Rock NR #6	Kurrawang NR #6	Kurrawang NR #4	Burra Rock NR #3	Kurrawang NR #7	Burra Rock NR #4	Kurrawang NR #2	Burra Rock NR #2	Kurrawang NR #1	Burra Rock NR #5	Kurrawang NR #5	Kurrawang NR #3	Burra Rock NR #1	White Foil	White Foil	Binduli North	Site 40a	Kurrawang				
Cinclosomatidae	<i>Cinclosoma castanotum</i>	Chestnut Quail-thrush		1								1												X
Campephagidae	<i>Coracina maxima</i>	Ground Cuckooshrike					1																	
	<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike				1	1				1					1	1				1			X
	<i>Lalage tricolor</i>	White-winged Triller																			1			
Neosittidae	<i>Daphoenositta chrysoptera</i>	Varied Sittella															1	5					X	
Oreoicidae	<i>Oreoica gutturalis</i>	Crested Bellbird	1		1		1					1	1	1	1	1		X	4				X	
Pachycephalidae	<i>Colluricincla harmonica</i>	Grey Shrikethrush	1			1	1					1	1		1	1	1			5	1		X	
	<i>Pachycephala inornata</i>	Gilbert's Whistler																			1			
	<i>Pachycephala rufiventris</i>	Rufous Whistler																X	6					X
Artamidae	<i>Artamus personatus</i>	Masked Woodswallow										1												
	<i>Artamus cinereus</i>	Black-faced Woodswallow											1											
	<i>Artamus cyanopterus</i>	Dusky Woodswallow	1																			1		
	<i>Cracticus torquatus</i>	Grey Butcherbird	1		1		1		1				1		1						1			
	<i>Cracticus nigrogularis</i>	Pied Butcherbird			1		1		1				1		1	1					1			
	<i>Gymnorhina tibicen</i>	Australian Magpie					1								1	1	X				1			
	<i>Strepera versicolor</i>	Grey Currawong	1	1			1	1		1				1	1	1	X						X	X
Rhipiduridae	<i>Rhipidura leucophrys</i>	Willie Wagtail										1				1	1	X						X
	<i>Rhipidura albiscapa</i>	Grey Fantail																	3					
Monarchidae	<i>Grallina cyanoleuca</i>	Magpie-lark					1									1					1			
Corvidae	<i>Corvus bennetti</i>	Little Crow	1			1	1								1		X	11						
	<i>Corvus coronoides</i>	Australian Raven													1	1					1			X
Petroicidae	<i>Microeca fascinans</i>	Jacky Winter								1		1					1						X	
	<i>Petroica goodenovii</i>	Red-capped Robin	1				1					1				1			4	1				X
	<i>Melanodryas cucullata</i>	Hooded Robin																			1			
	<i>Eopsaltria griseogularis</i>	Western Yellow Robin	1																				X	
	<i>Drymodes superciliaris</i>	Northern Scrub-Robin				1		1																
Hirundinidae	<i>Petrochelidon ariel</i>	Fairy Martin															1							
	<i>Petrochelidon nigricans</i>	Tree Martin										1								2				
	<i>Hirundo neoxena</i>	Welcome Swallow																						X
Dicaeidae	<i>Dicaeum hirundinaceum</i>	Mistletoebird													1				1					

Family	Species	Common name	Surveys																						
			A										B	C	D	E	F	G	H	I					
			Burra Rock NR #6	Kurrawang NR #6	Kurrawang NR #4	Burra Rock NR #3	Kurrawang NR #7	Burra Rock NR #4	Kurrawang NR #2	Burra Rock NR #2	Kurrawang NR #1	Burra Rock NR #5	Kurrawang NR #5	Kurrawang NR #3	Burra Rock NR #1	White Foil	White Foil	Binduli North	Site 40a	Kurrawang					
Estrildidae	<i>Taeniopygia guttata</i>	Zebra Finch										1													X
Motacillidae	<i>Anthus novaeseelandiae</i>	Australasian Pipit					1					1													
Mammals																									
Tachyglossidae	<i>Tachyglossus aculeatus</i>	Short-beaked Echidna			1											1									X
Bovidae	<i>Capra hircus</i>	Goat														1	1								
	<i>Ovis aries</i>	Sheep														1	1								
Canidae	<i>Vulpes vulpes</i>	Red Fox														1	1								
	<i>Canis sp.</i>																						X		
Felidae	<i>Felis catus</i>	Cat																X							X
Vespertilionidae	<i>Chalinolobus morio</i>	Chocolate Wattled Bat																							X
Vespertilionidae	<i>Chalinolobus geoffroyi</i>	Lesser Long-eared Bat																							X
Dasyuridae	<i>Ningau yvonneae</i>	Mallee Ningau							1																
	<i>Sminthopsis crassicaudata</i>	Fat-tailed Dunnart											2												
	<i>Sminthopsis dolichura</i>	Little Long-tailed Dunnart				2								1											
Burramyidae	<i>Cercartetus concinnus</i>	Southwestern Pygmy Possum								2															
Macropodidae	<i>Macropus fuliginosus</i>	Western Grey Kangaroo					1										1	X							X
	<i>Osphranter robustus</i>	Euro					1																		
	<i>Osphranter rufus</i>	Red Kangaroo														1									
Leporidae	<i>Oryctolagus cuniculus</i>	Rabbit														1	1	X					X		X
Muridae	<i>Mus musculus</i>	House Mouse			1																				
	<i>Notomys mitchellii</i>	Mitchell's Hopping Mouse				2			8			1		1											
	<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse						1																	

