

Bonnievale Flora and Vegetation Assessment

Prepared for Focus Minerals Ltd

Ref: T17006



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Document Control

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A handwritten signature in black ink, appearing to read "Joe Grehan".

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Terratree Pty Ltd

Executive Summary

Terratree Pty Ltd (Terratree) was commissioned by Focus Minerals Ltd (Focus Minerals) to conduct a Level 1 Flora, Fauna and Vegetation survey of its Bonnievale project area. The survey area encompasses approximately 100ha within the Shire of Coolgardie, approximately 11km north of the town of Coolgardie.

This survey was commissioned to assist planning and approval processes for the proposed underground mine operations, and was conducted in accordance with Level 1 standards as prescribed in Guidance Statement No. 51, *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004a) and *Technical Guide – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA and Department of Parks and Wildlife, 2016).

The survey area lies within the Eastern Goldfield (COO3) Biogeographic Region, in accordance with the recognised Interim Biogeographical Regionalisation Areas (IBRA) classification. Cowan (2001) describes the vegetation of the subregion as consisting of:

“Mallee, Acacia thickets and shrub-heaths 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 Acacias” The Goldfields Woodlands also demonstrates an exceptionally high diversity of Eucalyptus species, with as many as 170 species occurring in the bioregion.”

The survey area is situated within the Coolgardie Botanical District (CBD) of the Southwestern Interzone Botanical Province, which is characterised by a dominance of open Eucalyptus woodlands with saltbush/bluebush understory, giving way to scrub-heath and Casuarina thickets on sandplains (Beard, 1990).

A Level 1 flora and vegetation survey was conducted within the survey area between 24th -26th April, 2017, by Senior Botanist Kelby Jennings.

The survey area was accessed via 4WD vehicle, with a detailed survey conducted on foot. A reconnaissance survey was undertaken to assess the extent and characteristics of vegetation communities and to determine the potential presence of Threatened and Priority flora.

The reconnaissance survey was followed by a detailed, quadrat-based assessment of vegetation communities. Quadrat locations were strategically positioned within distinct vegetation communities, and recorded significant landscape, soil and vegetation data. Vegetation communities were described in accordance with NVIS Level 5 classifications. The vegetation condition was determined using the Keighery (1994) Vegetation Condition Scale. Flora species were also recorded opportunistically throughout the survey to supplement quadrat data.

The combined review of database searches, survey reports and published literature yielded a total of 58 flora taxa of conservation significance previously recorded from within 30 km of the survey area. These are comprised of three Threatened, 18 Priority 1, six Priority 2, 28 Priority 3 and three Priority 4 species.

No Threatened or Priority Ecological Communities were identified as occurring within 30km of the survey area.

A total of 88 vascular flora species, representing 50 genera from 32 families, were recorded within the survey area. Families with the highest species representation were Chenopodiaceae (13 taxa), followed by Fabaceae (12 taxa) and Scrophulariaceae (9 taxa). Well-represented genera include *Eremophila* (9 species), *Acacia* (8 species) and *Eucalyptus* (8 species).

Centipeda thespidioides (Family Asteraceae) was identified as potentially representing a range extension to the south, with the nearest record located approximately 100km north.

No Threatened (Declared Rare) or Priority flora were recorded within the survey area.

Eight species of introduced (exotic) flora, from six families, were recorded within the survey area, representing 9% of total floristic diversity. No Declared Plants were recorded within the survey area.

A total of six vegetation communities were described and mapped within the survey area.

No Threatened or Priority Ecological Communities were identified as occurring within the survey area.

Vegetation condition ranged from Excellent to Completely Degraded within the survey area. Vegetation in the northern portion of the site was heavily impacted by previous mining and exploration activities, with numerous tracks, drilling pads, waste dumps and excavation. Undisturbed vegetation in the south and east of the survey was in mostly Excellent condition, with no evidence of historical mining activities, and little evidence of grazing or clearing impacts to native vegetation.

No significant limitations with regard to the effectiveness of the survey were identified.

The assessment of the environmental values concluded that clearing of native vegetation within the survey area is unlikely to be at variance with any of the clearing principles.

In order to minimise and manage impacts to environmental values within the survey area, it is recommended that:

- Clearing be limited to areas where it is necessary and unavoidable;
- Significant trees be retained and avoided during construction, where possible;
- Earthworks be designed and constructed to allow unimpeded water flow through natural drainage channels during rainfall events; and
- All unnecessary impacts to native vegetation be avoided.

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1 Introduction

Terratree Pty Ltd (Terratree) was commissioned by Focus Minerals Ltd (Focus Minerals) to conduct a Level 1 Flora, Fauna and Vegetation survey of its Bonnievale project area (hereafter referred to as the 'survey area'). This survey was commissioned to assist planning and approval processes for the proposed underground mine operations.

The surveys were designed and conducted in accordance with Level 1 standards as prescribed in Guidance Statement No. 51, *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004a) and *Technical Guide – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA and Department of Parks and Wildlife, 2016).

The survey area encompasses approximately 100ha within the Shire of Coolgardie, approximately 11km north of the town of Coolgardie (**Figure 1**).

1.1 Regulatory Context

1.1.1 Legislation

Current State and Federal Government legislation relevant to environmental impact assessment and the conservation of biodiversity in W.A. include the following:

State:

- *Environmental Protection Act 1986* (EP Act)
- *Wildlife Conservation Act 1950* (WC Act)

Federal:

- Environment Protection and Biodiversity Conservation Act 1999 (EBPC Act)

1.1.2 Government Policy and Guidelines

A number of State policies, EPA position statements, EPA guidance statements and relevant environmental guidelines and codes of practice are relevant to environmental impact assessment of the survey area as follows:

- *EPA Position Statement No. 2 Environmental Protection of Native Vegetation* (EPA 1999);
- *EPA Position Statement No. 3 Terrestrial Biological Surveys* (EPA 2002a);
- *EPA Position Statement No. 7 Principles of Environmental Protection* (EPA 2002b);
- EPA Guidance Statement No. 33 Environmental guidance for Planning and Development (EPA 2008);
- *EPA Guidance Statement No. 51 Terrestrial Flora and Vegetation Surveys* (EPA 2004a);
- *Technical Guide – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA and Department of Parks and Wildlife, 2016).

1.1.3 Threatened and Priority Flora

All Australian native flora is protected under the WC Act, where flora is defined as any plant (including wildflower, palm, shrub, tree, fern, creeper or vine) which is either native to Western Australia or declared to be flora under the Act, and includes any part of flora and all seed and spores thereof. Any activity in Western Australia that involves taking part of or the whole of a WA native plant may require a licence or permit to do so.

Species of flora may be listed as 'Threatened' pursuant to Schedule 1 of the EPBC Act. Any action likely to have a significant impact on a species listed under the EPBC Act requires referral to the Commonwealth Department of the Environment (DotE) and potentially the approval of the Commonwealth Minister for the Environment.

A flora species may be designated 'Declared Rare' species under subsection 2 of section 23F of the WC Act and it is an offence to 'take' or damage rare flora without Ministerial approval. Section 23F of the Act defines 'to take' as "... to gather, pluck, cut, pull up, destroy, dig up, remove or injure the flora to cause or permit the same to be done by any means". The WA State Minister for the Environment can declare taxa (species, subspecies or variety) as 'Declared Rare Flora' (DRF) if they are considered to be in danger of extinction, rare or otherwise in need of special protection. At the State level, the term 'Threatened Flora' is now commonly used to refer to DRF regardless of their Commonwealth status.

Species of flora acquire a 'Declared Rare' or 'Priority' conservation status when populations are restricted geographically or threatened by local processes (**Table 1**). The Department of Parks and Wildlife (DPaW) recognises these threats and applies regulations towards population protection and species conservation. DPaW enforces regulations under the WC Act to conserve Declared Rare Flora (DRF) and Priority Flora and protect significant populations.

The list of Threatened (Declared Rare) flora is reviewed annually by a scientific panel that assess a taxon's conservation status and ranks them into categories. The Priority Flora list is dynamic, as new information becomes available conservation status is reviewed and changes to the listing may result. The categories for Priority Flora give an indication of the priority for undertaking further surveys based on the number of known sites, and degree of threat to those populations.

Table 1: Definition of Threatened and Priority Flora Species (DPaW 2014)

Code	Definition
T	Threatened Flora – (Declared Rare Flora – Extant) Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection and have been gazetted as such (Schedule 1 under the <i>Wildlife Conservation Act 1950</i>).
X	Presumed Extinct Flora (Declared Rare Flora - Extinct) Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such Schedule 2 under the <i>Wildlife Conservation Act 1950</i> .
P1	Priority One – Poorly Known Species Species that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.
P2	Priority Two – Poorly Known Species Species that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.

Code	Definition
P3	<p>Priority Three – Poorly Known Species</p> <p>Species that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities 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 localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.</p>
P4	<p>Priority Four – Rare, Near Threatened and other species in need of monitoring</p> <p>(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.</p> <p>(b) Near Threatened. Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</p> <p>(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.</p>
P5	<p>Priority Five - Conservation Dependent species</p> <p>Species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.</p>

1.1.4 Local and Regionally Significant Flora

In addition to plant taxa being recognised as significant through their Declared Rare or Priority Flora status, they can also be significant for a number of other reasons. Guidance Statement No. 51, *Terrestrial flora and vegetation surveys for environmental impact assessment in Western Australia* (EPA 2004a) states that "significant flora" may include taxa that have:

- *"a keystone role in a particular habitat for threatened species, or supporting large populations representing a significant proportion of the local regional population of a species;*
- *relic status;*
- *anomalous features that indicate a potential new discovery;*
- *being representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);*
- *the presence of restricted subspecies, varieties or naturally occurring hybrids;*
- *local endemism/a restricted distribution; or*
- *being poorly reserved. "*

Similarly, plant communities or vegetation may be considered "significant vegetation" for reasons other than a listing as a Threatened Ecological Community. The EPA (EPA 2004a) states that these reasons include:

- *"scarcity;*
- *unusual species;*
- *novel combinations of species;*
- *a role as a refuge;*
- *a role as a key habitat for threatened species or large populations representing a significant proportion of the local to regional total population of a species;*
- *being representative of the range of a unit (particularly, a good local and/or regional example of a unit in 'prime' habitat, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range); or*
- *a restricted distribution. "*

1.1.5 Threatened and Priority Ecological Communities

In Western Australia "Threatened Ecological Communities" (TECs) are defined by the Western Australian Threatened Ecological Communities Scientific Advisory Committee (within DPaW) and are assigned to one of the categories outlined below (**Table 2**). While they are not afforded direct statutory protection at a State level (unlike Threatened Flora) under the WC Act their significance is acknowledged through other State environmental approval processes (i.e. Environmental Impact Assessment process pursuant to Part IV of the EP Act).

Table 2: Definition of Codes for Threatened Ecological Communities

Code	Definition
PD: Presumed Totally Destroyed	An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future. An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant
CR: Critically Endangered	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated. An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future.
EN: Endangered	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future. An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future.
VU: Vulnerable	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range. An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future.

Selected TECs are also afforded statutory protection at a Federal level pursuant to the EPBC Act. Not all State listed TECs are given Federal protection, only a select few. The *EPBC Act* provides for the strong protection of TECs, which are listed under section 181 of the *EPBC Act*, and are defined as "Critically Endangered", "Endangered" or "Vulnerable" under Section 182 of the *EPBC Act*.

The EPBC Act provides protection for TECs under federal legislation, which are defined as communities which are:

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

A community that is not listed as a TEC may be listed as a Priority Ecological Community (PEC). DPaW (DEC 2010) describes a PEC as an ecological community that is under consideration for listing as a TEC, but does not yet meet the criteria or has not been adequately defined. It is placed in either Category 1, 2, or 3 of the PEC list. Ecological communities that are adequately known, and are rare but not threatened, or meet

criteria for Near Threatened, or those who have recently been removed from the threatened list, are placed in Priority 4. These ecological communities require monitoring. Conservation dependent ecological communities are placed in Priority 5. Categories and definitions of PEC are listed in **Table 3**.

Table 3: Definition of Codes for Priority Ecological Communities (DEC, 2010)

Code	Definition
P1: Priority One	Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or Pastoral lands, urban areas, active mineral leases) and for which current threats exist. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.
P2: Priority Two	Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.
P3: Priority Three	(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or; (ii) Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or; (iii) Communities made up of large, and/or widespread occurrences that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes. Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.
P4: Priority Four	Ecological communities that are adequately known, Rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring. (a) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands. (b) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (c) Ecological communities that have been removed from the list of threatened communities during the past five years. P5: Priority Five Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.
P5: Priority Five	Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

1.1.6 Environmentally Sensitive Areas

Under section 51B of the EP Act the Minister can, by notice, declare an area of the State specified in the notice or an area of the State to be an Environmentally Sensitive Area (ESAs). ESAs are protected under the *Environmental Protection (Clearing of Native Vegetation) Regulation 2004* and are selected for their environmental values at state or national levels. Some of the reasons for assigning this status include:

- Protection of rare or threatened species of native plants;
- Protection of wetlands and water courses;
- Protection of sites that have other high conservation, scientific or aesthetic values;

- Protection of Aboriginal or European cultural sites.

2 Existing Environment

2.1 Biogeography

The survey area lies within the Eastern Goldfield (COO3) Biogeographic Region, in accordance with the recognised Interim Biogeographical Regionalisation Areas (IBRA) classification. Cowan (2001) describes the vegetation of the subregion as consisting of:

“Mallee, Acacia thickets and shrub-heaths 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 graninulites of the Fraser Range. The area is rich in endemic Acacias” The Goldfields Woodlands also demonstrates an exceptionally high diversity of Eucalyptus species, with as many as 170 species occurring in the bioregion.”

The Eastern Goldfields subregion extends over 5,102,428ha. The dominant land use in this subregion is grazing, with smaller areas of crown reserves, mining, freehold, and conservation. Only 4.35 % of the sub-region is vested within conservation reserves (Cowan, 2001).

2.2 Soils and Landforms

The survey area lies within the Eastern Goldfields subregion of the Coolgardie bioregion, typified by a subdued landscape 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 (Cowan, 2001).

The Digital Atlas of Australian soils describe the soils of the survey area as broad shallow valley plains of deep calcareous loamy soils (Um5.12), with saline flats and gypsum.

The Geological Survey of Western Australia maps the surface geology of the survey area as broad strip of colluvium (gravel sand and silt) as sheet wash or talus running north-east to south west, with Bonnievale tonalite, laterite and reworked products to the north, and komatiite and medium to coarse-grained mafic rocks (mainly gabbro and dolerite) in the south.

2.3 Regional Vegetation

The survey area is situated within the Coolgardie Botanical District (CBD) of the Southwestern Interzone Botanical Province, which is characterised by a dominance of open Eucalyptus woodlands with saltbush/bluebush understory, giving way to scrub-heath and Casuarina thickets on sandplains (Beard, 1990).

Sandplains in the east of the CBD support grasslands of hard spinifex (*Triodia basedowii*). These grasslands occur with an open tree and shrub steppe of mulga, marble gum (*Eucalyptus gongylocarpa*), Mallees (*E. kingsmillii*, *E. trichopoda*, *E. brachycorys* and *E. youngiana*), bowgada and spinifex wattle (*A. coolgardiensis*). In places denser woodlands of Mulga, Spinifex, Wattle or Mallee are found over the spinifex. On western sandplains, shrublands are dominated by bowgada with cypress pine (*Callitris columellaris*), Mallees (e.g. *E. leptopoda* and *E. kingsmillii*), Mulga and *Grevillea* spp. On the yellow sandplains in the south-west are closed mixed shrublands with *Melaleuca*, *Hakea*, *Calothamnus*, *Baeckea*, *Banksia*, *Allocasuarina* and *Acacia* spp.

The mesas have bowgada, mulga and *A. linophylla* shrublands above the breakaways, while the lower slopes support shrublands with saltbush (*Atriplex* spp.), *Frankenia* spp., *Ptilotus* spp. and *Eremophila pterocarpa*. The hilly terrain has shrublands of Mulga, Minniritchie, *Eremophila* spp. and Cotton Bush (*Ptilotus obovatus*). Hills in the far west have woodlands of York Gum (*Eucalyptus loxophleba*), Salmon Gum (*E. salmonophloia*) and Jam. The stony plains support shrublands of Mulga, Gidgee, Granite Wattle (*Acacia quadrimarginea*), Minniritchie, Prickly Wattle, Snakewood, Jam Wattle and *Eremophila* spp. On the valley floors there are shrublands of Samphire (*Halosarcia* spp.), Saltbush, Sage (*Cratystylis subspinescens*) and *Frankenia* spp. surrounding salt lakes. Floodplains along the Murchison and its tributaries have shrublands of Bluebush (*Maireana* spp.), Saltbush and *Frankenia* spp., as well as Mulga, Prickly Wattle and *Acacia distans*.

Two terrestrial vegetation types have been identified to occur within the survey area (Table 4).

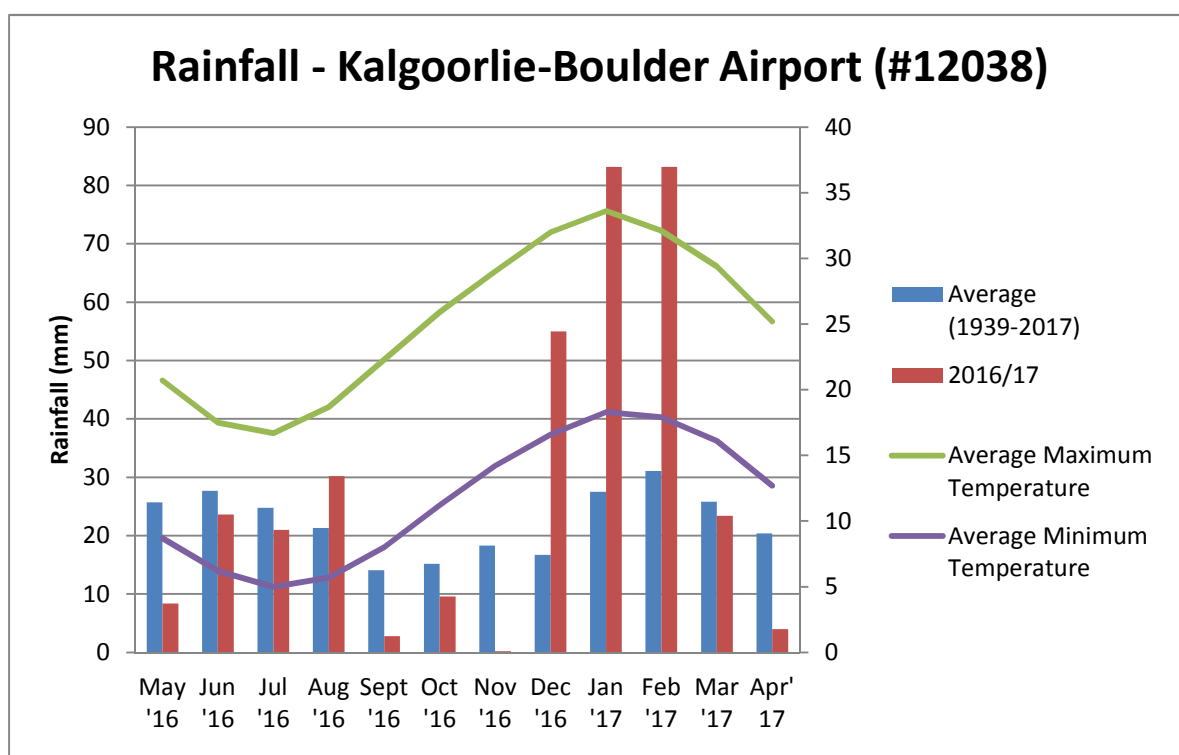
Table 4: Regional Vegetation Associations within the survey area (Beard, 1990)

Vegetation Association	Current Extent (ha)	Pre-European Extent (ha)	Remaining (%)	Description
Coolgardie_1294	6047	6295	96.1	Medium woodland; coral gum
Coolgardie_9	235,162	240,509	97.8	Medium woodland; coral gum (<i>E. torquata</i>) & goldfields blackbutt (<i>E. lesoufii</i>) (also some e10,11)

2.4 Climate

The Eastern Goldfields subregion possesses an Arid to Semi-arid climate, with 200-300 mm of annual rainfall, sometimes in summer but usually in winter (Cowan, 2001).

Rainfall data for weather station Kalgoorlie-Boulder Airport (#12038), located approximately 35km NE of the survey area, recorded significant cyclonic rainfall events during the period of Jan-Feb 2017, with a combined recorded rainfall of 166mm. Rainfall for March was broadly consistent with the historical average. The significant rain recorded during Jan-Feb 2017, along with consistent episodic rainfall for March and April, means that survey conditions are likely to be favourable for the presence of ephemeral species and floristic identifying material (flowers and/or seeds) (**Graph 1**).



Graph 1: Climate data for Kalgoorlie-Boulder Airport (#12038)

3 Methods

3.1 Desktop Review

Searches were requested of DPaW's Threatened and Priority databases for flora and ecological communities of conservation significance. Database searches were conducted for records within 30 km of the survey area. In addition, an EPBC Protected Matters search was conducted for significant environmental matters within 30km of the survey area (**Appendix 3**).

Significant flora and ecological communities identified by the desktop assessment were assessed with regard to their likelihood of occurring within the survey area (**Appendix 1, Table 1**).

3.2 Field Assessment

A Level 1 flora and vegetation survey was conducted within the survey area between 24th -26th April, 2017, by Senior Botanist Kelby Jennings.

The Level 1 flora and vegetation survey was carried out in accordance EPA Guidance Statement No. 51, *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA 2004a) and the *Technical Guide – Flora and Vegetation Surveys for Environmental Impact Assessment*.

The survey area was accessed via 4WD vehicle, with a detailed survey conducted on foot. A reconnaissance survey was undertaken to assess the extent and characteristics of vegetation communities and to determine the potential presence of Threatened and Priority flora.

The reconnaissance survey was followed by a detailed, quadrat-based assessment of vegetation communities. Quadrat locations were strategically positioned within distinct vegetation communities, and recorded significant landscape, soil and vegetation data. Vegetation communities were described in accordance with NVIS Level 5 classifications. The vegetation condition was determined using the Keighery (1994) Vegetation Condition Scale. While undertaking the survey, detailed notes on landscape formations and vegetation descriptions were made to provide supplementary information. Flora species were also recorded opportunistically throughout the survey to supplement quadrat data.

Specimens were collected to confirm field identification, whenever a potential Priority species were encountered, or when high quality flowering or fruiting material was available. Collected flora specimens were pressed, dried, fumigated and frozen in accordance with the requirements of the Western Australian Herbarium. Plant specimens were identified by experienced taxonomist Chris Hancock, via the use of local and regional flora keys and by comparison with named specimens held at the WA Herbarium.

4 Results

4.1 Desktop Review

4.1.1 Threatened and Priority Flora

The combined review of database searches, survey reports and published literature yielded a total of 58 flora taxa of conservation significance previously recorded from within 30 km of the survey area. These are comprised of three Threatened, 18 Priority 1, six Priority 2, 28 Priority 3 and three Priority 4 species.

Significant flora and ecological communities identified by the desktop assessment were assessed with regard to their range and habitat preferences to determine their likelihood of occurring within the survey area. This analysis resulted in the identification of one flora species with a high likelihood of occurring within the survey area (*Acacia websteri*, Priority 1), as well as 14 species with a possible likelihood.

The complete list of conservation significant flora recorded in the desktop search, including the results of the habitat suitability analysis, is presented in **Appendix 1, Table 1**.

4.1.2 Introduced Flora

The EPBC Protected Matters search (**Appendix 3**) identified three invasive plant species as potentially occurring within the survey area: *Carrichtera annua* (Ward's Weed), *Cylindropuntia* spp. (Prickly Pears) and *Lycium ferocissimum* (African Boxthorn).

4.1.3 Threatened and Priority Ecological Communities

No Threatened or Priority Ecological Communities were identified as occurring within 30km of the survey area.

4.2 Flora

A total of 88 vascular flora species, representing 50 genera from 32 families, were recorded within the survey area. Families with the highest species representation were Chenopodiaceae (13 taxa), followed by Fabaceae (12 taxa) and Scrophulariaceae (9 taxa). Well-represented genera include *Eremophila* (9 species), *Acacia* (8 species) and *Eucalyptus* (8 species).

Two species, Poaceae sp. and Medicago sp. were not able to be identified to species level due to sterile material. These taxa are considered unlikely to represent species of conservation significance.

Centipeda thespidioides (Family Asteraceae) was identified as potentially representing a range extension to the south, with the nearest record located approximately 100km north.

The full list of vascular flora species recorded is presented in **Appendix 1, Table 2**.

4.2.1 Threatened and Priority Flora

No Threatened (Declared Rare) or Priority flora were recorded within the survey area.

4.2.2 Introduced Flora

Eight species of introduced (exotic) flora, from six families, were recorded within the survey area, representing 9% of total floristic diversity. No Declared Plants were recorded within the survey area.

4.3 Vegetation Communities

A total of six vegetation communities were described and mapped within the survey area. Vegetation communities are presented spatially in **Figure 2** and described below in **Table 5**, including their area and percentage of extent within the survey area.

Table 5: Vegetation Communities recorded in survey area

Community Name	Landscape Position	Community Description	Area (ha)	% of total
AqDIPO	Mid-slope	Tall Shrubland of <i>Acacia quadrimarginea</i> , <i>Casuarina pauper</i> and <i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i> over Sparse Shrubland of <i>Dodonaea lobulata</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i> and <i>Acacia tetragonophylla</i> over Low Sparse Shrubland of <i>Ptilotus obovatus</i> subsp. <i>obovatus</i> , <i>Eremophila decipiens</i> subsp. <i>decipiens</i> and <i>Sclerolaena diacantha</i> .	9.15	11.43
Ec	Lower Slope	Open Forest of <i>Eucalyptus clelandii</i> .	2.00	2.50
AaDI	Small rise	Low Open Woodland of <i>Eucalyptus griffithsii</i> over Tall Open Shrubland of <i>Acacia acuminata</i> over Mid Open Shrubland of <i>Dodonaea lobulata</i> , <i>Scaevola spinescens</i> and <i>Eremophila decipiens</i> .	1.93	2.41
EsAnSs	Flat	Open forest of <i>Eucalyptus salmonophloia</i> , <i>Eucalyptus clelandii</i> and <i>Eucalyptus transcontinentalis</i> over Tall Sparse Shrubland of <i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i> and <i>Eremophila interstans</i> subsp. <i>interstans</i> over Open Shrubland of <i>Atriplex nummularia</i> , <i>Eremophila scoparia</i> and <i>Dodonaea lobulata</i> over Low Sparse Shrubland of <i>Scaevola spinescens</i> , <i>Ptilotus obovatus</i> subsp. <i>obovatus</i> and <i>Exocarpos aphyllus</i> .	37.62	47.01
EgSaEd	Flat	Woodland of <i>Eucalyptus griffithsii</i> and <i>Eucalyptus clelandii</i> over Tall Sparse Shrubland of <i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i> and <i>Eremophila interstans</i> subsp. <i>interstans</i> over Open Shrubland of <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Atriplex nummularia</i> and <i>Eremophila scoparia</i> over Low Sparse Shrubland of <i>Eremophila decipiens</i> , <i>Scaevola spinescens</i> and <i>Exocarpos aphyllus</i> .	23.19	28.98
AaPo	Macro-channel	Tall Shrubland of <i>Acacia acuminata</i> , <i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i> and <i>Dodonaea lobulata</i> over Low Open Shrubland of <i>Ptilotus obovatus</i> subsp. <i>obovatus</i> , <i>Enchylaena tomentosa</i> var. <i>tomentosa</i> and <i>Rhagodia drummondii</i> .	37.62	47.01
Total			80.02	100

4.3.1 Threatened and Priority Ecological Communities

No Threatened or Priority Ecological Communities were identified as occurring within the survey area.

5 Discussion

5.1 Site Description

The landscape of the survey area consists of a flat to gently undulating plain with a shallow drainage channel bisecting in an east-west direction. The southern extent of the survey area encompasses part of the lower slopes of Emu Hill. There were no significant or restricted landscape features observed within the survey area.

The vegetation consists predominately of open *Eucalyptus* woodland, with *Acacia/Casuarina* shrubland on low slopes and *Acacia* shrubland in the drainage channel.

5.2 Vegetation Condition

Vegetation condition ranged from Excellent to Completely Degraded within the survey area. Vegetation in the northern portion of the site was heavily impacted by previous mining and exploration activities, with numerous tracks, drilling pads, waste dumps and excavations.

Areas in the middle and west of the survey area were found to be impacted by previous exploration activity, including tracks and drill pads. These areas were assessed as being in Good condition.

Undisturbed vegetation in the south and east of the survey area was in mostly Excellent condition, with no evidence of historical mining activities, and little evidence of grazing or clearing impacts to native vegetation.

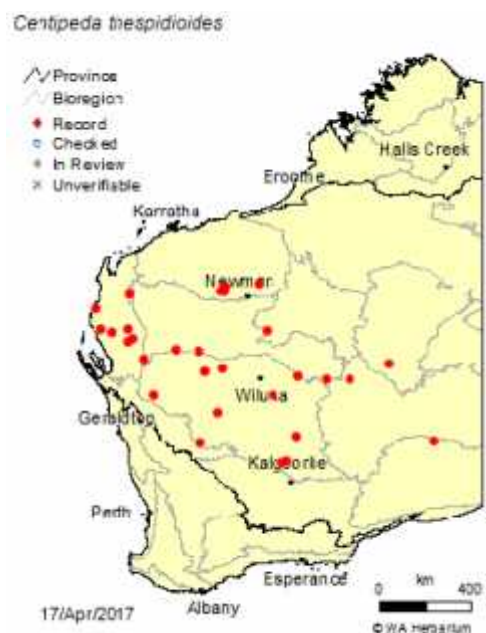
Table 6: Vegetation condition area statement

Vegetation Condition	Area (ha)	% of total
Excellent	25.39	31.7
Good	31.38	39.2
Degraded	15.68	19.6
Completely Degraded	7.57	9.5
Total	80.02	100.0

5.3 *Centipeda thespidioides* (Range Extension)

Centipeda thespidioides (Family Asteraceae) is an erect annual herb up to 0.2m in height. It flowers during April-November, producing white/yellow flowers. It occurs in a variety of soils in claypans, saline flats, creeks and rivers.

Although a wide ranging plant, this specimen would represent the southern extent of its known range, with the closest records located approximately 100km north of the survey area.



5.4 Survey Limitations

Potential survey limitations, as detailed in EPA Guidance Statement No. 51 (EPA 2004a), in relation to the survey timing and effort, are assessed in **Table 7**. The assessment found no significant limitation with regard to the effectiveness of the survey.

Table 7: Potential Limitations and relevance to survey area

Potential Limitation	Discussion	Limitation (Y/N)
Sources of information and availability of contextual information (i.e. pre-existing background vs. new material)	Desktop assessments, including DPaW database searches, were conducted prior to field investigations.	No
Scope (e.g. what life forms, etc., were sampled)	The survey effort assessed all vascular flora species and vegetation communities observed within the survey area	No
Proportion of flora collected and identified (based on sampling, timing and intensity)	Two flora specimens were unable to be identified to species level. These specimens are not considered to potentially represent Threatened or Priority species.	No
Completeness and further work which might be needed (e.g. was the relevant area fully surveyed)	The survey implemented a comprehensive assessment over all areas of the survey area.	No
Taxonomic certainty	All species not identified in the field, and all potential threatened and priority species were collected for identification by a taxonomic expert against reference material.	No
Mapping reliability	Current and detailed aerial photography was available for the purposes of mapping, which was supported by quadrat-based vegetation assessment.	No
Timing, weather, season, cycle	The April timing of the survey is considered to be outside the optimal season for this region. However, significant rainfall during Jan-Feb would be favourable for the emergence of ephemeral species.	No
Disturbances (fire, flood, accidental human intervention etc.)	Some survey areas had been disturbed by previous exploration activities and access tracks. The survey effort focused on the assessment of undisturbed vegetation and landform.	No
Intensity (in retrospect, was the intensity adequate)	The intensity of the Level 1 and Targeted Search were adequate for the purpose of the survey.	No
Resources	The field survey, plant identification and reporting were all adequately resourced.	No
Experience levels (e.g. degree of expertise in plant identification to taxon level).	The field survey was carried out by suitably qualified and experienced personnel with previous experience undertaking surveys in the local area. Plant identification was done by an experienced taxonomist with extensive knowledge of the Eastern Goldfields bioregion.	No

6 Assessment Against the 10 Clearing Principles

Any clearing of native vegetation must be assessed against the 10 clearing principles outlined in the permit. In this assessment, the result of the Level 1 flora and vegetation and the Level 1 fauna survey (**Appendix 4**) are assessed against the relevant criteria (**Table 8**).

The assessment of the environmental values concluded that clearing of native vegetation within the survey area is unlikely to be at variance with any of the clearing principles.

Table 8: Assessment against the 10 clearing principles within the survey area

Principle Number	Principle Description	Assessment	Outcome
1 (a)	Native vegetation should not be cleared if it comprises a high level of biological diversity	A total of 87 vascular flora species were identified as occurring in the survey area, and no significant landforms or other features were observed.	Proposal unlikely to be at variance with this principle.
2 (b)	Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia	Although Malleefowl are currently active in the local area, the survey area and proposed development footprint do not contain any significant habitat for this species.	Proposal unlikely to be at variance with this principle.
3 (c)	Native vegetation should not be cleared if it includes, or is necessary for the continued existence of rare flora	No Threatened flora species were recorded within the survey area during the surveys	Proposal unlikely to be at variance with this principle.
4 (d)	Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of a Threatened Ecological Community	No Threatened or Priority ecological communities were identified as occurring in the project area from either the desktop assessment or the field survey.	Proposal unlikely to be at variance with this principle.
5 (e)	Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared	Although mining activity has significantly impacted vegetation within the Eastern Goldfields region, no extensive vegetation clearing has occurred. Beard vegetation complexes within the survey area were found to have 97.8% and 96% of their pre-European extent remaining.	Proposal unlikely to be at variance with this principle.
6 (f)	Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland	No significant watercourses or wetland were identified within the survey area.	Proposal unlikely to be at variance with this principle.
7 (g)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation	The project area contains stable landforms and soils, and is unlikely to be significantly impacted by the proposal or result in appreciable land degradation.	Proposal unlikely to be at variance with this principle.

Principle Number	Principle Description	Assessment	Outcome
8 (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 effects of the proposal will be local in nature, and there are no nearby conservation areas to be potentially impacted.	Proposal is unlikely to be at variance with this principle.
9 (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	No significant surface water issues were identified within the survey area, and the area of vegetation to be cleared is unlikely to significantly affect groundwater quality or processes.	Proposal unlikely to be at variance with this principle.
10 (j)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate the incidence or intensity of flooding	The proposal is not considered likely to cause or exacerbate the incidence or intensity of flooding events.	Proposal unlikely to be at variance with this principle.

7 Conclusions and Recommendations

The desktop review of database searches, survey reports and published literature yielded a total of 58 flora taxa of conservation significance previously recorded from within 30 km of the survey area. These are comprised of three Threatened, 18 Priority 1, six Priority 2, 28 Priority 3 and three Priority 4 species.

A Level 1 flora and vegetation survey was conducted within the survey area between 24th -26th April, 2017, by Senior Botanist Kelby Jennings.

A total of 88 vascular flora species (including 8 exotic species), representing 50 genera from 32 families, were recorded within the survey area. Six vegetation communities were described and mapped within the survey area.

No Threatened (Declared Rare) or Priority flora or Ecological Communities were recorded within the survey area.

No significant limitations with regard to the effectiveness of the survey were identified.

The assessment of the environmental values concluded that clearing of native vegetation within the survey area is unlikely to be at variance with any of the clearing principles.

In order to minimise and manage impacts to environmental values within the survey area, it is recommended that:

- Clearing be limited to areas where it is necessary and unavoidable;
- Significant trees be avoided and retained during construction, where possible;
- Earthworks be designed and constructed to facilitate unimpeded water flow through natural drainage channels during rainfall events; and
- All unnecessary clearing and other impacts to native vegetation are avoided.

8 References

Atlas of Living Australia. (2014) Atlas of Living Australia. URL <http://www.ala.org.au/> [accessed 18 August 2014]

Beard, J.S. (1990) *Plant Life of Western Australia*. Kangaroo Press, Kenthurst, N.S.W.

Beeston, G.R., Hopkins, A.J.M. and Shepherd, D.P (2002) Land Use and Vegetation in Western Australia.

Bureau of Meteorology (2017): Climate Statistics for Australian Locations. http://www.bom.gov.au/climate/averages/tables/ca_wa_names.shtml. Accessed 23 May 2017

Bureau of Rural Sciences (1991); Digital Atlas of Australian Soils, Australian Soil Resource Information System, 18 Marcus Clarke St, GPO box 858, Canberra

Department of Environment and Conservation (2010) *Definitions, Categories and Criteria for Threatened and Priority Ecological Communities*.