- A Chapman, A., Kealley, I., McMillan, D., McMillan, P., Rolland, G. (1991) Biological surveys of four Goldfields Reserves: Kurrawang Nature Reserve, Burra Rock Nature Reserve, Cave Hill Nature Reserve and Dordie Rocks Nature Reserve , *Landnote*, 1/91, 1-26.
- B Ninox Wildlife Consulting (1999) *Survey for the White Foil Gold Project*, Unpublished report for Mines and Resources Australia Pty Ltd, Perth.
- C 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 Australia Pty Ltd, Perth.
- D Spectrum Ecology (2020) *Binduli Expansion Report Desktop Report Review*, Unpublished report for Talis, Perth.

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

**Basic and Targeted Vertebrate Fauna Survey
Beacon Haul Roads**



APPENDIX C

DEFINITIONS OF SIGNIFICANT FAUNA UNDER THE WA BIODIVERSITY CONSERVATION ACT 2016

Threatened, Extinct and Specially Protected fauna or flora¹ are species² 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.

Rapid Habitat Assessment

Basic and Targeted Vertebrate Fauna Survey
Beacon Haul Roads



Date: 26/07/2023

Habitat Assessment #: 1

Observer: Dr Scott Thompson

Zone: 51

Easting: 304598 mE

Northing: 6599196 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Disturbed

Habitat Quality: Disturbed

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 2

Observer: Dr Scott Thompson

Zone: 51

Easting: 304739 mE

Northing: 6599222 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Disturbed

Habitat Quality: Disturbed

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 3

Observer: Dr Scott Thompson

Zone: 51

Easting: 305104 mE

Northing: 6599248 mN

Fire History: > 5yrs

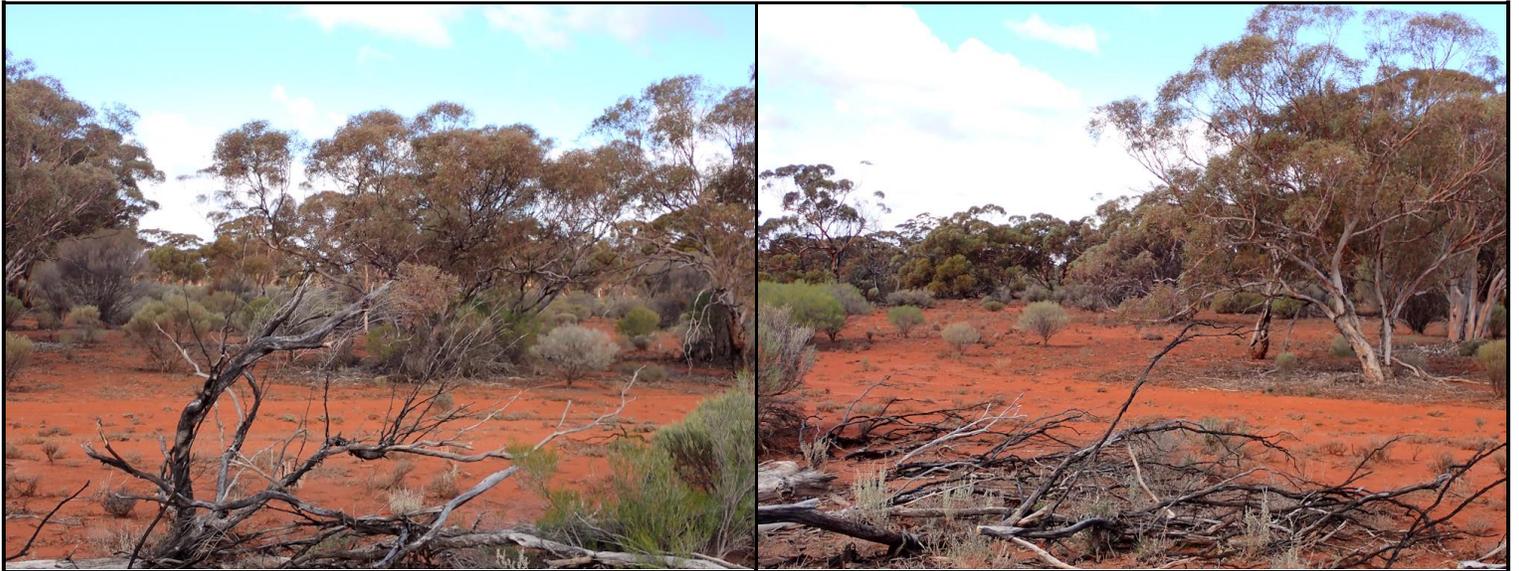
Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Disturbed