Cowen, M., 2001: *Coolgardie 3 (COO3 – Eastern Goldfields subregion) Subregional description and biodiversity values*. From A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002, pp 156-169

Department of Parks and Wildlife (2014) Conservation Codes for Western Australian Flora and Fauna.

Department of Minerals and Energy (1993): *Geological Survey of Western Australia - Kalgoorlie (SH51-09)*, 100 Plain St, East Perth

Department of the Environment (2015a) *Interim Biogeographic Regionalisation for Australia*. Version 7. <http://www.environment.gov.au/land/nrs/science/ibra#ibra>. Accessed 28 August 2015.

Department of the Environment. (2015a) Great Western Woodlands of Western Australia, Coolgardie. Esperance Hwy, Norseman, WA, Australia. Accessed 7 October 2015.

Environmental Protection Authority. (2002a) Terrestrial Biological Surveys as an Element of Biodiversity Protection. Position Statement No. 3.

Environmental Protection Authority. (2004a) *Guidance Statement for the Assessment of Environmental Factors - Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia*. No. 51.

EPA and Department of Parks and Wildlife, 2016: *Technical Guide – Flora and Vegetation Surveys for Environmental Impact Assessment*.

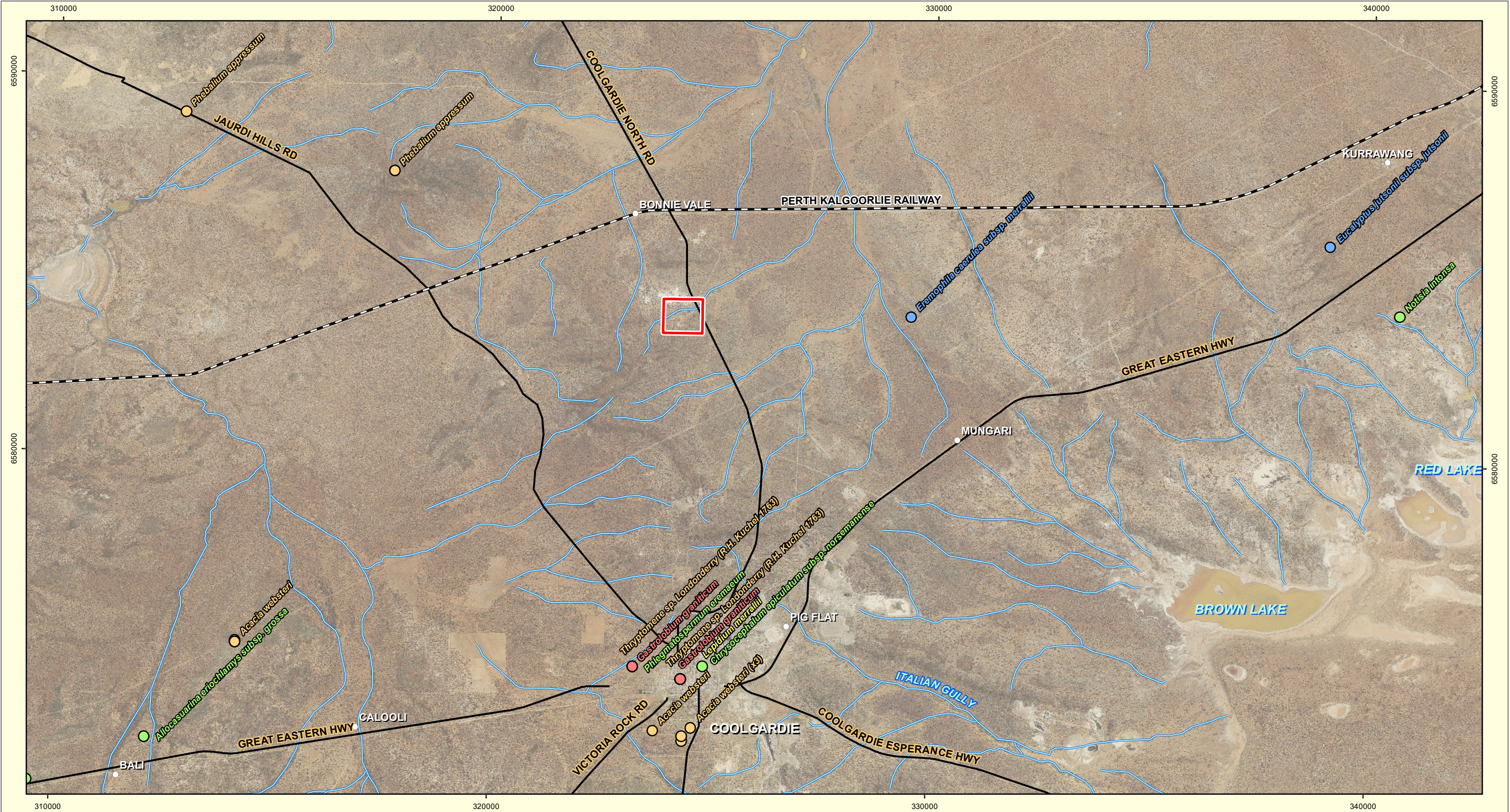
Government of Western Australia. (2011). 2011 *Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report)*. Accessed November 2016. WA Department of Environment and Conservation, Perth.

Tille, P.J. (2006) *Soil-Landscapes of Western Australia's Rangelands and Arid Interior*. Resource Science and Land Management Branches of the Department of Agriculture.

Western Australian Herbarium. (2015) *FloraBase—the Western Australian Flora*. URL <http://florabase.dpaw.wa.gov.au/> [accessed 28 August 2015]

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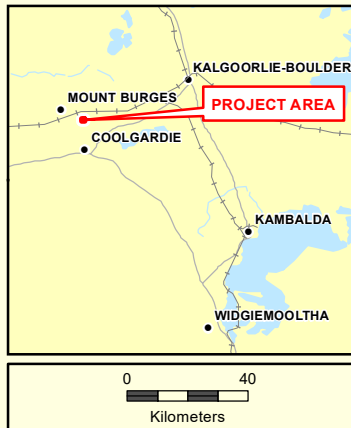
Figures



LEGEND

Project Area	Threatened and Priority Flora
Watercourse	Threatened
Railway	Priority 1
	Priority 2
	Priority 3
	Priority 4

Source: Topography - Geoscience Australia
 Orthophoto - Landgate, 2011
 Threatened & Priority Flora - DPaW, 2017

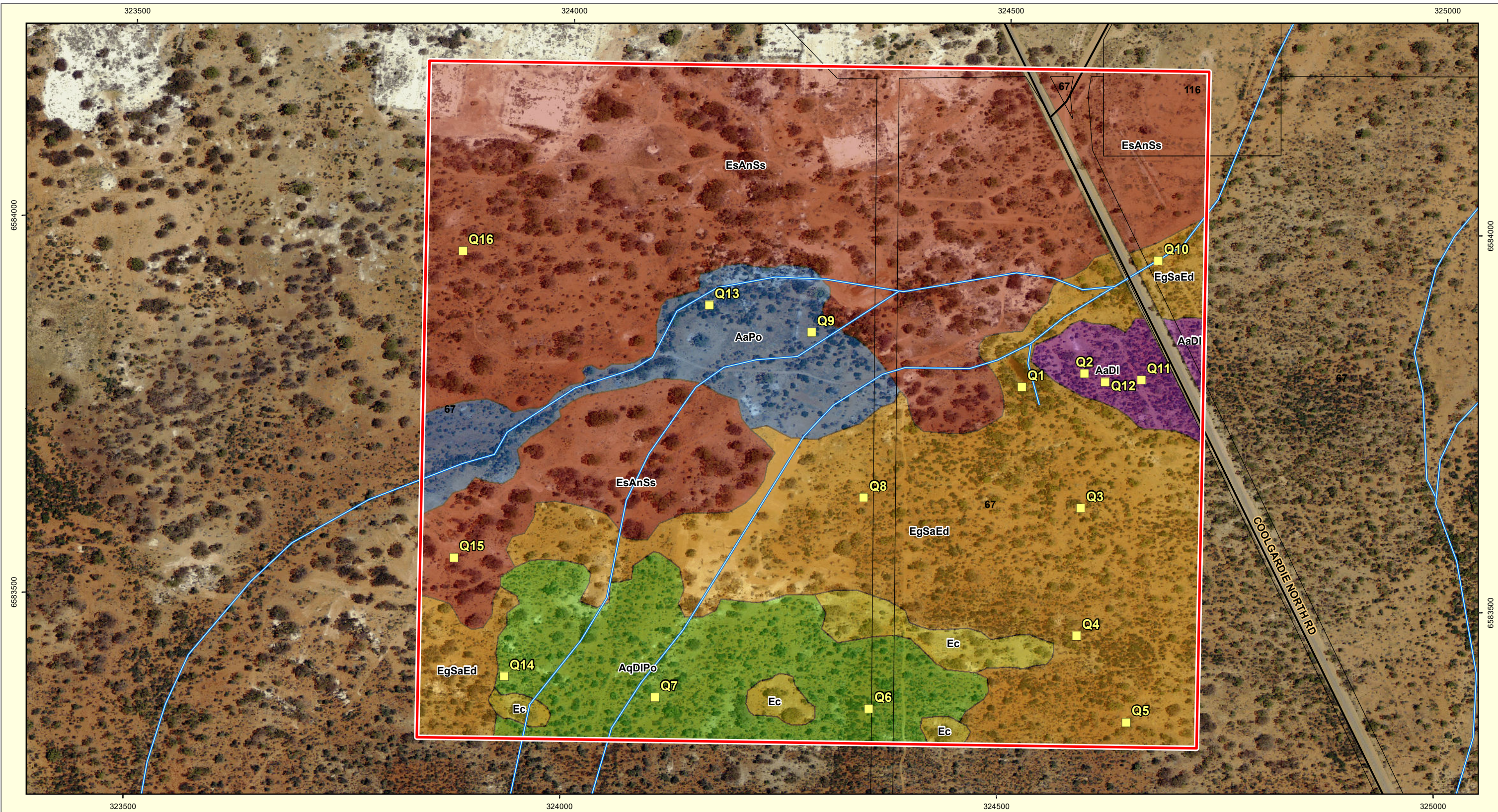


PROJECT LOCATION
 Focus Minerals Level 1 Flora, Fauna and Vegetation Assessment

0 1 2 4 6 8 10
 Kilometers
 Coordinate System
 GCS GDA 1994

Scale: 1:100,000 @ A3	Prepared: ENVIRONMAPS	Project No: T17006
Date: 1/06/2017	Checked: Mr K. Jennings	Figure 1
Revision: Rev A	Reviewed: Mr J. Grehan	

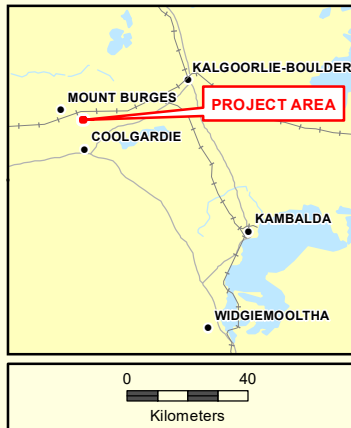
Terratree



LEGEND

Project Area	Vegetation Communities
Cadastre	AaDI
Watercourse	AaPo
Quadrat Location	AqDIPO
	Ec
	EgSaEd
	EsAnSs

Source: Topography - Landgate
Orthophoto - Landgate, 2011

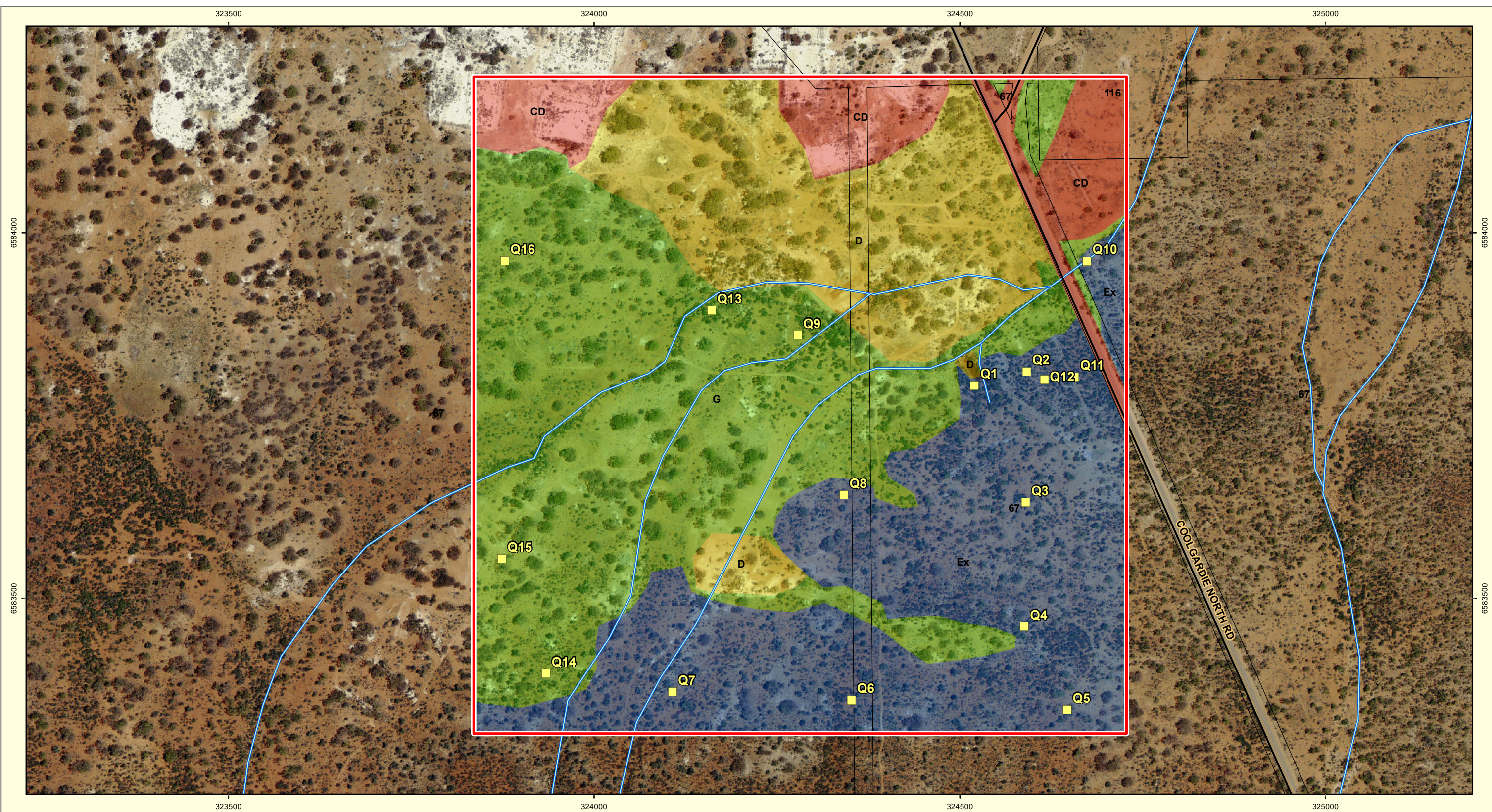


VEGETATION COMMUNITIES
Focus Minerals Level 1 Flora, Fauna and Vegetation Assessment

N
0 50 100 200 300 400 500
Metres
Coordinate System
GCS GDA 1994

Scale: 1:5,000 @ A3	Prepared: ENVIRONMAPS	Project No: T17006
Date: 8/06/2017	Checked: Mr K. Jennings	Figure 2
Revision: Rev A	Reviewed: Mr J. Grehan	

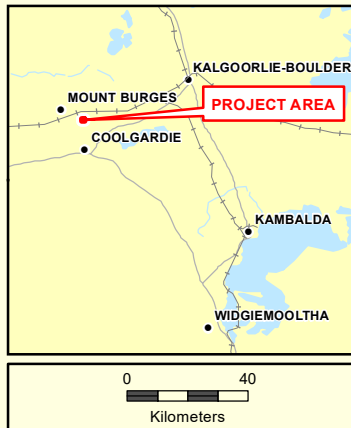
Terratree



LEGEND

Project Area	Excellent
Cadastre	Good
Watercourse	Degraded
Quadrat Location	Completely Degraded

Source: Topography - Landgate
Orthophoto - Landgate, 2011



VEGETATION CONDITION
Focus Minerals Level 1 Flora, Fauna and Vegetation Assessment

N
0 50 100 200 300 400 500
Metres
Coordinate System
GDA 1994 MGA Zone 51

Scale: 1:5,112 @ A3	Prepared: ENVIRONMAPS	Project No: T17006
Date: 16/06/2017	Checked: Mr K. Jennings	Figure 3
Revision: Rev A	Reviewed: Mr J. Grehan	

Terratree

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Appendix 1 – Flora Data Tables

Table 1: Desktop Flora Results and Probability Assessment

Table 2: Field Survey Flora Species List

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Table 1: Desktop Flora Results and Probability Assessment

Status	Taxon	Assessment	Likelihood
T (CR)	<i>Gastrolobium graniticum</i>	Recorded in local area	Possible
T (EN)	<i>Thelymitra stellata</i>	Outside known range	Low
T (VU)	<i>Acacia sciophanes</i>	Outside range	Low
Priority 1	<i>Acacia coatesii</i>	Records in region, habitat expected	Possible
	<i>Acacia sclerophylla</i> var. <i>teretiuscula</i>	Outside range	Low
	<i>Acacia websteri</i>	Records in region, habitat expected	High
	<i>Austrostipa</i> sp. Carlingup Road (S. Kern & R. Jasper LCH 18459)	Extreme of known range	Low
	<i>Baeckea</i> sp. Bulla Bulling (D.J.E. Whibley 4648)	Recorded in region, habitat not expected	Low
	<i>Baeckea</i> sp. Gnarlbine Rocks (G. Barrett GRH469)	One record only	Low
	<i>Dampiera plumosa</i>	Outside known range	Low
	<i>Eremophila praecox</i>	Records in region, possible habitat	Possible
	<i>Eucalyptus websteriana</i> subsp. <i>norsemanica</i>	North of known range	Low
	<i>Gossypium londonderriense</i>	Incorrect return	N/A
	<i>Hakea</i> sp. Great Victoria Desert (L. Cockram LAC 139) PN	Outside usual range	Low
	<i>Heliotropium nesopelydum</i>	Incorrect return	N/A
	<i>Lepidosperma</i> sp. Parker Range (N. Gibson & M. Lyons 2094)	Restricted range	Low
	<i>Melichrus</i> sp. Coolgardie (K.R. Newbey 8698)	Outside usual range	Low
	<i>Persoonia leucopogon</i>	Outside known range	Low
	<i>Phebalium appressum</i>	Habitat not expected	Low
	<i>Thryptomene</i> sp. Coolgardie (E. Kelso s.n. 1902)	Recorded in region, little known	Possible
<i>Thryptomene</i> sp. Londonderry (R.H. Kuchel 1763)	Recorded in region, little known	Possible	
Priority 2	<i>Austrostipa</i> sp. Dowerin (G. Wiehl F 8004)	Infrequent occurrence	Low
	<i>Elachanthus pusillus</i>	Infrequent occurrence	Low
	<i>Goodenia salina</i>	Outside usual range	Low
	<i>Hakea rigida</i>	Outside usual range	Low
	<i>Lepidium merrallii</i>	Infrequent occurrence	Low
	<i>Phebalium clavatum</i>	Habitat not expected	Low
Priority 3	<i>Acacia crenulata</i>	Habitat not expected, outside main range	Low
	<i>Allocasuarina eriochlamys</i> subsp. <i>grossa</i>	Grows in region, but habitat not expected	Possible
	<i>Alyxia tetanifolia</i>	Habitat not expected	Low
	<i>Angianthus prostratus</i>	Extreme of known range	Low
	<i>Austroparmelina macrospora</i>	East of known range	Low
	<i>Austrostipa blackii</i>	Within known range	Possible