Habitat Quality: Disturbed

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 4

Observer: Dr Scott Thompson

Zone: 51

Easting: 305548 mE

Northing: 6599410 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Disturbed

Habitat Quality: Disturbed

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 5

Observer: Dr Scott Thompson

Zone: 51

Easting: 305882 mE

Northing: 6599554 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 6

Observer: Dr Scott Thompson

Zone: 51

Easting: 306383 mE

Northing: 6599669 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Disturbed

Habitat Quality: Disturbed

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 7

Observer: Dr Scott Thompson

Zone: 51

Easting: 306869 mE

Northing: 6599749 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 8

Observer: Dr Scott Thompson

Zone: 51

Easting: 307371 mE

Northing: 6599855 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 9

Observer: Dr Scott Thompson

Zone: 51

Easting: 307941 mE

Northing: 6599991 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 10

Observer: Dr Scott Thompson

Zone: 51

Easting: 308527 mE

Northing: 6600131 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Disturbed

Habitat Quality: Disturbed

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 11

Observer: Dr Scott Thompson

Zone: 51

Easting: 309243 mE

Northing: 6600262 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Disturbed

Habitat Quality: Disturbed

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 12

Observer: Dr Scott Thompson

Zone: 51

Easting: 309942 mE

Northing: 6600289 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 13

Observer: Dr Scott Thompson

Zone: 51

Easting: 310419 mE

Northing: 6600268 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 14

Observer: Dr Scott Thompson

Zone: 51

Easting: 310854 mE

Northing: 6600256 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 15

Observer: Dr Scott Thompson

Zone: 51

Easting: 311205 mE

Northing: 6600196 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 16

Observer: Dr Scott Thompson

Zone: 51

Easting: 311676 mE

Northing: 6600176 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 17

Observer: Dr Scott Thompson

Zone: 51

Easting: 311992 mE

Northing: 6600205 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 18

Observer: Dr Scott Thompson

Zone: 51

Easting: 311995 mE

Northing: 6600434 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 19

Observer: Dr Scott Thompson

Zone: 51

Easting: 312001 mE

Northing: 6600734 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 20

Observer: Dr Scott Thompson

Zone: 51

Easting: 312005 mE

Northing: 6600959 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 21

Observer: Dr Scott Thompson

Zone: 51

Easting: 312002 mE

Northing: 6601185 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 22

Observer: Dr Scott Thompson

Zone: 51

Easting: 312270 mE

Northing: 6600149 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 23

Observer: Dr Scott Thompson

Zone: 51

Easting: 312525 mE

Northing: 6600112 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 24

Observer: Dr Scott Thompson

Zone: 51

Easting: 312769 mE

Northing: 6600117 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Disturbed

Habitat Quality: Disturbed

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 25

Observer: Dr Scott Thompson

Zone: 51

Easting: 313083 mE

Northing: 6600106 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 26

Observer: Dr Scott Thompson

Zone: 51

Easting: 313370 mE

Northing: 6600075 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 27

Observer: Dr Scott Thompson

Zone: 51

Easting: 313696 mE

Northing: 6600074 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 28

Observer: Dr Scott Thompson

Zone: 51

Easting: 314044 mE

Northing: 6600095 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 29

Observer: Dr Scott Thompson

Zone: 51

Easting: 314305 mE

Northing: 6600078 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 30

Observer: Dr Scott Thompson

Zone: 51

Easting: 314694 mE

Northing: 6600108 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 31

Observer: Dr Scott Thompson

Zone: 51

Easting: 315032 mE

Northing: 6600130 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 32

Observer: Dr Scott Thompson

Zone: 51

Easting: 315358 mE

Northing: 6600105 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 33

Observer: Dr Scott Thompson

Zone: 51

Easting: 315565 mE

Northing: 6600093 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 34

Observer: Dr Scott Thompson

Zone: 51

Easting: 315786 mE

Northing: 6600078 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 35

Observer: Dr Scott Thompson

Zone: 51

Easting: 315879 mE

Northing: 6600114 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 36

Observer: Dr Scott Thompson

Zone: 51

Easting: 316113 mE

Northing: 6600098 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Disturbed

Habitat Quality: Disturbed

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 37