Status	Taxon	Assessment	Likelihood
	<i>Banksia lullfitzii</i>	East of known range	Low
	<i>Bossiaea concinna</i>	East of known range	Low
	<i>Chrysocephalum apiculatum</i> subsp. <i>norsemanense</i>	Previously recorded in region	Possible
	<i>Cryptandra crispula</i>	Not recorded in region	Low
	<i>Cyathostemon verrucosus</i>	Extreme of known range	Low
	<i>Diocirea acutifolia</i>	Recorded in region, possible habitat	Possible
	<i>Diocirea microphylla</i>	Records in region, possible habitat	Possible
	<i>Eremophila veronica</i>	Infrequent occurrence	Low
	<i>Gompholobium cinereum</i>	Extreme of known range	Low
	<i>Grevillea georgeana</i>	Extreme of known range	Low
	<i>Hibbertia pachyphylla</i>	Extreme of known range	Low
	<i>Isolepis australiensis</i>	Outside usual range	Low
	<i>Lepidium fasciculatum</i>	Infrequent occurrence	Low
	<i>Melaleuca macronychia</i> subsp. <i>trygonoides</i>	North of known range	Low
	<i>Mirbelia densiflora</i>	North of known range	Low
	<i>Notisia intonsa</i>	Recorded in region	Possible
	<i>Phlegmatospermum eremaeum</i>	Wide range, potential habitat	Possible
	<i>Psammomoya ephedroides</i>	Outside known range	Low
	<i>Scyphiphora hydrophylacea</i>	Incorrect return	N/A
	<i>Styphelia</i> sp. Bullfinch (M. Hislop 3574)	Extreme of known range	Low
	<i>Verticordia stenopetala</i>	Outside known range	Low
	<i>Xanthoparmelia dayiana</i>	Infrequent occurrence	Low
Priority 4	<i>Eremophila caerulea</i> subsp. <i>merrallii</i>	Records in region, possible habitat	Possible
	<i>Eucalyptus jutsonii</i> subsp. <i>jutsonii</i>	Records in region, possible habitat	Possible
	<i>Eucalyptus pterocarpa</i>	North of known range	Low

Table 2: Field Survey Flora Species List

Family	Taxon
Amaranthaceae	<i>Ptilotus nobilis</i> subsp. <i>nobilis</i>
	<i>Ptilotus obovatus</i> var. <i>obovatus</i>
	<i>Ptilotus spathulatus</i>
Apiaceae	<i>Daucus glochidiatus</i>
Apocynaceae	<i>Marsdenia australis</i>
Asteraceae	<i>Centipeda ?thespidioides</i>
	<i>Chrysocephalum puteale</i>
	<i>Olearia muelleri</i>
	* <i>Monoculus monstrosus</i>
	* <i>Sonchus oleraceus</i>
	<i>Streptoglossa liatroides</i>
	<i>Vittadinia sulcata</i>
Boraginaceae	<i>Heliotropium curassavicum</i>
Brassicaceae	* <i>Sisymbrium erysimoides</i>
Casuarinaceae	<i>Casuarina pauper</i>
Chenopodiaceae	<i>Atriplex nummularia</i>
	<i>Chenopodium curvispicatum</i>
	<i>Dysphania pumilio</i>
	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>
	<i>Maireana ?trichoptera</i> (sterile)
	<i>Maireana pentatropis</i>
	<i>Maireana sedifolia</i>
	<i>Maireana suaedifolia</i>
	<i>Maireana triptera</i>
	<i>Rhagodia drummondii</i>
	<i>Sclerolaena cuneata</i>
	<i>Sclerolaena diacantha</i>
	<i>Sclerolaena obliquicuspis</i>
Convolvulaceae	<i>Convolvulus remotus</i>
Euphorbiaceae	<i>Euphorbia drummondii</i>
Fabaceae	<i>Acacia acuminata</i>
	<i>Acacia erinacea</i>
	<i>Acacia hemiteles</i>
	<i>Acacia jennerae</i>
	<i>Acacia nyssophylla</i>
	<i>Acacia oswaldii</i>
	<i>Acacia quadrimarginea</i>
	<i>Acacia tetragonophylla</i>
	<i>Medicago</i> sp. (sterile)
	<i>Senna artemisioides</i> subsp. <i>filifolia</i>
	<i>Senna stowardii</i>
<i>Templetonia ceracea</i>	

Family	Taxon
Geraniaceae	* <i>Erodium cicutarium</i>
	<i>Erodium cygnorum</i>
Goodeniaceae	<i>Scaevola spinescens</i>
Haloragaceae	<i>Haloragis trigonocarpa</i>
Juncaceae	<i>Juncus aridicola</i>
Lamiaceae	* <i>Salvia verbenaca</i>
Loranthaceae	<i>Amyema gibberula</i> var. <i>gibberula</i>
Malvaceae	<i>Abutilon cryptopetalum</i>
	<i>Sida fibulifera</i>
Myrtaceae	<i>Eucalyptus campaspe</i>
	<i>Eucalyptus celastroides</i> subsp. <i>celastroides</i>
	<i>Eucalyptus clelandii</i>
	<i>Eucalyptus griffithsii</i>
	<i>Eucalyptus salmonophloia</i>
	<i>Eucalyptus torquata</i>
	<i>Eucalyptus transcontinentalis</i>
<i>Eucalyptus yilgarnensis</i>	
Pittosporaceae	<i>Pittosporum angustifolium</i>
Poaceae	<i>Austrostipa elegantissima</i>
	<i>Enneapogon avenaceus</i>
	<i>Enneapogon caerulescens</i>
	<i>Poaceae</i> sp. (sterile)
Polygonaceae	* <i>Rumex vesicaria</i>
Primulaceae	* <i>Lysimachia arvensis</i>
Proteaceae	<i>Grevillea nematophylla</i> subsp. <i>nematophylla</i>
Rhamnaceae	<i>Trymalium myrtillus</i> subsp. <i>myrtillus</i>
Santalaceae	<i>Exocarpos aphyllus</i>
	<i>Santalum spicatum</i>
Sapindaceae	<i>Dodonaea lobulata</i>
Scrophulariaceae	<i>Eremophila clarkei</i>
	<i>Eremophila decipiens</i> subsp. <i>decipiens</i>
	<i>Eremophila gibbosa</i>
	<i>Eremophila glabra</i> subsp. <i>glabra</i>
	<i>Eremophila interstans</i> subsp. <i>interstans</i>
	<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>
	<i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>
	<i>Eremophila parvifolia</i> subsp. <i>auricampa</i>
<i>Eremophila scoparia</i>	
Solanaceae	<i>Solanum cleistogamum</i>
	<i>Solanum lasiophyllum</i>
	* <i>Solanum nigrum</i>
	<i>Solanum nummularium</i>
Thymelaeaceae	<i>Pimelea microcephala</i> subsp. <i>microcephala</i>

Family	Taxon
Violaceae	<i>Hybanthus floribundus</i> subsp. <i>curvifolius</i>
Zygophyllaceae	<i>Zygophyllum aurantiacum</i> subsp. <i>aurantiacum</i>
	<i>Zygophyllum ovatum</i>

*Denotes introduced (exotic) flora

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Appendix 2 – Quadrat Data

nc = No Collection

cl = climber

oh = overhanging

p = parasitic (mistletoe)

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Quadrat:	1	Landform:	MacD	Leaf Litter:	50
Date:	25/04/2017	Outcropping:	None	Soil:	Red clay
Ph NW:	Camera 1	Vegetation Community:			
Ph SE:	Camera 1	Eucalyptus woodland over Eremophila/Dodonaea shrub			
Easting:	324520				
Northing:	6583791	Vegetation Condition:	Excellent		
Coll #	Species	Height (cm)	% Cover		
001	<i>Eucalyptus griffithsii</i>	800	20		
029	<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	400	10		
nc	<i>Acacia tetragonophylla</i>	400	5		
030	<i>Dodonaea lobulata</i>	250	10		
016	<i>Senna artemisioides</i> subsp. <i>filifolia</i>	220	3		
011	<i>Scaevola spinescens</i>	180	0.1		
013	<i>Acacia acuminata</i>	150	0.1		
034	<i>Pittosporum angustifolium</i>	150	0.01		
nc	<i>Solanum lasiophyllum</i>	80	1		
017	<i>Austrostipa elegantissima</i>	60	0.1		
018	<i>Austrostipa elegantissima</i>	60	0.1		
nc	<i>Ptilotus obovatus</i> var. <i>obovatus</i>	50	5		
010	Poaceae sp. (sterile)	50	0.1		
014	<i>Rhagodia drummondii</i>	40	1		
015	<i>Chenopodium curvispicatum</i>	40	1		
021	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	40	1		
008	<i>Solanum nummularium</i>	40	0.1		
026	<i>Vittadinia sulcata</i>	30	0.01		
025	<i>Dysphania pumilio</i>	25	0.02		
020	<i>Daucus glochidiatus</i>	20	2		
028	* <i>Solanum nigrum</i>	20	0.02		
019	* <i>Sisymbrium erysimoides</i>	15	0.01		
023	* <i>Lysimachia arvensis</i>	10	1		
024	<i>Vittadinia sulcata</i>	10	0.05		
009	* <i>Monoculus monstrosus</i>	10	0.01		
027	<i>Sida fibulifera</i>	10	0.01		
012	<i>Haloragis trigonocarpa</i>	5	0.1		
022	<i>Haloragis trigonocarpa</i>	5	0.01		
033	<i>Maireana?</i> <i>tomentosa</i> (sterile)	3	0.01		
032	<i>Euphorbia drummondii</i>	1	0.01		
031	<i>Marsdenia australis</i>	cl			



Plate 1: Quadrat 1, NW corner



Plate 2: Quadrat 2, SE corner

Quadrat:	2	Landform:	Crest	Leaf Litter:	20
Date:	25/04/2017	Outcropping:	None	Soil:	Red clay
Ph NW:	Camera 1	Vegetation Community:			
Ph SE:	Camera 1	Acacia/Eremophila shrubland			
Easting:	324591				
Northing:	6583810	Vegetation Condition:	Excellent		
Coll #	Species			Height (cm)	% Cover
001	<i>Eucalyptus griffithsii</i>			700	1
013	<i>Acacia acuminata</i>			350	10
029	<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>			300	2
037	<i>Casuarina pauper</i>			220	0.1
016	<i>Senna artemisioides</i> subsp. <i>filifolia</i>			180	5
030	<i>Dodonaea lobulata</i>			170	3
036	<i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>			170	1
021	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>			120	1
nc	<i>Scaevola spinescens</i>			100	0.5
018	<i>Austrostipa elegantissima</i>			100	0.1
038	<i>Zygophyllum aurantiacum</i> subsp. <i>aurantiacum</i>			50	0.1
040	<i>Rhagodia drummondii</i>			50	0.1
nc	<i>Ptilotus obovatus</i> var. <i>obovatus</i>			40	1
041	<i>Scaevola spinescens</i>			40	0.1
033	<i>Maireana?</i> <i>tomentosa</i> (sterile)			10	0.1
039	<i>Enneapogon avenaceus</i>			10	0.01
031	<i>Marsdenia australis</i>			cl	0.02



Plate 3 Quadrat 2, NW corner



Plate 4: Quadrat 2, SE corner

Quadrat:	3	Landform:	Flat	Leaf Litter:	
Date:	25/04/2017	Outcropping:	None	Soil:	Red
Ph NW:	Camera 1	Vegetation Community:			loamy clay
Ph SE:	Camera 1	Eucalyptus woodland over Eremophila/Dodonaea Shrub over Atriplex			
Easting:	324590				
Northing:	6583631	Vegetation Condition:	Excellent		
Coll #	Species			Height (cm)	% Cover
003	<i>Eucalyptus salmonophloia</i>			1200	5
001	<i>Eucalyptus griffithsii</i>			800	8
029	<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>			400	5
030	<i>Dodonaea lobulata</i>			250	5
047	<i>Atriplex nummularia</i>			200	7
nc	<i>Acacia tetragonophylla</i>			170	0.2
016	<i>Senna artemisioides</i> subsp. <i>filifolia</i>			150	1
037	<i>Casuarina pauper</i>			120	0.1
018	<i>Austrostipa elegantissima</i>			100	0.1
036	<i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>			60	0.02
015	<i>Chenopodium curvispicatum</i>			50	1
nc	<i>Scaevola spinescens</i>			50	0.1
nc	<i>Ptilotus obovatus</i> var. <i>obovatus</i>			40	3
014	<i>Rhagodia drummondii</i>			40	1
021	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>			40	0.1
044	<i>Maireana triptera</i>			30	0.1
033	<i>Maireana?</i> <i>tomentosa</i> (sterile)			20	0.1
046	<i>Ptilotus nobilis</i> subsp. <i>nobilis</i>			10	0.5
012	<i>Haloragis trigonocarpa</i>			10	0.1
042	<i>Sclerolaena diacantha</i>			10	0.01
043	<i>Enneapogon caerulescens</i>			10	0.01
045	<i>Convolvulus remotus</i>			3	0.01
048	<i>Streptoglossa liatroides</i>			3	0.01
031	<i>Marsdenia australis</i>			cl	0.1



Plate 5: Quadrat 3, NW corner



Plate 6 : Quadrat 3, SE corner

Quadrat:	4	Landform:	Upper	Leaf Litter:	30
Date:	25/04/2017	Outcropping:		Soil:	Red
Ph NW:	Camera 1	Vegetation Community:			sandy clay
Ph SE:	Camera 1	Low Eucalyptus woodland over Eremophila/Dodonaea over Scaevola			
Easting:	324588				
Northing:	6583461	Vegetation Condition:	Excellent		
Coll #	Species			Height (cm)	% Cover
053	<i>Acacia quadrimarginea</i>			600	15
001	<i>Eucalyptus griffithsii</i>			400	5
029	<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>			300	5
nc	<i>Acacia tetragonophylla</i>			300	2
030	<i>Dodonaea lobulata</i>			250	15
nc	<i>Scaevola spinescens</i>			150	10
036	<i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>			150	5
057	<i>Eremophila glabra</i> subsp. <i>glabra</i>			130	0.5
055	<i>Acacia erinacea</i>			60	0.5
037	<i>Casuarina pauper</i>			60	0.1
nc	<i>Ptilotus obovatus</i> var. <i>obovatus</i>			40	
056	<i>Eremophila parvifolia</i> subsp. <i>auricampa</i>			20	0.01
033	<i>Maireana?</i> <i>tomentosa</i> (sterile)			15	0.01
042	<i>Sclerolaena diacantha</i>			10	0.01
031	<i>Marsdenia australis</i>			cl	0.1



Plate 7: Quadrat 4, NW corner



Plate 8: Quadrat 4, SE corner

Quadrat:	5	Landform:	Mid	Leaf Litter:	50
Date:	25/04/2017	Outcropping:	None	Soil:	Red
Ph NW:	Camera 1	Vegetation Community:			loamy clay
Ph SE:	Camera 1	Eucalyptus woodland over Eremophila over Atriplex			
Easting:	324647				
Northing:	6583348	Vegetation Condition:	Excellent		
Coll #	Species			Height (cm)	% Cover
001	<i>Eucalyptus griffithsii</i>			900	15
037	<i>Casuarina pauper</i>			500	1
058	<i>Eremophila scoparia</i>			190	5
047	<i>Atriplex nummularia</i>			180	15
029	<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>			150	0.1
057	<i>Eremophila glabra</i> subsp. <i>glabra</i>			130	1
049	<i>Exocarpos aphyllus</i>			120	0.1
014	<i>Rhagodia drummondii</i>			100	2
016	<i>Senna artemisioides</i> subsp. <i>filifolia</i>			100	1
054	<i>Maireana sedifolia</i>			100	0.5
059	<i>Maireana</i> ? <i>trichoptera</i> (sterile)			100	0.5
030	<i>Dodonaea lobulata</i>			100	0.1
017	<i>Austrostipa elegantissima</i>			80	0.1
nc	<i>Scaevola spinescens</i>			70	0.1
055	<i>Acacia erinacea</i>			40	1
051	<i>Eremophila decipiens</i> subsp. <i>decipiens</i>			40	0.5
021	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>			40	0.1
044	<i>Maireana triptera</i>			40	0.1
060	<i>Maireana suaedifolia</i>			40	0.01
042	<i>Sclerolaena diacantha</i>			20	0.01
033	<i>Maireana?</i> <i>tomentosa</i> (sterile)			10	0.02
046	<i>Ptilotus nobilis</i> subsp. <i>nobilis</i>			2	0.05
031	<i>Marsdenia australis</i>			cl	0.1



Plate 9: Quadrat 5, NW corner



Plate 10: Quadrat 5, SE corner

Quadrat:	6	Landform:	Mid	Leaf Litter:	10
Date:	25/04/2017	Outcropping:	None	Soil:	Red clay
Ph NW:	Camera 1	Vegetation Community:			
Ph SE:	Camera 1	Tall Casuarina/Acacia Shrub over Eremophila over Atriplex/Scaevola			
Easting:	324352				
Northing:	6583361	Vegetation Condition:	Excellent		
Coll #	Species			Height (cm)	% Cover
037	<i>Casuarina pauper</i>			900	20
053	<i>Acacia quadrimarginea</i>			400	10
029	<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>			350	15
nc	<i>Santalum spicatum</i>			230	1
nc	<i>Acacia tetragonophylla</i>			220	2
030	<i>Dodonaea lobulata</i>			180	5
036	<i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>			170	0.1
047	<i>Atriplex nummularia</i>			160	20
nc	<i>Scaevola spinescens</i>			150	10
016	<i>Senna artemisioides</i> subsp. <i>filifolia</i>			150	5
021	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>			60	0.2
040	<i>Rhagodia drummondii</i>			60	0.1
055	<i>Acacia erinacea</i>			50	0.2
nc	<i>Ptilotus obovatus</i> var. <i>obovatus</i>			40	1
051	<i>Eremophila decipiens</i> subsp. <i>decipiens</i>			40	0.1
044	<i>Maireana triptera</i>			30	0.1
042	<i>Sclerolaena diacantha</i>			20	0.01
012	<i>Haloragis trigonocarpa</i>			10	0.05
033	<i>Maireana?</i> <i>tomentosa</i> (sterile)			10	0.01
031	<i>Marsdenia australis</i>			cl	0.1