Observer: Dr Scott Thompson

Zone: 51

Easting: 316372 mE

Northing: 6600156 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 38

Observer: Dr Scott Thompson

Zone: 51

Easting: 316593 mE

Northing: 6600225 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 39

Observer: Dr Scott Thompson

Zone: 51

Easting: 316779 mE

Northing: 6600309 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 40

Observer: Dr Scott Thompson

Zone: 51

Easting: 316481 mE

Northing: 6600153 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 41

Observer: Dr Scott Thompson

Zone: 51

Easting: 316296 mE

Northing: 6600101 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 42

Observer: Dr Scott Thompson

Zone: 51

Easting: 315995 mE

Northing: 6600067 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 43

Observer: Dr Scott Thompson

Zone: 51

Easting: 315646 mE

Northing: 6600033 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 44

Observer: Dr Scott Thompson

Zone: 51

Easting: 315465 mE

Northing: 6600064 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 45

Observer: Dr Scott Thompson

Zone: 51

Easting: 315327 mE

Northing: 6600063 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 46

Observer: Dr Scott Thompson

Zone: 51

Easting: 315180 mE

Northing: 6600049 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 47

Observer: Dr Scott Thompson

Zone: 51

Easting: 314925 mE

Northing: 6600053 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 48

Observer: Dr Scott Thompson

Zone: 51

Easting: 314544 mE

Northing: 6600039 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 49

Observer: Dr Scott Thompson

Zone: 51

Easting: 314178 mE

Northing: 6600028 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 50

Observer: Dr Scott Thompson

Zone: 51

Easting: 313872 mE

Northing: 6600032 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 51

Observer: Dr Scott Thompson

Zone: 51

Easting: 313570 mE

Northing: 6600030 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 52

Observer: Dr Scott Thompson

Zone: 51

Easting: 313241 mE

Northing: 6599853 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 53

Observer: Dr Scott Thompson

Zone: 51

Easting: 313394 mE

Northing: 6599569 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 54

Observer: Dr Scott Thompson

Zone: 51

Easting: 313594 mE

Northing: 6599362 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Disturbed

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 55

Observer: Dr Scott Thompson

Zone: 51

Easting: 313824 mE

Northing: 6599172 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 56

Observer: Dr Scott Thompson

Zone: 51

Easting: 314106 mE

Northing: 6599047 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mallee over shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 57

Observer: Dr Scott Thompson

Zone: 51

Easting: 314406 mE

Northing: 6598916 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 58

Observer: Dr Scott Thompson

Zone: 51

Easting: 314717 mE

Northing: 6598780 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Disturbed

Habitat Quality: Disturbed

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 59

Observer: Dr Scott Thompson

Zone: 51

Easting: 314908 mE

Northing: 6598649 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Disturbed

Habitat Quality: Disturbed

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 60

Observer: Dr Scott Thompson

Zone: 51

Easting: 315135 mE

Northing: 6598573 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 61

Observer: Dr Scott Thompson

Zone: 51

Easting: 315238 mE

Northing: 6598488 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 62

Observer: Dr Scott Thompson

Zone: 51

Easting: 315472 mE

Northing: 6598370 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 63

Observer: Dr Scott Thompson

Zone: 51

Easting: 315749 mE

Northing: 6598250 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Chenopod and salt lake habitat

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 64

Observer: Dr Scott Thompson

Zone: 51

Easting: 315918 mE

Northing: 6598133 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 65

Observer: Dr Scott Thompson

Zone: 51

Easting: 316120 mE

Northing: 6598034 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 66

Observer: Dr Scott Thompson

Zone: 51

Easting: 315579 mE

Northing: 6598266 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 67

Observer: Dr Scott Thompson

Zone: 51

Easting: 315360 mE

Northing: 6598417 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 68

Observer: Dr Scott Thompson

Zone: 51

Easting: 314587 mE

Northing: 6598764 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 69

Observer: Dr Scott Thompson

Zone: 51

Easting: 314274 mE

Northing: 6598925 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 70

Observer: Dr Scott Thompson

Zone: 51

Easting: 313942 mE

Northing: 6599066 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mallee over shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 71

Observer: Dr Scott Thompson

Zone: 51

Easting: 313591 mE

Northing: 6599297 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 72

Observer: Dr Scott Thompson

Zone: 51

Easting: 313260 mE

Northing: 6599699 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 73

Observer: Dr Scott Thompson

Zone: 51

Easting: 312969 mE

Northing: 6600040 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 74

Observer: Dr Scott Thompson

Zone: 51

Easting: 312080 mE

Northing: 6600109 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 75

Observer: Dr Scott Thompson

Zone: 51

Easting: 311873 mE

Northing: 6600120 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 76

Observer: Dr Scott Thompson

Zone: 51

Easting: 311509 mE

Northing: 6600146 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 77

Observer: Dr Scott Thompson

Zone: 51

Easting: 311029 mE

Northing: 6600180 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 78

Observer: Dr Scott Thompson

Zone: 51

Easting: 310708 mE

Northing: 6600232 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 79

Observer: Dr Scott Thompson

Zone: 51

Easting: 310188 mE

Northing: 6600235 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 80

Observer: Dr Scott Thompson

Zone: 51

Easting: 309645 mE

Northing: 6600213 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 81

Observer: Dr Scott Thompson

Zone: 51

Easting: 308925 mE

Northing: 6600195 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 82

Observer: Dr Scott Thompson

Zone: 51

Easting: 308346 mE

Northing: 6600026 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 83

Observer: Dr Scott Thompson

Zone: 51

Easting: 307695 mE

Northing: 6599886 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 84

Observer: Dr Scott Thompson

Zone: 51

Easting: 307173 mE

Northing: 6599733 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 85

Observer: Dr Scott Thompson

Zone: 51

Easting: 306699 mE

Northing: 6599698 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 86

Observer: Dr Scott Thompson

Zone: 51

Easting: 306225 mE

Northing: 6599586 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 87

Observer: Dr Scott Thompson

Zone: 51

Easting: 305778 mE

Northing: 6599432 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Disturbed

Habitat Quality: Disturbed

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 88

Observer: Dr Scott Thompson

Zone: 51

Easting: 305349 mE

Northing: 6599300 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Disturbed

Habitat Quality: Disturbed

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 89

Observer: Dr Scott Thompson

Zone: 51

Easting: 305307 mE

Northing: 6599084 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Disturbed

Habitat Quality: Disturbed

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 90

Observer: Dr Scott Thompson

Zone: 51

Easting: 305465 mE

Northing: 6598815 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Disturbed

Habitat Quality: Disturbed

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 91

Observer: Dr Scott Thompson

Zone: 51

Easting: 305631 mE

Northing: 6598537 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Disturbed

Habitat Quality: Disturbed

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 92

Observer: Dr Scott Thompson

Zone: 51

Easting: 305809 mE

Northing: 6598239 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Disturbed

Habitat Quality: Disturbed

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 93

Observer: Dr Scott Thompson

Zone: 51

Easting: 305974 mE

Northing: 6597965 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 94

Observer: Dr Scott Thompson