Plate 11: Quadrat 6, NW corner



Plate 12: Quadrat 6, SE corner

Quadrat:	7	Landform:	Lower	Leaf Litter:	10
Date:	25/04/2017	Outcropping:	Some	Soil:	Red clay
Ph NW:	Camera 1	Vegetation Community:			
Ph SE:	Camera 1	Tall Casuarina/Acacia Shrub over Eremophila over Senna/Dodonaea/Scaevola			
Easting:	324107				
Northing:	6583372	Vegetation Condition:	Excellent		
Coll #	Species			Height (cm)	% Cover
001	<i>Eucalyptus griffithsii</i>			oh	2
037	<i>Casuarina pauper</i>			700	15
053	<i>Acacia quadrimarginea</i>			500	5
029	<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>			350	3
nc	<i>Acacia tetragonophylla</i>			300	10
016	<i>Senna artemisioides</i> subsp. <i>filifolia</i>			180	10
030	<i>Dodonaea lobulata</i>			160	5
nc	<i>Scaevola spinescens</i>			160	3
049	<i>Exocarpos aphyllus</i>			150	0.1
057	<i>Eremophila glabra</i> subsp. <i>glabra</i>			120	1
041	<i>Scaevola spinescens</i>			60	0.1
051	<i>Eremophila decipiens</i> subsp. <i>decipiens</i>			50	1
nc	<i>Ptilotus obovatus</i> var. <i>obovatus</i>			30	0.05
044	<i>Maireana triptera</i>			20	0.01
042	<i>Sclerolaena diacantha</i>			15	0.05
031	<i>Marsdenia australis</i>			cl	0.01



Plate 13: Quadrat 7, NW corner



Plate 14: Quadrat 7, SE corner

Quadrat:	8	Landform:	Flat	Leaf Litter:	1
Date:	25/04/2017	Outcropping:	Some	Soil:	Red
Ph NW:	Camera 1	Vegetation Community:			loamy clay
Ph SE:	Camera 1	Tall Casuarina/Eremophila Shrub over Senna/Scaevola/Atriplex Shrub			
Easting:	324342				
Northing:	6583641	Vegetation Condition:	Excellent		
Coll #	Species			Height (cm)	% Cover
037	<i>Casuarina pauper</i>			500	10
029	<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>			300	5
047	<i>Atriplex nummularia</i>			170	2
016	<i>Senna artemisioides</i> subsp. <i>filifolia</i>			150	5
nc	<i>Scaevola spinescens</i>			130	2
030	<i>Dodonaea lobulata</i>			120	3
nc	<i>Solanum lasiophyllum</i>			60	0.5
nc	<i>Acacia tetragonophylla</i>			50	2
040	<i>Rhagodia drummondii</i>			50	0.1
nc	<i>Ptilotus obovatus</i> var. <i>obovatus</i>			40	5
044	<i>Maireana triptera</i>			30	1
033	<i>Maireana?</i> <i>tomentosa</i> (sterile)			10	0.1
031	<i>Marsdenia australis</i>			cl	0.1



Plate 15: Quadrat 8, NW corner



Plate 16: Quadrat 8, SE corner

Quadrat:	9	Landform:	Flat	Leaf Litter:	1
Date:	25/04/2017	Outcropping:	None	Soil:	Red
Ph NW:	Camera 1	Vegetation Community:			loamy clay
Ph SE:	Camera 1	Tall Acacia/Eremophila Shrub over Low Bluebush Shrubland			
Easting:	324278				
Northing:	6583860	Vegetation Condition:	Good		
Coll #	Species			Height (cm)	% Cover
013	<i>Acacia acuminata</i>			350	10
029	<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>			350	5
030	<i>Dodonaea lobulata</i>			170	5
036	<i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>			160	1
047	<i>Atriplex nummularia</i>			120	0.1
nc	<i>Acacia tetragonophylla</i>			100	0.5
nc	<i>Solanum lasiophyllum</i>			80	0.5
040	<i>Rhagodia drummondii</i>			80	0.1
021	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>			60	0.1
063	<i>Abutilon cryptopetalum</i>			60	0.01
nc	<i>Ptilotus obovatus</i> var. <i>obovatus</i>			40	20
044	<i>Maireana triptera</i>			30	0.5
033	<i>Maireana?</i> <i>tomentosa</i> (sterile)			15	0.1
019	* <i>Sisymbrium erysimoides</i>			10	0.01
064	* <i>Monoculus monstrosus</i>			2	0.5
032	<i>Euphorbia drummondii</i>			1	0.01



Plate 17: Quadrat 9, NW corner



Plate 18: Quadrat 9, SE corner

Quadrat:	10	Landform:	MacD	Leaf Litter:	30
Date:	26/04/2017	Outcropping:	None	Soil:	Red
Ph NW:	Camera 1	Vegetation Community:			sandy clay
Ph SE:	Camera 1	Eucalyptus woodland over Eremophila/Senna Shrub			
Easting:	324674				
Northing:	6583961	Vegetation Condition:	Excellent		
Coll #	Species			Height (cm)	% Cover
001	<i>Eucalyptus griffithsii</i>			800	15
061	<i>Eremophila interstans</i> subsp. <i>interstans</i>			500	1
029	<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>			220	5
016	<i>Senna artemisioides</i> subsp. <i>filifolia</i>			200	5
nc	<i>Acacia tetragonophylla</i>			200	1
058	<i>Eremophila scoparia</i>			160	1
076	* <i>Salvia verbenaca</i>			150	10
030	<i>Dodonaea lobulata</i>			150	5
047	<i>Atriplex nummularia</i>			150	0.5
nc	<i>Scaevola spinescens</i>			100	5
049	<i>Exocarpos aphyllus</i>			80	0.1
051	<i>Eremophila decipiens</i> subsp. <i>decipiens</i>			50	0.5
nc	<i>Ptilotus obovatus</i> var. <i>obovatus</i>			30	0.1
044	<i>Maireana triptera</i>			20	0.01
012	<i>Haloragis trigonocarpa</i>			10	0.01
033	<i>Maireana?</i> <i>tomentosa</i> (sterile)			10	0.01
042	<i>Sclerolaena diacantha</i>			10	0.01
031	<i>Marsdenia australis</i>			cl	0.1



Plate 19: Quadrat 10, NW corner



Plate 20: Quadrat 10, SE corner

Quadrat:	11	Landform:	Upper	Leaf Litter:	60
Date:	26/04/2017	Outcropping:	None	Soil:	Red
Ph NW:	Camera 1	Vegetation Community:			sandy clay
Ph SE:	Camera 1	Tall Acacia Shrubland over Eremophila Shrub			
Easting:	324657				
Northing:	6583803	Vegetation Condition:	Excellent		
Coll #	Species			Height (cm)	% Cover
001	<i>Eucalyptus griffithsii</i>			800	2
077	<i>Grevillea nematophylla</i> subsp. <i>nematophylla</i>			500	1
013	<i>Acacia acuminata</i>			400	30
016	<i>Senna artemisioides</i> subsp. <i>filifolia</i>			200	10
029	<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>			200	2
nc	<i>Scaevola spinescens</i>			180	10
050	<i>Eremophila decipiens</i> subsp. <i>decipiens</i>			170	10
030	<i>Dodonaea lobulata</i>			150	10
051	<i>Eremophila decipiens</i> subsp. <i>decipiens</i>			50	0.1
nc	<i>Ptilotus obovatus</i> var. <i>obovatus</i>			40	0.1
034	<i>Pittosporum angustifolium</i>			40	0.05
042	<i>Sclerolaena diacantha</i>			40	0.01
079	<i>Hybanthus floribundus</i> subsp. <i>curvifolius</i>			40	0.01
033	<i>Maireana? tomentosa</i> (sterile)			10	0.01
078	<i>Amyema gibberula</i> var. <i>gibberula</i>			p	0.1



Plate 21: Quadrat 11, NW corner



Plate 22: Quadrat 11, SE corner

Quadrat:	12	Landform:	Crest	Leaf Litter:	50
Date:	26/04/2017	Outcropping:		Soil:	Red clay
Ph NW:	Camera 1	Vegetation Community:			
Ph SE:	Camera 1	Tall Acacia shrubland over Eremophila shrubland			
Easting:	324616				
Northing:	6583799	Vegetation Condition:	Excellent		
Coll #	Species			Height (cm)	% Cover
013	<i>Acacia acuminata</i>			400	25
nc	<i>Acacia tetragonophylla</i>			250	1
077	<i>Grevillea nematophylla</i> subsp. <i>nematophylla</i>			190	2
050	<i>Eremophila decipiens</i> subsp. <i>decipiens</i>			180	10
nc	<i>Scaevola spinescens</i>			170	1
016	<i>Senna artemisioides</i> subsp. <i>filifolia</i>			170	0.1
030	<i>Dodonaea lobulata</i>			150	15
033	<i>Maireana?</i> <i>tomentosa</i> (sterile)			15	0.01
031	<i>Marsdenia australis</i>			cl	0.01



Plate 23: Quadrat 12, NW corner



Plate 24: Quadrat 12, SE corner

Quadrat:	13	Landform:	MacD	Leaf Litter:	75
Date:	26/04/2017	Outcropping:	None	Soil:	Red clay
Ph NW:	Camera 1	Vegetation Community:			
Ph SE:	Camera 1	Tall Acacia/Eremophila Shrubland over Low Bluebush Shrubland			
Easting:	324160				
Northing:	6583894	Vegetation Condition:	Excellent		
Coll #	Species			Height (cm)	% Cover
95	<i>Acacia acuminata</i>			400	20
36	<i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>			250	20
30	<i>Dodonaea lobulata</i>			180	5
16	<i>Senna artemisioides</i> subsp. <i>filifolia</i>			170	5
47	<i>Atriplex nummularia</i>			170	1
21	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>			70	1
14	<i>Rhagodia drummondii</i>			50	1
nc	<i>Solanum lasiophyllum</i>			50	1
nc	<i>Ptilotus obovatus</i> var. <i>obovatus</i>			40	10
51	<i>Eremophila decipiens</i> subsp. <i>decipiens</i>			40	0.1
17	<i>Austrostipa elegantissima</i>			40	0.01
44	<i>Maireana triptera</i>			30	1
8	<i>Solanum nummularium</i>			30	0.1
42	<i>Sclerolaena diacantha</i>			15	0.1
19	* <i>Sisymbrium erysimoides</i>			10	0.01
20	<i>Daucus glochidiatus</i>			10	0.01
70	* <i>Salvia verbenaca</i>			10	0.01
23	* <i>Lysimachia arvensis</i>			5	0.01
91	<i>Erodium cygnorum</i>			5	0.01
085	<i>Ptilotus spathulatus</i>			1	0.01
92	<i>Erodium cygnorum</i>			cl	0.01



Plate 25: Quadrat 13, NW corner



Plate 26: Quadrat 13, SE corner

Quadrat:	14	Landform:	Lower	Leaf Litter:	10
Date:	26/04/2017	Outcropping:	None	Soil:	Red clay
Ph NW:	Camera 1	Vegetation Community:			
Ph SE:	Camera 1	Tall Acacia/Casuarina Shrubland over Eremophila/Dodonaea Shrubland			
Easting:	323934				
Northing:	6583397	Vegetation Condition:	Good		
Coll #	Species			Height (cm)	% Cover
37	<i>Casuarina pauper</i>			600	20
53	<i>Acacia quadrimarginea</i>			300	2
16	<i>Senna artemisioides</i> subsp. <i>filifolia</i>			200	5
29	<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>			180	0.1
30	<i>Dodonaea lobulata</i>			100	1
57	<i>Eremophila glabra</i> subsp. <i>glabra</i>			100	1
99	<i>Trymalium myrtillus</i> subsp. <i>myrtillus</i>			100	1
54	<i>Maireana sedifolia</i>			70	0.1
nc	<i>Scaevola spinescens</i>			60	0.5
55	<i>Acacia erinacea</i>			50	2
51	<i>Eremophila decipiens</i> subsp. <i>decipiens</i>			50	1
49	<i>Exocarpos aphyllus</i>			40	0.1
nc	<i>Acacia tetragonophylla</i>			40	0.1
nc	<i>Ptilotus obovatus</i> var. <i>obovatus</i>			30	1
100	<i>Maireana? tomentosa</i> (sterile)			30	0.1
42	<i>Sclerolaena diacantha</i>			20	0.01
33	<i>Maireana? tomentosa</i> (sterile)			10	0.1
31	<i>Marsdenia australis</i>			cl	0.01



Plate 27: Quadrat 14, NW corner



Plate 28: Quadrat 14, SE corner

Quadrat:	15	Landform:	Lower	Leaf Litter:	60
Date:	26/04/2017	Outcropping:	None	Soil:	Red clay
Ph NW:	Camera 1	Vegetation Community:			
Ph SE:	Camera 1	Open Eucalyptus forest over Sparse Eremophila/Senna shrubland			
Easting:	323873				
Northing:	6583554	Vegetation Condition:	Good		
Coll #	Species			Height (cm)	% Cover
103	<i>Eucalyptus transcontinentalis</i>			1000	25
5	<i>Eucalyptus clelandii</i>			1000	15
58	<i>Eremophila scoparia</i>			170	1
102	<i>Senna stowardii</i>			170	1
16	<i>Senna artemisioides</i> subsp. <i>filifolia</i>			160	5
61	<i>Eremophila interstans</i> subsp. <i>interstans</i>			120	0.1
57	<i>Eremophila glabra</i> subsp. <i>glabra</i>			100	0.1
47	<i>Atriplex nummularia</i>			90	2
49	<i>Exocarpos aphyllus</i>			50	0.1
55	<i>Acacia erinacea</i>			50	0.1
56	<i>Eremophila parvifolia</i> subsp. <i>auricampa</i>			50	0.1
nc	<i>Ptilotus obovatus</i> var. <i>obovatus</i>			40	1
51	<i>Eremophila decipiens</i> subsp. <i>decipiens</i>			40	0.1
42	<i>Sclerolaena diacantha</i>			20	0.01
33	<i>Maireana?</i> <i>tomentosa</i> (sterile)			10	0.01



Plate 29: Quadrat 15, NW corner



Plate 30: Quadrat 15, SE corner

Quadrat:	16	Landform:	Flat	Leaf Litter:	40
Date:	26/04/2017	Outcropping:	None	Soil:	Red clay
Ph NW:	Camera 1	Vegetation Community:			
Ph SE:	Camera 1	Open Eucalyptus forest over Sparse Eremophila/Senna shrubland			
Easting:	323878				
Northing:	6583961	Vegetation Condition:	Excellent		
Coll #	Species			Height (cm)	% Cover
2	<i>Eucalyptus yilgarnensis</i>			1200	10
5	<i>Eucalyptus clelandii</i>			1000	50
61	<i>Eremophila interstans</i> subsp. <i>interstans</i>			350	0.1
29	<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>			280	1
58	<i>Eremophila scoparia</i>			250	5
13	<i>Acacia acuminata</i>			200	0.1
16	<i>Senna artemisioides</i> subsp. <i>filifolia</i>			180	10
47	<i>Atriplex nummularia</i>			160	2
56	<i>Eremophila parvifolia</i> subsp. <i>auricampa</i>			120	0.1
105	<i>Acacia nyssophylla</i>			100	1
106	<i>Templetonia ceracea</i>			100	1
nc	<i>Scaevola spinescens</i>			50	0.5
8	<i>Solanum nummularium</i>			40	1
51	<i>Eremophila decipiens</i> subsp. <i>decipiens</i>			40	1



Plate 31: Quadrat 16, NW corner



Plate 32: Quadrat 16, SE corner

Appendix 3 – EPBC Protected Matters Report

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EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 15/05/17 15:00:05

[Summary](#)

[Details](#)

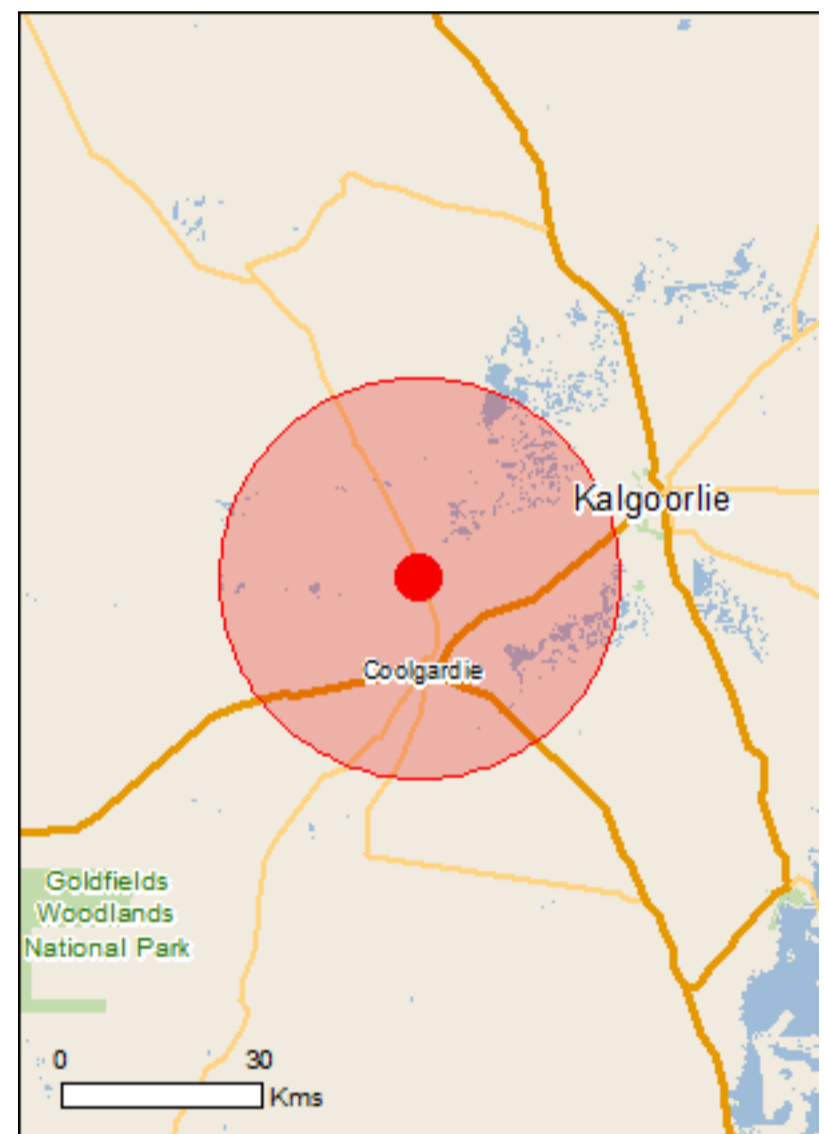
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

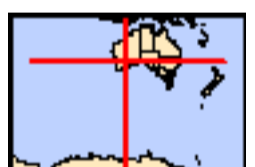
[Acknowledgements](#)



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

[Coordinates](#)

Buffer: 30.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	7
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 <http://www.environment.gov.au/heritage>

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

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	11
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

State and Territory Reserves:	4
Regional Forest Agreements:	None
Invasive Species:	15
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

National Heritage Properties		[Resource Information]
Name	State	Status
Historic		
Goldfields Water Supply Scheme, Western Australia	WA	Listed place

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence

Birds

Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to 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
--	------------	--

Insects

Ogyris subterrestris petrina Arid Bronze Azure [77743]	Critically Endangered	Species or species habitat may occur within area
---	-----------------------	--

Mammals

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

Plants

Gastrolobium graniticum Granite Poison [14872]	Endangered	Species or species habitat likely to occur within area
---	------------	--

Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat may occur within area
---	------------	--

Listed Migratory Species		[Resource Information]
--------------------------	--	--------------------------

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
------	------------	------------------

Migratory Marine Birds

Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
---	--	--

Migratory Terrestrial Species

Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
---	--	--

Migratory Wetlands Species

Name	Threatened	Type of Presence
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known 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 Land [\[Resource Information \]](#)

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.