Zone: 51

Easting: 304944 mE

Northing: 6599204 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Disturbed

Habitat Quality: Disturbed

Surface: Sandy clay



Date: 26/07/2023

Habitat Assessment #: 95

Observer: Dr Scott Thompson

Zone: 51

Easting: 304703 mE

Northing: 6599166 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 96

Observer: Dr Scott Thompson

Zone: 51

Easting: 299597 mE

Northing: 6585343 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 97

Observer: Dr Scott Thompson

Zone: 51

Easting: 299600 mE

Northing: 6585168 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 98

Observer: Dr Scott Thompson

Zone: 51

Easting: 299576 mE

Northing: 6585519 mN

Fire History: > 5yrs

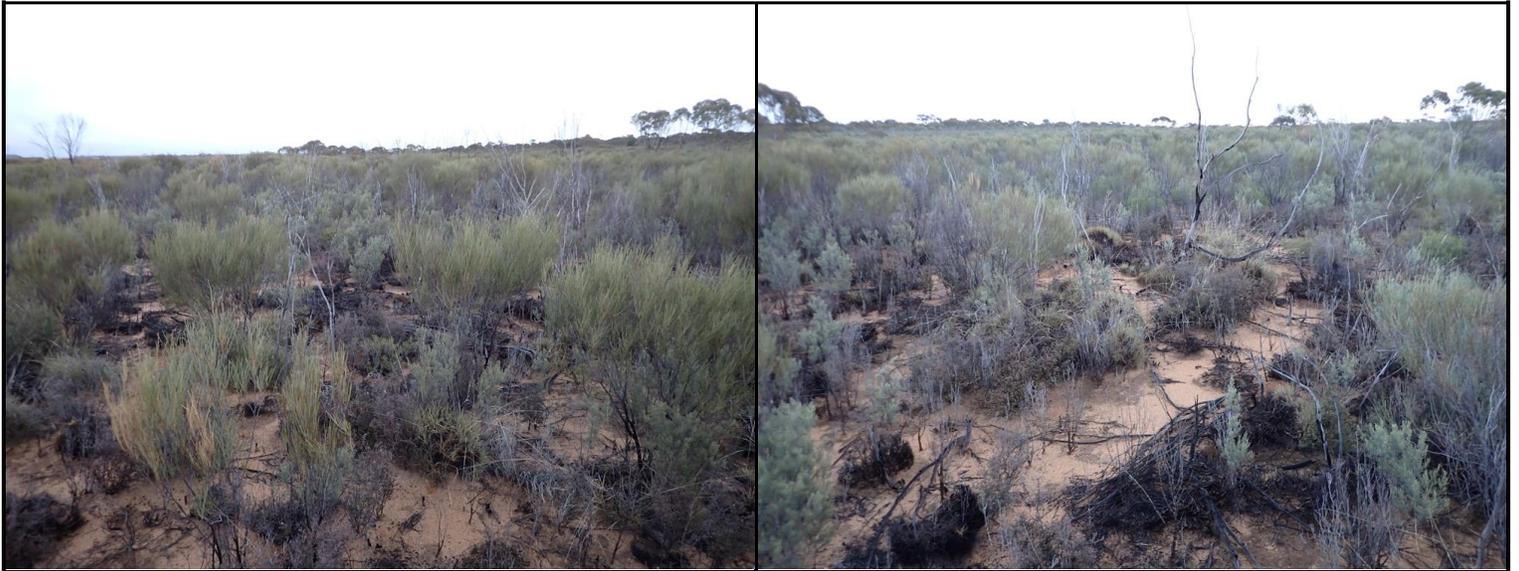
Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 99

Observer: Dr Scott Thompson

Zone: 51

Easting: 299650 mE

Northing: 6585796 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 100

Observer: Dr Scott Thompson

Zone: 51

Easting: 299691 mE

Northing: 6586022 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 101

Observer: Dr Scott Thompson

Zone: 51

Easting: 299756 mE

Northing: 6586310 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mallee over shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 102

Observer: Dr Scott Thompson

Zone: 51

Easting: 299804 mE

Northing: 6586512 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mallee over shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 103

Observer: Dr Scott Thompson

Zone: 51

Easting: 299845 mE

Northing: 6586742 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mallee over shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 104

Observer: Dr Scott Thompson

Zone: 51

Easting: 299896 mE

Northing: 6587112 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mallee over shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 105

Observer: Dr Scott Thompson

Zone: 51

Easting: 299966 mE

Northing: 6587369 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mallee over shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 106

Observer: Dr Scott Thompson

Zone: 51

Easting: 300028 mE

Northing: 6587722 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 107

Observer: Dr Scott Thompson

Zone: 51

Easting: 300086 mE

Northing: 6588003 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 108

Observer: Dr Scott Thompson

Zone: 51

Easting: 300146 mE

Northing: 6588304 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 109

Observer: Dr Scott Thompson

Zone: 51

Easting: 300203 mE

Northing: 6588601 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 110

Observer: Dr Scott Thompson

Zone: 51

Easting: 300254 mE

Northing: 6588894 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 111

Observer: Dr Scott Thompson

Zone: 51

Easting: 300325 mE

Northing: 6589196 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 112

Observer: Dr Scott Thompson

Zone: 51

Easting: 300370 mE

Northing: 6589498 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 113

Observer: Dr Scott Thompson

Zone: 51

Easting: 300441 mE

Northing: 6589823 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 114

Observer: Dr Scott Thompson

Zone: 51

Easting: 300486 mE

Northing: 6590124 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 115

Observer: Dr Scott Thompson

Zone: 51

Easting: 300532 mE

Northing: 6590425 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 116

Observer: Dr Scott Thompson

Zone: 51

Easting: 300626 mE

Northing: 6590853 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mallee over shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 117