Name
Commonwealth Land -

Listed Marine Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known 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
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species

Name	Threatened	Type of Presence
Thinornis rubricollis Hooded Plover [59510]		habitat may occur within area Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Kangaroo Hills Timber Reserve	WA
Kurrawang	WA
Scahill Timber Reserve	WA
Yallari Timber Reserve	WA

Invasive Species	[Resource Information]
Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.	

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Carrichtera annua Ward's Weed [9511]		Species or species habitat likely to occur within area
Cylindropuntia spp. Prickly Pears [85131]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

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

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

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

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

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

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

Coordinates

-30.84559 121.1548

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](#)
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- [-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 4 – Level 1 Fauna Assessment

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Bonnievale Level 1 Fauna Assessment



Prepared for: Focus Minerals
Level 2 159 Adelaide Terrace, East Perth WA 6004

Prepared by: J. Turpin, Kingfisher Environmental Consulting
870 Elizabeth Avenue, Mundaring, 6073

May 2017

EXECUTIVE SUMMARY

Focus Minerals Limited (Focus) proposes to develop the Bonnievale Project, located 10km north of Coolgardie, in the Goldfields region of Western Australia. As part of the Environmental Impact Assessment for the project, Kingfisher Environmental Consulting was commissioned by Terratree Pty Ltd on behalf of Focus to undertake a Level 1 fauna assessment of the proposed development area (termed project area).

The fauna assessment comprised a desktop review and reconnaissance (field) survey which was conducted during April 2017 over the Bonnievale Project area and its immediate surrounds. The field survey sampled all major fauna habitats present and included target searches for significant fauna, bird census, the use of motion sensitive cameras and acoustic bat recorders.

The desktop review identified 290 fauna species potentially occurring within the project area, of which 62 fauna species were recorded during the field survey (five reptiles, 47 birds, seven native mammals and three introduced mammals). Four species of conservation significance were recorded during the survey: the Malleefowl (one bird observed outside the project area) and three locally significant bird species. The sighting of the Malleefowl was of interest and therefore searches were undertaken to determine the extent of breeding habitat within and directly adjacent to the project area, as the species can forage widely. Seven old, inactive mounds (breeding sites) were recorded outside the project area and one ancient, inactive mound was recorded within the project area.

The Bonnievale project area is predominantly comprised of Eucalypt Woodland on loam flats, with the lower stony slopes of Emu Hill occurring on its southern margins. Most of the area is unsuitable for the Malleefowl to breed within and no other species of high conservation significance were recorded. Potential impacts associated with the project to the federally listed Malleefowl are not expected to be significant under the EPBC Significant Impact criteria.

Management strategies to reduce potential impacts of the development include:

-) Avoid disturbance to Malleefowl mounds;
-) Report any sightings of Malleefowl.
-) Avoid disturbance to the dense shrublands within the gullies associated with Emu Hill;
-) Avoid disturbance to large mature, hollow bearing Eucalypt trees;
-) Limit disturbance footprint to minimise the cumulative clearing of the regionally significant Great Western Woodlands.

If additional areas are proposed to be developed then impacts to the local Malleefowl populations may require consideration.

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1. INTRODUCTION

1.1 Project Background

Focus Minerals Limited (Focus) proposes to develop the Bonnievale Project located 10km north of Coolgardie, in the Goldfields region of Western Australia. The Bonnievale Project lies adjacent to the historic Bonnievale townsite and includes disturbed areas associated with historical mining activities.

Kingfisher Environmental Consulting (Kingfisher) was commissioned by Terratree Pty Ltd on behalf of Focus to conduct a Level 1 Fauna Survey of the Bonnievale Project Area. A Level 1 Fauna Assessment is required to identify the fauna values of a site so that impacts upon these from any proposed development can be assessed and, where possible, minimised.

1.2 Fauna Assessment Objectives

Where a project is likely to affect biodiversity, the information gathered for Environmental Impact Assessment (EIA) via desktop studies and fauna surveys should enable the impacts of the proposal and their environmental significance to be determined to an acceptable level. Fauna assessments should provide a sufficient level of detail so that proposals that receive environmental approval by government agencies, meet state, national and international legislative requirements (EPA, 2002). The requirements of fauna surveys and desktop studies associated with EIA are detailed in Environmental Protection Agency (EPA) documents including Guidance Statement 56 (EPA, 2004), Position Statement No. 3 (EPA, 2002), and Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA, 2010). The key objectives of fauna studies are to:

1. Conduct a review of background information (a search of all sources for literature, data and map-based information);
2. Compile an inventory of vertebrate fauna expected to occur within the site in light of fauna habitats present;
3. Identify significant fauna species occurring or likely to utilise habitat within the project area;
4. Document the characteristics of the fauna assemblage of the site including significance at an international, national, state, regional and local level;
5. Delineate key fauna values present in the area and potential sensitivity to impacts;
6. Identify significant or fragile fauna habitats within the project area; and
7. Identify potential impacts to fauna and propose recommendations to minimise impacts.

The Bonnievale Level 1 Fauna Assessment therefore included a “Desktop Survey”, field “Reconnaissance Survey” and a detailed report (this report) discussing the survey results.

1.3 Survey Area

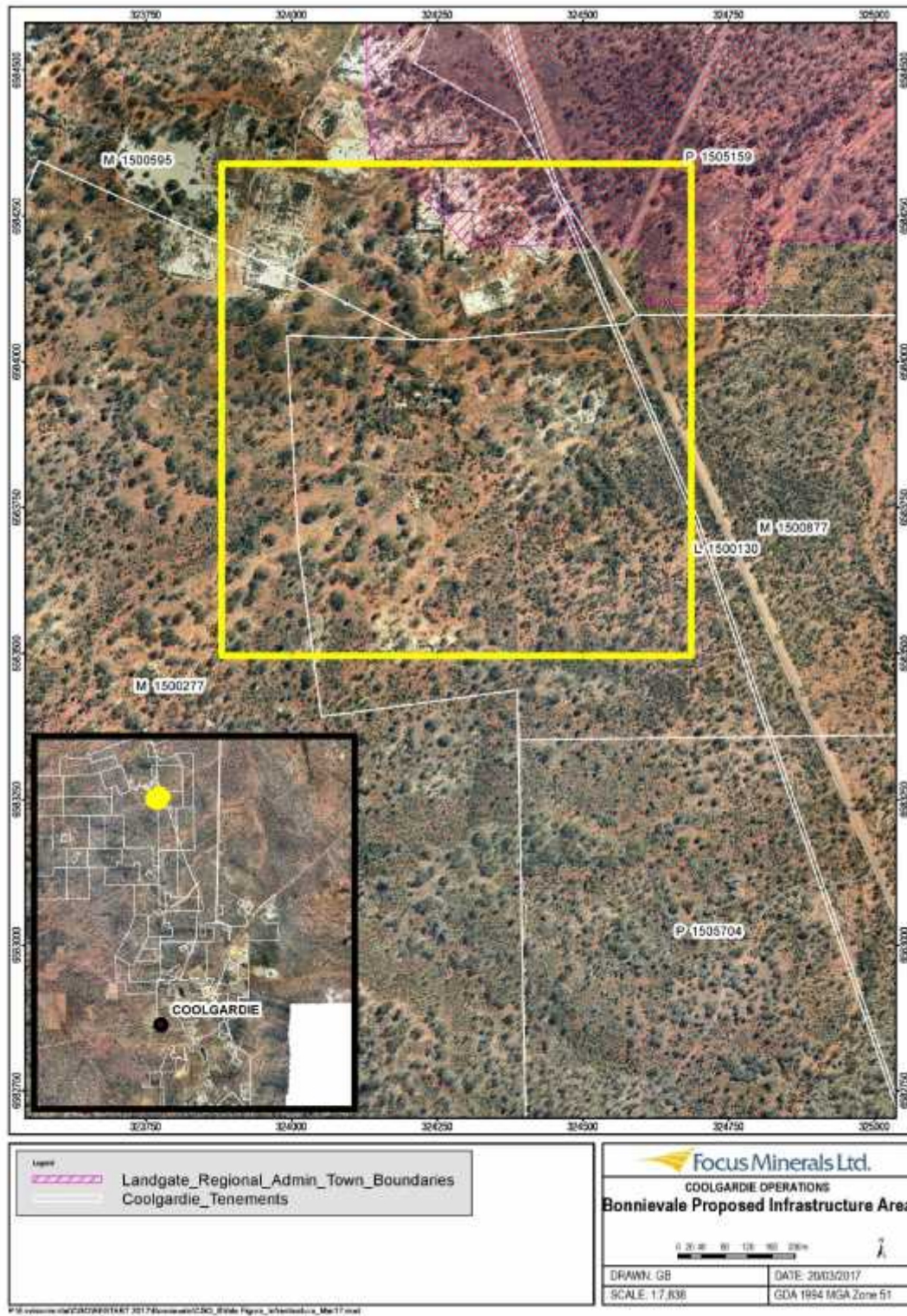
The area covered by the fauna assessment (the “survey area”) corresponds to the Bonnievale Project Area and its immediate surrounds (see Figure 1). It is situated adjacent to the historic Bonnievale townsite and so supports intact native vegetation (dominated by Salmon Gum woodland) however there has been some localised historical mining disturbance.

1.4 Scoping Requirements

This document has been developed in consideration of the following:

1. EPA Position Statement No 3, Terrestrial Biological Surveys as an element of Biodiversity Protection (EPA, 2002);
2. EPA Guidance Statement No 56, Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia (EPA, 2004); and
3. EPA Technical guide - Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA, 2010).

Figure 1. The Bonnievale Project location – note the project area is shown in yellow.



2. BACKGROUND

2.1 Regional Description

The Interim Biogeographic Regionalisation of Australia (IBRA) has identified 26 bioregions in Western Australia (Figure 2). Bioregions are classified on the basis of climate, geology, landforms, vegetation and fauna (Thackway and Cresswell, 1995). IBRA Bioregions are affected by a range of different threatening processes and have varying levels of sensitivity to impact (EPA, 2004).

Coolgardie Bioregion

The project is located within the Coolgardie Bioregion and the Eastern Goldfields Subregion (Coolgardie 3, IBRA, 2008). The Coolgardie Bioregion falls within the Bioregion Group 2 classification (EPA, 2004). Bioregions within Group 2 have “native vegetation that is largely contiguous but is used for commercial grazing.”

Cowan (2001) describes the Eastern Goldfields subregion as:

“The vegetation is of Mallees, Acacia thickets and shrub heaths on sandplains. Diverse Eucalyptus woodlands occur around salt lakes, on ranges, and in valleys. Salt lakes support dwarf shrublands of samphire. The area is rich in endemic Acacias. The climate is Arid to Semi-arid with 200-300 mm of rainfall, sometimes in summer but usually in winter. The subregional area is 5,102,428ha.”

The dominant land use in this subregion is grazing, with smaller areas of crown reserves, mining, freehold, and conservation. Only 4.35 % of the sub-region is vested within conservation reserves (Cowan, 2001). Cowan (2001) describes the Goldfields Woodlands as having an exceptionally high diversity of Eucalyptus species with as many as 170 species occurring in the bioregion.

McKenzie *et al.* (2003) identifies several significant species occurring within the Eastern Goldfields Subregion, including:

-) Malleefowl (*Leipoa ocellata*);
-) Carpet Python (*Morelia spilota*);
-) Slender-billed Thornbill (*Acanthiza iredalei iredalei*);
-) Chuditch (*Dasyurus geoffroii*);
-) Peregrine Falcon (*Falco peregrinus*); and
-) Major Mitchell Cockatoo (*Cacatua leadbeateri*).

Bonnievale lies within the Great Western Woodlands, one of the very few, large, intact landscapes remaining in temperate Australia and is of global significance. Beard (1972) describes the vegetation of the region to include:

- ▯ Greenstone Ridges supporting a characteristic *Eucalyptus torquata* – *E. le souefii* association. Both *E. torquata* and *E. le souefii* are co-dominant, abundant and characteristic. Associated trees include *E. clelandii*, *E. campaspe*, *Casuarina pauper* and *Grevillea nematophylla*. There is an open shrub understorey, largely of *Eremophila* spp. (“Broombush”), *Dodonia*

lobulata, *Senna cardiosperma* and *Acacia species*, interspersed with *Atriplex nummularia*. Two understorey types, “broombush” and “saltbush”, occur on slopes, with broombush appearing on less alkaline soils;

- ▯ Eucalypt Woodlands of the lower slopes and flats consist typically of *Eucalyptus salmonophloia*, often with *E. salubris*, *E. torquata* and *E. longicornis*. *Melaleuca pauperiflora* (boree) occurs as a dominant understorey on heavy, periodically wet soils;
- ▯ Salt lakes and samphire flats. Distinct localised vegetation communities occur in saline or alkaline soils and fringed with open saltbush or bluebush, lightly wooded with *Casuarina pauper*, *Myoporum platycarpum* and some *Acacia species*; and
- ▯ Red sand dunes with scattered *Callitris columellaris*, *Pittosporum angustifolium*, *Acacia tetragonophylla*, *Eremophila miniata* and shrubs of *Grevillea sarissa* and *Acacia species* (Beard, 1972).

2.2 Previous Studies

Previous biological studies conducted in a local and regional context can serve to inform and direct desktop assessments and field surveys. Kingfisher has conducted several fauna assessments in the region, which provide useful background information relevant to the survey area. The local distribution of conservation significant fauna and their associated habitat types are of particular relevance.

The author (J. Turpin) has conducted several fauna assessments in the Coolgardie – Kalgoorlie area, including at Gunga West (7km south-west of Bonnievale); Shirl (13km south-east of Bonnievale); Mt Marion (34km south-east of Bonnievale); South Kalgoorlie (30km east of Bonnievale); Mount Martin (50km south-east of Bonnievale); Bulong (57km east of Bonnievale); Bardoc (58km north-east of Bonnievale) and Red Hill, Kambalda (60km south-east of Bonnievale). Table 1 lists previous reports utilized during the desktop and field assessments. The results of these surveys are included in the desktop assessment and are detailed in Appendix 2.

Table 1: Relevant local and regional fauna surveys

Title	Comments	Year
Gunga West Fauna Survey	Level 1 fauna survey 7km south-west of Bonnievale	2016
Kambalda Fauna Survey	Level 1 survey 60km south-east of Bonnievale	2015
Bulong (Cannon) Fauna Assessment	Level 1 Survey 57km east of Bonnievale at Bulong	2015
Mount Marion Fauna Assessments	Two fauna surveys conducted by J Turpin 34km south-east of Bonnievale	2015 / 2012
Fauna Assessment at South Bardoc	Level 1 Survey 45km south-east of Bonnievale at Bardoc	2012
Fauna Assessment at Italian Gully (Shirl)	Level 1 Survey 13km south-east of Bonnievale	2012
Fauna Assessment of the South Kalgoorlie Powerline	Level 1 Survey 30km south-east of Bonnievale	2012
Fauna Assessment of at South Kalgoorlie	Level 1 Survey 45km south-east of Bonnievale	2012
Fauna Assessment at Mount Martin	Level 1 Survey 50km south-east of Bonnievale	2012

2.3 Conservation Significance

Biodiversity in Western Australia is protected, managed and assessed under international, national and state agreements, legislation and policy. For Environmental Impact Assessment, the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *Western Australian Wildlife Conservation Act 1950* (WC Act) are of particular relevance to Western Australian fauna.

EPBC Act

At the national level, fauna is protected under the EPBC Act. Schedule 1 of the Commonwealth EPBC Act contains a list of species that are considered Critically Endangered (CE), Endangered (E), Vulnerable (V), Extinct (Ex), Extinct in the wild (ExW) and Conservation Dependent (CD). These categories are described in Appendix 1. The significance levels for fauna used in the EPBC Act are those recommended by the International Union for the Conservation of Nature and Natural Resources (IUCN) and reviewed by Mace and Stuart (1994).

Under the provisions of the Commonwealth EPBC Act proposed actions which have the potential to have a significant impact on a matter of national environmental significance must be referred to the Commonwealth Minister for the Environment for a decision as to whether an assessment is required under the provisions of that Act (EPA, 2004).

The EPBC Act also has lists of migratory species that are recognised under international treaties such as the China Australia Migratory Bird Agreement (CAMBA), the Japan Australia Migratory Bird Agreement (JAMBA) and the Bonn Convention (The Convention on the Conservation of Migratory Species of Wild Animals).

Wildlife Conservation Act

At the state level, significant fauna is listed under the *Western Australian Wildlife Conservation Act 1950: Wildlife Conservation (Specially Protected Fauna) Notice 2016*. There are seven levels of conservation significance provided for fauna. Scheduled species are prioritised and listed as:

-) Schedule 1 (S1): Fauna that is rare or likely to become extinct – Critically Endangered;
-) Schedule 2 (S2): Fauna that is rare or likely to become extinct – Endangered;
-) Schedule 3 (S3): Fauna that is rare or likely to become extinct – Vulnerable;
-) Schedule 4 (S4): Fauna that is rare or likely to become extinct – Extinct;
-) Schedule 5 (S5): Birds subject to international agreements – the protection of migratory species;
-) Schedule 6 (S6): Fauna that are of special conservation need - species dependent on ongoing conservation;
-) Schedule 7 (S7): Fauna that is in need of special protection.

The WC Act uses a set of schedules but also classifies species using some of the IUCN categories. These categories and Schedules are described in Appendix 1.

Priority Fauna

In Western Australia, the Department of Parks and Wildlife (DPaW) has produced a supplementary list of Priority Fauna for species that do not meet the criteria for listing as threatened under Schedule 1 (of the WC Act). These species however are often poorly known and/or of conservation dependence. Some Priority species, however, are also assigned to the IUCN Conservation Dependant Category. Levels of Priority are described in Appendix 1 (Priority 1 – 4).

Conservation Significant Fauna

Fauna species included under conservation acts and/or agreements are formally recognised as of conservation significance under state or federal legislation. Species listed as Priority by DPaW, or that are included in biodiversity publications (such as the Action Plan for Australian Birds 2010), are also of recognised conservation significance. In addition, species that are at the limit of their distribution, those that have a very restricted range and those that occur in breeding colonies, such as some waterbirds, can be considered of conservation significance, although this level of significance has no legislative or published recognition and is based on interpretation of distribution information.

Locally significant fauna are species not listed under Acts or in publications, but considered of at least local significance because of their pattern of distribution. This level may have links to preserving biodiversity at the genetic level (EPA, 2002). For example, if a population is isolated but a subset of a widespread (common) species, then it may not be recognised as threatened, but may have unique genetic characteristics. Species on the edge of their range, or that are sensitive to impacts such as habitat fragmentation, may also be classed as locally significant.

3. SURVEY METHODS

3.1 Approach

The level of fauna assessment required by the EPA is determined by the size and location of the proposed disturbance and the sensitivity of the surrounding environment in which the disturbance is planned. Due to the size and location of the proposed project, a Level 1 Fauna Assessment was sufficient to satisfy the EPA guidelines (EPA, 2004).

A Level 1 Fauna Assessment consists of a desktop study and reconnaissance survey. The EPA (2004) describes a Level 1 Assessment as “research to gather background information on the target area (usually at the locality scale). This involves a search of all sources for literature, data and map-based information”. The purpose of a reconnaissance survey is to verify the accuracy of the background study to further delineate and characterise the fauna and faunal assemblages present in the target area and to identify potential impacts. This involves a “target area visit by suitably qualified personnel to undertake selective, low intensity sampling of the fauna and faunal assemblages, and to provide habitat descriptions and habitat maps of the project area” (EPA, 2004).

Kingfisher has conducted numerous fauna surveys within the vicinity of project area (see Section 2.2) and holds an extensive fauna database for the area. These provided the background information on which the desktop study was based. This fauna assessment was conducted with reference to guidance and position statements published by the WA Environmental Protection Authority (EPA) on fauna surveys and environmental protection, and commonwealth biodiversity legislation (e.g. EPA, 2002, 2004; EPA and DEC, 2010).

3.2 Personnel and Survey Timing

The Bonnievale Fauna Assessment was undertaken from 24th till 26th April 2017 by Jeff Turpin (Principal Zoologist, B.Sc. Zoology). This report was prepared by Jeff Turpin.

3.3 Desktop Survey

As per the recommendations of EPA and DEC (2010), the nomenclature and taxonomic order presented in this report are based on the Western Australian Museum’s Checklist of the Vertebrates of Western Australia (Western Australian Museum, 2016). Information for this fauna assessment was drawn primarily from the DPaW threatened species database and “NatureMap” (DPaW, 2017), the BirdLife Australia Atlas Database (BirdLife Australia, 2017), EPBC Protected Matters Search Tool (DOTE, 2017) and the results of fauna surveys conducted in the region (J Turpin records – see section 2.2; Bamford Consulting Ecologists 2012, 2015, 2016). All databases were interrogated in April 2017 (

Table 2). This information was supplemented with species expected in the area based on general patterns of distribution.

Table 2: Fauna databases

Title	Comments	Area Searched / Year
NatureMap	Records of specimens held in the WA Museum and DPaw database records. Includes historical data.	Survey area with a 40 km Buffer.
Birds Australia Atlas Database	Records of bird observations in Australia, 1998-2017.	Species list for the 1 degree grid cell containing the survey area
EPBC Protected Matters Search Tool	Records on matters protected under the EPBC Act, including threatened species and conservation estate.	Survey area (plus~100 km buffer)
DPaw Threatened and Priority Fauna database	Records of significant fauna within DPaw databases	Survey area with 30km buffer, 2017.
J Turpin database	Fauna recorded during previous fauna surveys in the region. Several surveys conducted in the Coolgardie – Kalgoorlie area were consulted.	2012-2017

3.4 Field Survey

The Bonnievale Fauna Assessment was undertaken concurrent to the Flora and Vegetation survey of the area, and in accordance with EPA Guidance Statement 56 (EPA, 2004). During the fauna survey, the project area was visually inspected and extensively traversed on foot. All major fauna habitats (major vegetation types) present were sampled and assessed for the likelihood of supporting conservation significant fauna. Those habitats deemed suitable to support such significant fauna were also subject to further intensive targeted surveying. While surveying focused on locating evidence of significant fauna, all species observed were recorded. Surveying included:

-) Identification of fauna habitats;
-) Targeted searching for species of conservation significance;
-) Bird Census;
-) Targeted herpetofauna searches (hand searching, head-torching);
-) Use of Motion-sensitive Cameras;
-) Use of Acoustic Bat detectors;
-) Spotlighting;
-) Opportunistic Surveying; and
-) Fauna habitat assessment – the suitability of vegetation communities (fauna habitats) to support species of conservation significance.

Species of Conservation Significance

The presence of many conservation significant fauna species can be confirmed by searching for evidence of their activities (e.g. scats, tracks, diggings, burrows, nests). Searching for significant fauna was therefore undertaken by walking through habitat considered suitable for such species. The Malleefowl (*Leipoa ocellata*) and Arid

Bronze Azure Butterfly (*Ogyris subterrestris petrina*) were of particular interest and specifically targeted during the survey as they are species of high conservation significance known from the region. Surveying focused on searching for:

-) Malleefowl – distinctive tracks, mounds, feathers and scats;
-) Arid Bronze Azure Butterfly – searches including for the associated ant *Camponotus terebrans*;
-) Priority fauna species; and
-) Locally significant birds (bird census in appropriate habitat).

Motion sensitive cameras (Bushnell Trophy Cam) were placed at four locations within the survey area to sample for conservation significant fauna (eg. Malleefowl and Chuditch), larger mammals and reptiles (Table 3). Cameras were operated over two nights and baited with universal bait (a mixture of sardines, rolled oats and peanut butter).

Table 3: Camera locations

Camera	Habitat	Easting	Northing	Comments
1	Gully / Woodland	324455	6583558	Targeting small mammals / reptiles
2	Dense Acacia gully	323710	6582836	Targeting small mammals / reptiles
3	Eucalypt Woodland	324413	6583136	Targeting small mammals / reptiles
4	Eucalypt Woodland	324421	6584254	Targeting small mammals / reptiles

To sample for bats an ANABAT SD1 detector was placed at two locations within the survey area (Table 4). One unit recorded bat calls over one night at each location.

Table 4: ANABAT locations

Camera	Habitat	Easting	Northing	Comments
1	Gully in stony rise	324388	6583200	Recorded full night
2	Eucalypt Woodland	324421	6584254	Recorded full night

Nocturnal surveying was conducted both on foot and by vehicle along access tracks throughout the project area. Spotlighting was conducted on the night of the 25th of April by two personnel over a total of four person hours.

Arid Bronze Azure

The Arid Bronze Azure Butterfly has a symbiotic relationship with the “pale-coloured” or “Goldfields” form of a sugar ant (*Camponotus terebrans*). The butterfly larvae feed on, or are fed by the ants and they live entirely within the ant’s subterranean nests during their development (Gamblin *et al*, 2010). Therefore, the Arid Bronze Azure Butterfly requires the presence of *Camponotus terebrans* to occur. Within the range of the Arid Bronze Azure Butterfly, *Camponotus terebrans* nests have been recorded at the base of several Eucalypt species, predominantly Gimlet (*E. salubris*) and also *E. salmonophloia* and *E. capillosa*. The dominant Eucalypt at Lake Douglas, where the Arid Bronze Azure Butterfly was known to occur was *Eucalyptus concinna*. As such, targeted searches for *Camponotus terebrans* were conducted both diurnally (searching for ants’ nests at the base of smooth-barked Eucalypts) and nocturnally, searching for active ants along the trunks of smooth-barked Eucalypts (such as *Eucalyptus clelandii*, *Eucalyptus salubris* and *E. salmonophloi*).

At all times, observations of fauna were noted when they contributed to the accumulation of information on the local fauna assemblage. These included such casual observations as birds or reptiles seen while travelling through the site.

3.5 Limitations

EPA Guidance Statement 56 (EPA 2004) outlines a number of limitations that may arise during surveying. These survey limitations are addressed below (Table 5).

Table 5: Potential fauna survey limitations

Limitation	Comment
Level of survey.	Level 1 (desktop study, reconnaissance survey with some targeted surveying for conservation significant fauna).
Competency/experience of the consultant(s) carrying out the survey.	The field personnel/authors have had extensive experience in conducting desktop reviews and fauna surveys. This includes several Level 1 and Level 2 surveys conducted across the region.
Scope (What faunal groups were sampled and were some sampling methods not able to be employed because of constraints?).	Birds were extensively sampled due to the nature of the survey, and some foraging was conducted to sample for reptiles, amphibians and mammals. Additional mammal species occurring in the area were detected using the motion sensitive cameras and bat detectors.
Proportion of fauna identified, recorded and/or collected.	All fauna observed were identified.
Sources of information e.g. previously available information (whether historic or recent) as distinct from new data.	Sources include previous reports on the fauna of the region (BCE 2010, 2012, 2015, 2016); databases (BirdLife Australia, DPaW, EPBC, J Turpin) and local fauna records obtained by J Turpin.
The proportion of the task achieved and further work which might be needed.	Survey Complete.
Timing/weather/season/cycle.	Field survey conducted during April 2017. Weather conditions were mild during the survey and many plants (<i>Eucalypt</i> and <i>Eremophila</i> spp.) were in flower, indicating an optimal time to conduct the survey.
Disturbances (e.g. fire, flood, accidental human intervention etc.) which affected results of survey.	No disturbances affected the survey results.
Intensity. (In retrospect, was the intensity adequate?)	Survey intensity was moderate (desktop study, reconnaissance survey with some targeted surveying for conservation significant fauna) and was adequate to satisfy EPA guidelines.
Completeness (e.g. was relevant area fully surveyed).	The entire survey area was visually inspected and all major fauna habitats sampled. Habitats likely to support conservation significant fauna were subject to further intensive sampling.
Resources (e.g. degree of expertise available in animal identification to taxon level).	All species identified to taxon level.
Remoteness and/or access problems.	Not Applicable.
Availability of contextual (e.g. biogeographic) information on the region.	Regional information was available and was consulted. See Section 2.2 "Previous Studies".

4. SURVEY RESULTS

4.1 Fauna Habitats

The fauna survey area extended from the slopes of Emu Hill (8km north of Coolgardie) to the abandoned Bonnievale Mine. It comprised mostly Eucalypt Woodland on loam flats however contained the lower stony slopes associated with Emu Hill on its southern margins. Three major fauna habitats were recognised within the survey area (Table 6, photographs depicted in Appendix 3).

Table 6: Fauna Habitats.

Landform	Vegetation
Undulating loam and stony plains	Eucalypt Woodland and Mallee dominated by <i>E. salubris</i> , <i>E. lesouefii</i> and <i>E. salmonophloia</i> with an open understorey including <i>Eremophila scoparia</i> , <i>Santalum spicatum</i> and sparsely occurring chenopods.
Greenstone Hills	Shrublands dominated by <i>A. quadrimarginea</i> with <i>A. tetragonophylla</i> , <i>A. burkitii</i> , <i>Scaevola spinescens</i> and <i>Eremophila</i> species (e.g. <i>E. oldfieldii</i>). Occasional smaller stands of <i>Eucalyptus</i> Woodland occur. The southern margins of the survey area are situated on the lower slopes of Emu Hill and include several incised gullies supporting dense thickets of vegetation (particularly <i>A. quadrimarginea</i> , <i>Scaevola spinescens</i> and <i>Eremophila oldfieldii</i>).
Lower stony slopes	Sheaok (<i>Casuarina pauper</i>) Woodland with a variable understorey occurs on the lower slopes and foothills of Emu Hill.
Disturbed Areas	Disturbed land from public off-road vehicle use, illegal rubbish disposal, timber cutting and previous mining and exploration activities.

4.2 Vertebrate Fauna

The desktop survey identified 290 vertebrate fauna species potentially occurring in the survey area (Appendix 2). Based on the results of the database searches and literature reviews, 5 frog, 85 reptile, 164 bird, 26 native mammal and 10 introduced mammal species may potentially occur. This list includes 24 species of conservation significance, based on species distributions and the habitats present within the survey area. The vertebrate fauna expected to occur within the survey area has the following composition (Table 7, Appendix 2).

Table 7: Expected Fauna Summary Table

Taxon	Species Expected	Species Recorded	Conservation Significant Fauna Potentially Occurring (Species recorded listed in parenthesis)		
			EPBC / WC Acts	DPAW Priority	Locally Significant
Frogs	5	0	0	0	0
Reptiles	85	5	1	0	0
Birds	164	47	4 (1)	1	13 (3)
Native Mammals	26	7	1	1	1
Introduced Mammals	10	3	0	0	0
Invertebrates	NA	NA	1	1	0
Total	290	62	7	3	14

A total of 62 fauna species were recorded during the field survey, comprising five reptile, 47 bird, seven native mammal and three introduced mammal species (Appendix 2). This included four fauna species of conservation significance.

5. CONSERVATION SIGNIFICANT FAUNA

5.1 Conservation Significant Fauna Recorded or Expected to Occur

Conservation significant fauna recorded during the survey comprised the Malleefowl (listed under legislation) and three locally significant species:

-) Malleefowl (*Leipoa ocellata*) – EPBC Vulnerable, one sighted and seven mounds recorded;
-) Western Yellow Robin (*Eopsaltria griseogularis*) – locally significant, three pairs recorded;
-) Gilbert's Whistler (*Pachycephala inornata*) – locally significant, two recorded; and
-) Chestnut Quail-thrush (*Cinclosoma castanotum*) – locally significant, one group recorded.

Details on species of conservation significance recorded or expected to occur in the survey area are presented in Table 8 and Status Codes:)CS1: EPBC Act listed species: End = Endangered, Vul = Vulnerable, Mig = Migratory, CrE = Critically Endangered;

)CS2: WC Act listed species: S1 - 7 = Schedule 1 – 7; DPaW Priority Species: P1 - 4 = Priority 1 - 4;

)CS3: Locally Significant species: L = Locally Significant.

Table 9. Conservation significance codes are detailed in **Section 2.2**. The project area (and its surrounds) is likely to be important for several significant species which are expected to occur there in resident populations or may utilise the project area during foraging or breeding. These species are discussed below.

Table 8: Significant fauna recorded from the Bonnievale area.

Common Name	Species Name	Status	Easting	Northing	Comments
Malleefowl	<i>Leipoa ocellata</i>	VUL	323781	6582812	Individual observed
Malleefowl	<i>Leipoa ocellata</i>	VUL	323519	6583033	Fresh tracks
Malleefowl	<i>Leipoa ocellata</i>	VUL	324300	6583616	Inactive Mound
Malleefowl	<i>Leipoa ocellata</i>	VUL	324245	6583003	Inactive Mound
Malleefowl	<i>Leipoa ocellata</i>	VUL	324701	6583140	Inactive Mound
Malleefowl	<i>Leipoa ocellata</i>	VUL	324029	6583215	Inactive Mound
Malleefowl	<i>Leipoa ocellata</i>	VUL	324087	6582913	Inactive Mound
Malleefowl	<i>Leipoa ocellata</i>	VUL	323405	6583080	Inactive Mound
Malleefowl	<i>Leipoa ocellata</i>	VUL	323358	6582384	Inactive Mound
Malleefowl	<i>Leipoa ocellata</i>	VUL	322523	6582835	Mega Mound
Western Yellow Robin	<i>Eopsaltria griseogularis</i>	Local	322526	6582242	1 recorded
Western Yellow Robin	<i>Eopsaltria griseogularis</i>	Local	323176	6581972	2 recorded
Western Yellow Robin	<i>Eopsaltria griseogularis</i>	Local	323503	6582829	2 recorded
Western Yellow Robin	<i>Eopsaltria griseogularis</i>	Local	323702	6582828	2 recorded
Gilbert's Whistler	<i>Pachycephala inornata</i>	Local	324391	6583325	1 recorded
Gilbert's Whistler	<i>Pachycephala inornata</i>	Local	324199	6583431	1 recorded
Gilbert's Whistler	<i>Pachycephala inornata</i>	Local	324029	6583215	1 recorded

Chestnut Quail Thrush	<i>Cincoloma castanotus</i>	Local	323945	6583186	2 recorded
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Status Codes:)CS1: EPBC Act listed species: End = Endangered, Vul = Vulnerable, Mig = Migratory, CrE = Critically Endangered;
)CS2: WC Act listed species: S1 - 7 = Schedule 1 – 7; DPaw Priority Species: P1 - 4 = Priority 1 - 4;
)CS3: Locally Significant species: L = Locally Significant.

Table 9: Significant fauna species recorded (BOLD) or expected in the survey area.