Observer: Dr Scott Thompson

Zone: 51

Easting: 300672 mE

Northing: 6591016 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 118

Observer: Dr Scott Thompson

Zone: 51

Easting: 300694 mE

Northing: 6591119 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 119

Observer: Dr Scott Thompson

Zone: 51

Easting: 300772 mE

Northing: 6591425 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 120

Observer: Dr Scott Thompson

Zone: 51

Easting: 300778 mE

Northing: 6591528 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 121

Observer: Dr Scott Thompson

Zone: 51

Easting: 300673 mE

Northing: 6591314 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 122

Observer: Dr Scott Thompson

Zone: 51

Easting: 300565 mE

Northing: 6590602 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 123

Observer: Dr Scott Thompson

Zone: 51

Easting: 300500 mE

Northing: 6590321 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 124

Observer: Dr Scott Thompson

Zone: 51

Easting: 300455 mE

Northing: 6590194 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mallee over shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 125

Observer: Dr Scott Thompson

Zone: 51

Easting: 300418 mE

Northing: 6590048 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mallee over shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 126

Observer: Dr Scott Thompson

Zone: 51

Easting: 300357 mE

Northing: 6589707 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mallee over shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 127

Observer: Dr Scott Thompson

Zone: 51

Easting: 300303 mE

Northing: 6589404 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 128

Observer: Dr Scott Thompson

Zone: 51

Easting: 300271 mE

Northing: 6589286 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 129

Observer: Dr Scott Thompson

Zone: 51

Easting: 300245 mE

Northing: 6589037 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 130

Observer: Dr Scott Thompson

Zone: 51

Easting: 300186 mE

Northing: 6588773 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 131

Observer: Dr Scott Thompson

Zone: 51

Easting: 300116 mE

Northing: 6588514 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 132

Observer: Dr Scott Thompson

Zone: 51

Easting: 300086 mE

Northing: 6588189 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 133

Observer: Dr Scott Thompson

Zone: 51

Easting: 300011 mE

Northing: 6587930 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 134

Observer: Dr Scott Thompson

Zone: 51

Easting: 299946 mE

Northing: 6587601 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 135

Observer: Dr Scott Thompson

Zone: 51

Easting: 299878 mE

Northing: 6587295 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 136

Observer: Dr Scott Thompson

Zone: 51

Easting: 299825 mE

Northing: 6586976 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mallee over shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 137

Observer: Dr Scott Thompson

Zone: 51

Easting: 299765 mE

Northing: 6586659 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mallee over shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 138

Observer: Dr Scott Thompson

Zone: 51

Easting: 299721 mE

Northing: 6586460 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 139

Observer: Dr Scott Thompson

Zone: 51

Easting: 299674 mE

Northing: 6586222 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Mixed shrubland

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 140

Observer: Dr Scott Thompson

Zone: 51

Easting: 299621 mE

Northing: 6585942 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 141

Observer: Dr Scott Thompson

Zone: 51

Easting: 299583 mE

Northing: 6585725 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 142

Observer: Dr Scott Thompson

Zone: 51

Easting: 303235 mE

Northing: 6597248 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 143

Observer: Dr Scott Thompson

Zone: 51

Easting: 303148 mE

Northing: 6597000 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 144

Observer: Dr Scott Thompson

Zone: 51

Easting: 302849 mE

Northing: 6596763 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 145

Observer: Dr Scott Thompson

Zone: 51

Easting: 302662 mE

Northing: 6596625 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 146

Observer: Dr Scott Thompson

Zone: 51

Easting: 302519 mE

Northing: 6596422 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 147

Observer: Dr Scott Thompson

Zone: 51

Easting: 302421 mE

Northing: 6596164 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 148

Observer: Dr Scott Thompson

Zone: 51

Easting: 302318 mE

Northing: 6595912 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 149

Observer: Dr Scott Thompson

Zone: 51

Easting: 302203 mE

Northing: 6595649 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 150

Observer: Dr Scott Thompson

Zone: 51

Easting: 302108 mE

Northing: 6595394 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 151

Observer: Dr Scott Thompson

Zone: 51

Easting: 301964 mE

Northing: 6595164 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 152

Observer: Dr Scott Thompson

Zone: 51

Easting: 301888 mE

Northing: 6594884 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 153

Observer: Dr Scott Thompson

Zone: 51

Easting: 301776 mE

Northing: 6594656 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 154

Observer: Dr Scott Thompson

Zone: 51

Easting: 301657 mE

Northing: 6594403 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 155

Observer: Dr Scott Thompson

Zone: 51

Easting: 301562 mE

Northing: 6594137 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 156

Observer: Dr Scott Thompson

Zone: 51

Easting: 301436 mE

Northing: 6593877 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 157

Observer: Dr Scott Thompson

Zone: 51

Easting: 301313 mE

Northing: 6593575 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 158

Observer: Dr Scott Thompson

Zone: 51

Easting: 301196 mE

Northing: 6593342 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 159

Observer: Dr Scott Thompson

Zone: 51

Easting: 301090 mE

Northing: 6593072 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 160

Observer: Dr Scott Thompson

Zone: 51

Easting: 301020 mE

Northing: 6592868 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 161

Observer: Dr Scott Thompson

Zone: 51

Easting: 300982 mE

Northing: 6592659 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 162

Observer: Dr Scott Thompson

Zone: 51

Easting: 300968 mE

Northing: 6592581 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 163

Observer: Dr Scott Thompson

Zone: 51

Easting: 300894 mE

Northing: 6592364 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 164

Observer: Dr Scott Thompson

Zone: 51

Easting: 300865 mE

Northing: 6592081 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 165

Observer: Dr Scott Thompson

Zone: 51

Easting: 300795 mE

Northing: 6591799 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 166

Observer: Dr Scott Thompson

Zone: 51

Easting: 300892 mE

Northing: 6591942 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 167

Observer: Dr Scott Thompson

Zone: 51

Easting: 300911 mE

Northing: 6592209 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 168

Observer: Dr Scott Thompson

Zone: 51

Easting: 301013 mE

Northing: 6592516 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 169

Observer: Dr Scott Thompson

Zone: 51

Easting: 301046 mE

Northing: 6592765 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 170

Observer: Dr Scott Thompson

Zone: 51

Easting: 301212 mE

Northing: 6593205 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 171

Observer: Dr Scott Thompson

Zone: 51

Easting: 301301 mE

Northing: 6593342 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 172

Observer: Dr Scott Thompson

Zone: 51

Easting: 301441 mE

Northing: 6593721 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 173

Observer: Dr Scott Thompson

Zone: 51

Easting: 301555 mE

Northing: 6593968 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 174

Observer: Dr Scott Thompson

Zone: 51

Easting: 301680 mE

Northing: 6594277 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 175

Observer: Dr Scott Thompson

Zone: 51

Easting: 301758 mE

Northing: 6594519 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 176

Observer: Dr Scott Thompson

Zone: 51

Easting: 301886 mE

Northing: 6594775 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 177

Observer: Dr Scott Thompson

Zone: 51

Easting: 301979 mE

Northing: 6595016 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 178

Observer: Dr Scott Thompson

Zone: 51

Easting: 302091 mE

Northing: 6595261 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 179

Observer: Dr Scott Thompson

Zone: 51

Easting: 302207 mE

Northing: 6595538 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 180

Observer: Dr Scott Thompson

Zone: 51

Easting: 302304 mE

Northing: 6595785 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 181

Observer: Dr Scott Thompson

Zone: 51

Easting: 302419 mE

Northing: 6596031 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 182

Observer: Dr Scott Thompson

Zone: 51

Easting: 302549 mE

Northing: 6596279 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 183

Observer: Dr Scott Thompson

Zone: 51

Easting: 302635 mE

Northing: 6596531 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 184

Observer: Dr Scott Thompson

Zone: 51

Easting: 302726 mE

Northing: 6596718 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 185

Observer: Dr Scott Thompson

Zone: 51

Easting: 303002 mE

Northing: 6596931 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 186

Observer: Dr Scott Thompson

Zone: 51

Easting: 303307 mE

Northing: 6597110 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Disturbed

Habitat Quality: Disturbed

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 187

Observer: Dr Scott Thompson

Zone: 51

Easting: 303425 mE

Northing: 6597167 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Disturbed

Habitat Quality: Disturbed

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 188

Observer: Dr Scott Thompson

Zone: 51

Easting: 303119 mE

Northing: 6597508 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Chenopod and salt lake habitat

Habitat Quality: Disturbed

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 189

Observer: Dr Scott Thompson

Zone: 51

Easting: 302947 mE

Northing: 6597833 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 190

Observer: Dr Scott Thompson

Zone: 51

Easting: 302963 mE

Northing: 6597892 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Eucalypt woodland over mixed shrubs

Habitat Quality: Disturbed

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 191

Observer: Dr Scott Thompson

Zone: 51

Easting: 302917 mE

Northing: 6598067 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Chenopod and salt lake habitat

Habitat Quality: Good

Surface: Sandy clay



Date: 27/07/2023

Habitat Assessment #: 192

Observer: Dr Scott Thompson

Zone: 51

Easting: 302862 mE

Northing: 6597998 mN

Fire History: > 5yrs

Landform: Flat plain

Soil Type: Sandy clay

Habitat Structure: Chenopod and salt lake habitat

Habitat Quality: Good

Surface: Sandy clay