Taxon	Species Name	Conservation Status				Expected status in project area	Local records
		EPBC	WCA	P	L		
Malleefowl	<i>Leipoa ocellata</i>	Vul	S3			Visitor	Bonnievale
Rainbow Bee-eater	<i>Merops ornatus</i>	Mig	S5			Migrant	Shirl
Fork-tailed Swift	<i>Apus pacificus</i>	Mig	S5			Irregular visitor	Woolgangie
Peregrine Falcon	<i>Falco peregrinus</i>		S7			Resident / Visitor	Victoria Rocks Rd
Major Mitchell's Cockatoo	<i>Cacatua leadbeateri</i>				L	Irregular visitor	Coolgardie
Chuditch	<i>Dasyurus geoffroyii</i>	Vul	S3			Unlikely / Vagrant	Kaloorlie
Carpet Python	<i>Morelia spilota</i>		S7	4		Resident	Kaloorlie
Eastern Great Egret	<i>Ardea modesta</i>	Mig	S5			Vagrant	Coolgardie
Common Sandpiper	<i>Acitis hypoleucos</i>	Mig	S5			Unlikely to occur	Kundana
Common Greenshank	<i>Tringa nebularia</i>	Mig	S5			Unlikely to occur	Kundana
Wood Sandpiper	<i>Tringa glareola</i>	Mig	S3			Unlikely to occur	Kaloorlie
Red-necked Stint	<i>Calidris ruficollis</i>	Mig	S5			Unlikely to occur	Kaloorlie
Sharp-tailed Sandpiper	<i>Calidris acuminata</i>	Mig	S5			Unlikely to occur	Kaloorlie
Arid Bronze Azure	<i>Ogyris subterrestris</i>	CE	S1			Unknown	Lake Douglas
Western Rosella	<i>Platycercus icterotis</i>			4		Irregular Visitor	Kaloorlie
Central Long-eared Bat	<i>Nyctophilus major tor</i>			4		Resident	Coolgardie
Hooded Plover	<i>Thinornis rubricollis</i>			4		Unlikely to occur	Yindarligooda
Tree-stem Trapdoor	<i>Aganippe castellum</i>			4		Unlikely to occur	Koolyanobbing
Inland Hairstreak	<i>Jalmenus aridus</i>			1		Potential Visitor	Lake Douglas
Australian Bustard	<i>Ardeotis australis</i>				L	Visitor	Credo
Shy Heathwren	<i>Hylacola cauta</i>				L	Visitor / Resident	St Ives
Square-tailed Kite	<i>Lophoictinia isura</i>				L	Visitor	St Ives
Slender-billed Thornbill	<i>Acanthiza iredalei</i>				L	Unlikely / Vagrant	Coolgardie
Crested Shrike-tit	<i>Falcunculus frontatus</i>				L	Resident / Visitor	Kaloorlie
Scarlet-chested Parrot	<i>Neophema splendida</i>				L	Irregular Visitor	St Ives
Regent Parrot	<i>Polytelis anthopeplus</i>				L	Visitor / Resident	St Ives
Bush Stone-curlew	<i>Burhinus grallarius</i>				L	Vagrant	Jilbadji
Southern Scrub-robin	<i>Drymodes brunneopygia</i>				L	Visitor / Vagrant	Coolgardie
Western Yellow-robin	<i>Eopsaltria griseogularis</i>				L	Resident	Bonnievale
Rufous Tree-creeper	<i>Climacteris rufus</i>				L	Resident	Gunga West
Chestnut Quail-thrush	<i>Cincoloma castanotus</i>				L	Resident	Bonnievale
Gilbert's Whistler	<i>Pachycephala inornata</i>				L	Resident	Bonnievale
Purple-gaped Honeyeater	<i>Lichenostomus cratitius</i>				L	Resident	Kaloorlie
Kultarr	<i>Antechinomys laniger</i>				L	Vagrant	Kaloorlie

Status Codes:

)CS1: EPBC Act listed species: End = Endangered, Vul = Vulnerable, Mig = Migratory, CrE = Critically Endangered;

)CS2: WC Act listed species: S1 - 7 = Schedule 1 – 7; DPaW Priority Species: P1 - 4 = Priority 1 - 4;

)CS3: Locally Significant species: L = Locally Significant.

5.2 Malleefowl

The Malleefowl is listed as Vulnerable under the EPBC and WC Act. In WA, Malleefowl occur mainly in scrubs and thickets of Mallee (*Eucalyptus* spp.), Boree (*Melaleuca lanceolata*), Bowgada (*Acacia linophylla*), and also other dense litter-forming shrublands including Mulga (*Acacia aneura*) (Johnstone and Storr, 2004). The species distribution was once larger and less fragmented, but the widespread clearing of suitable habitat, coupled with the degradation of habitat by fire and livestock, and fox predation has reduced Malleefowl numbers considerably (Johnstone and Storr, 2004).

The Malleefowl Mound

The Malleefowl has developed a highly sophisticated method of temperature control for egg incubation. They construct distinctive nests that comprise a large mound covering a central core of leaf litter. The mound is constructed out of sand, loam, pebbles or small rocks, depending on the substrate available. Mounds have a large central depression which is filled with leaf litter and covered with soil. Eggs are laid within the mound, buried and left to incubate by the heat generated from decomposing leaf litter (Malleefowl Preservation Group (MPG), 2013). An adult pair maintains the mound temperature of 32 – 34 degrees by adjusting soil cover to either retain or expel heat from the egg chamber (MPG, 2013).

Malleefowl are monogamous with pair bonds maintained for life (Priddel and Wheeler, 2003). The mound is constructed and maintained by an adult pair over 9 - 11 months of the year. Nest preparation occurs in autumn and the male will tend the nest through summer until temperatures begin to fall (MPG, 2013).

Malleefowl mounds range in size and diameter, depending on age and activity, however mounds commonly span more than five metres and up to one metre high. A pair of Malleefowl will often use the same nest over subsequent seasons however nest fidelity is highly variable. Some Malleefowl pairs have been recorded using the same mound for up to nine years while others relocate seasonally between a cluster of two, three or four mounds (Priddel and Wheeler, 2003). Where Malleefowl mounds are used over many generations, mounds can attain a size of over 20 metres (MPG, 2013).

Mound construction and breeding rely heavily on rainfall. Malleefowl have been recorded abandoning mound construction or failing to use a mound during seasons of low rainfall (Priddel and Wheeler, 2003). Priddel and Wheeler (2003) studied the nesting activity of Malleefowl within an isolated remnant of mallee in central New South Wales. The maximum longevity recorded for breeding adults was 12 years with an average of 7.5 years. Over a twenty year period the population declined, with large population decreases coincident with years of low rainfall and unsuccessful breeding.

Breeding Malleefowl tend to be sedentary, as they nest and roost in the same area year after year. Breeding males do not stray far from the active nest however birds may range over several kilometres outside the breeding season (MPG, 2013). Malleefowl also require large amounts of leaf litter for egg incubation and so are generally restricted to areas of dense vegetation that have not been burnt for many years. In the Kalgoorlie region, Malleefowl are often associated with dense vegetation on rocky hills, slopes and gravelly rises (J. Turpin, pers. obs.).

Established pairs generally breed annually with eggs laid from September to January. The average clutch size is 16 (but may range from five to 30) and the incubation period lasts for between 62 and 64 days (Priddel and Wheeler, 2003). Malleefowl chicks receive no parental care and as a result chick mortality is high due to predation and exposure (Priddel and Wheeler, 2003).

Mound Profile

The profile of a Malleefowl mound changes with breeding activity and age (erosion and vegetation growth). A number of profile stages are classified according to age (Benshemesh et. al., 2000) and include:

- J Profile 1: Typical crater with raised rims. This is the typical shape of an inactive nest. However, the nest may also be active and open;
- J Profile 2: Nest fully dugout. The characteristic of this profile is that the crater slopes down steeply and at the base the sides drop vertically to form a box- like structure with side usually 20 to 30 cm deep. Often, litter will have been raked into windrows, and may have started to enter the nest;
- J Profile 3: Nest with litter. This is the next stage after profile 2. Litter will have been raked into the nest by Malleefowl, and thick layers of litter are evident on the surface. There may or may not be sand mixed with the litter at this stage;
- J Profile 4: Nest mounded up (no crater). This is the typical profile of an active but unopened Malleefowl nest. The active mound is closed and dome shaped;
- J Profile 5: Nest a crater with peak in centre. This is a typical profile of an active nest which is in the process of being closed by Malleefowl;
- J Profile 6: Abandoned nest, with reduced height and depth due to inactivity and erosion however still contains an obvious central depression; and
- J Profile 7: Nest low and flat without peak or crater. This mound has not been used for some time and weathering and erosion have “flattened” the original mound. No central depression.

Survey Results

Searches for Malleefowl and its associated mounds were undertaken on foot by traversing through areas of suitable habitat and concentrated on areas of dense

shrubland. One Malleefowl was observed during the field survey, which prompted a wider scale survey of suitable habitat to ascertain if the species breeds in the local area (as the species can forage widely). Seven Malleefowl mounds were recorded from the lower slopes of Emu Hill (Table 10,

Plate 1 to

Plate 1: Malleefowl Mound 1. Plate 7) and shown in Figure 2. When Malleefowl mounds were detected, the location, vegetation type and physical characteristics (mound width, height, depth, shape / profile and substrate) were recorded and shown in Table 10. The approximate age of each mound was classified according to the criteria listed below:

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

Table 10: Malleefowl Mounds recorded during the fauna survey (UTM Zone 51)

Mound	Easting	Northing	Substrate	Profile	Width (m)	Height (cm)	Depth (cm)	Vegetation	Status	Age
1	324300	6583616	Gravel	6	9	30	5	<i>Acacia tetragonophylla</i> , <i>A. burkittii</i> , <i>Eremophila oldfieldii</i> , <i>Dodonaea</i>	Within Project	Old
2	324245	6583003	Gravel	6	5	40	10	<i>Acacia quadrimarginea</i> , <i>E oldfieldii</i> , <i>Senna sp.</i>	Outside Project	Old
3	324701	6583140	Gravel, loam	6	6	40	10	<i>Casuarina pauper</i> , <i>E oldfieldii</i> , <i>E. scoparia</i> , <i>Dodonaea</i> , Mallee	Outside Project	Old
4	324029	6583215	Gravel	1	9	60	10	<i>Acacia quadrimarginea</i> , <i>E oldfieldii</i> , <i>Dodonaea</i> , <i>Scaevola spinescens</i>	Outside Project	Moderately Old
5	324087	6582913	Gravel	7	5	20	5	<i>C. pauper</i> , <i>E oldfieldii</i> , <i>Senna</i> , <i>Dodonaea</i> , <i>Eucalyptus lesouefii</i>	Outside Project	Very Old
6	323405	6583080	Gravel	6	8	30	8	<i>Acacia quadrimarginea</i> , <i>E oldfieldii</i> , <i>A. burkittii</i> , <i>Santalum spicatum</i>	Outside Project	Old
7	323358	6582384	Gravel, loam	7	7	40	0	Mallee, <i>E oldfieldii</i> , <i>Dodonaea</i> , <i>Santalum spicatum</i>	Outside Project	Very Old
Tracks	323519	6583033	Sand	-	-	-	-	Eucalypt Woodland, dense gully	Outside Project	-
Sighting	323781	6582812	Gravel	-	-	-	-	Eucalypt Woodland, dense gully	Outside Project	-

Plate 1: Malleefowl Mound 1.



Plate 2: Malleefowl Mound 2.



Plate 3: Malleefowl Mound 3.



Plate 4: Malleefowl Mound 4.



Plate 5: Malleefowl Mound 5.



Plate 6: Malleefowl mound 6



Plate 7: Malleefowl Mound 7.



5.3 Locally Significant Birds

Several woodland bird species are recognized as declining in Western Australia (Saunders and Ingram, 1995, BirdLife Australia, 2016) and are listed in this report as locally significant. These species have lost considerable areas of habitat throughout the Wheatbelt and adjacent Goldfields as a result of large scale habitat clearance and the removal of mature Eucalypt trees. Listed species include the Regent Parrot, Southern Scrub-robin, Gilbert's Whistler, Chestnut Quail-thrush, Rufous Tree-creeper and Purple-gaped Honeyeater. The retention of these species in their natural abundances is of particular conservation significance as these species are now increasingly absent or rare over much of the Wheatbelt (Duncan et. al., 2006). Three locally significant species were recorded during the survey. These were:

- J Western Yellow Robin – recorded from dense gullies;
- J Chestnut Quail-Thrush – one party recorded from stony lower slopes of Emu Hill;
- J Gilbert's Whistler – recorded from dense gullies and stony slopes of Emu Hill;

5.4 Conservation Significant Fauna Expected within the Survey Area

Additional conservation significant fauna species have the potential to occur within the survey area. Most are likely to occur as irregular visitors or vagrants (e.g. Chuditch, Major Mitchell's Cockatoo, Fork-tailed Swift) and thus for which the site is of low importance, except where it may have value for connectivity. The project area (and surrounds) is likely to be important for 12 significant species which are expected to occur there in resident populations or may utilise the project area during foraging or breeding. These are:

- J Carpet Python – potential for resident population;
- J Peregrine Falcon – likely to be a regular visitor;
- J Shy Heathwren – potential for resident population;
- J Central Long-eared Bat – potential for resident population;
- J Western Rosella (inland ssp) – potential as a visitor although few nearby records;
- J Locally significant birds (Regent Parrot, Rufous Tree-creeper, Western Crested Shrike-Tit, Scarlet-chested Parrot, Southern Scrub-robin, Purple-gaped Honeyeater) - potential for resident populations; and
- J Rainbow Bee-eater – likely migrant.

5.5 Other Conservation Significant Fauna

Additional significant fauna species were detected on database or literature searches however are considered unlikely to occur within the survey area or occur there only as rare visitors or vagrants. This is due to the type and extent of habitats present and a reflection of the condition of vegetation present. This includes:

- J Chuditch - one record exists from Kambalda from 1974, however the nearest recent records come from Southern Cross (DPaW, 2017). The species has potential to occur as a vagrant as it is far ranging and so the potential exists for individuals to move through the area;

- J Slender-billed Thornbill - recorded from Coolgardie (BirdLife Australia, 2017), however due to a lack of suitable habitat, the species is unlikely to occur in the project area;
- J Fork-tailed Swift - an aerial species largely independent of terrestrial habitats;
- J Great Egret - favours freshwater wetlands absent from the survey area; and
- J Major Mitchell's Cockatoo - recorded from Coolgardie but few recent, local records suggest this species rarely occurs in the area.

5.6 Significant Invertebrates

No listed conservation significant invertebrates are known from the local area however three conservation significant invertebrate species have been recorded in the greater area (DPaW, 2017). These are the Arid Bronze Azure Butterfly (*Ogyris subterrestris petrina*), Inland Hairstreak (*Jalmenus aridus*) and the freshwater shrimp *Branchinella denticulata*.

The Arid Bronze Azure Butterfly is listed as Critically Endangered under the Wildlife Conservation Act and EPBC Act. It is only known from Barbalin Nature Reserve (10km west of Mukinbudin, in the Wheatbelt), however was formerly known from the Lake Douglas area (12 km south-west of Kalgoorlie). At Lake Douglas, the Arid Bronze Azure has been recorded from undulating stony rises supporting *Eucalyptus concinna*. While the species has not been recorded in the Lake Douglas area since 1993, it has the potential to persist in the wider area.

Surveying for the Arid Bronze Azure Butterfly and its associated ant, *Camponotus terrebrans*, did not locate either of these species. Over one night and two days, 100 Eucalypt trees (eg. *E. salubris*, *E. clelandii*, and *E. salmonophloia*) were inspected throughout the Bonnievale project area. The distinctive pale form of *Camponotus terrebrans* was not located, however, numerous ants were observed from a range of species. Notably, *Camponotus nigriceps*, *Camponotus gibbinotus* and *Crematogaster laeviceps chasei* were recorded from a range of trees. As the Arid Bronze Azure Butterfly is not known to occur in the area, and the Bonnievale area differs to the habitat observed at Lake Douglas (which is dominated by *E. concinna*), combined with the survey results (failing to record *C. terrebrans*), the Arid Bronze Azure is considered unlikely to occur within the Bonnievale Project Area.

The Inland Hairstreak is also only known from the Lake Douglas area associated with *Acacia tetragonophylla* and *Senna nemophila* (Braby, 2004). The freshwater shrimp *Branchinella denticulate* is only known from Gidgi Lake, 16km north of Kalgoorlie. The genus *Branchinella* encompasses a number of DPaW Priority listed species present in the region, restricted to salt lakes. It is unlikely to occur within the survey area.

Additionally, the Tree-stem Trapdoor Spider, *Aganippe castellum*, is listed as Priority 4 by DPaW. This species occurs on the mid to lower slopes of rocky ridges and the adjacent plains, where it builds a distinctive burrow against Eucalypts, Broom bush, Sheoaks and other shrubs (BCE database). The nearest records to Coolgardie come

from Koolyanobbing Range and Bungalbin Hill (over 150 km west of Kalgoorlie, DPaW, 2015 and J Turpin records), where the Tree-stem Trapdoor Spider appears to be widespread along the slopes of hills in the region. This species is not known from the Coolgardie area and no burrows were recorded during surveying.

5.7 EPBC Listed Fauna

When developments propose to undertake an action that has, will have or is likely to have a significant impact on a species listed under the EPBC Act (such as the Malleefowl) the proposed development is required to be referred to the Australian Government Department of the Environment. The Federal Environment Minister determines whether assessment is required under the EPBC Act (DOTE 2013). Guidelines for a referral involving EPBC listed species (Guidelines 1.1 EPBC Act) have been prepared (DOTE, 2013).

The Department of the Environment lists a significant impact as:
“an impact which is important, notable, or of consequence, having regard to its context or intensity” (DOTE, 2013).

Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts (DOTE, 2013). A significant impact is “likely” if the impact on the environment is a real (or not remote) chance or possibility. An action will require federal approval if the action has, will have, or is likely to have a significant impact on a species listed under the EPBC Act.

Critically Endangered and Endangered Species

An action is likely to have a significant impact on a Critically Endangered or Endangered species if there is a real chance or possibility that it will:

-) Reduce the area of occupancy of the species;
-) Lead to a long-term decrease in the size of a population;
-) Fragment an existing population into two or more populations;
-) Adversely affect habitat critical to the survival of a species;
-) Disrupt the breeding cycle of a population;
-) Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
-) Result in invasive species (that are harmful to a listed species) becoming established in the listed species habitat;
-) Introduce disease that may cause the species to decline; and/or
-) Interfere with the recovery of the species (DOTE, 2013).

No species listed as critically endangered or endangered were recorded or are expected to occur within the survey area.

Vulnerable Species

The same process applies for Vulnerable listed taxa however applies to important populations, rather than the species as a whole. An “important population” is a population that is necessary for a species long-term survival and recovery (DOTE, 2013). This may include populations identified as such in recovery plans, and/or that are:

-) Key source populations either for breeding or dispersal;
-) Populations that are necessary for maintaining genetic diversity; and/or
-) Populations that are near the limit of the species range (DOTE, 2013).

One species listed as Vulnerable, the Malleefowl, occurs in the local area and is discussed below.

Malleefowl Assessment

As the Malleefowl is a Matter of National Environmental Significance (Vulnerable under the EPBC Act), measures should include reducing or avoiding impacts to a local population. Under the Department of the Environment's Matters of National Significance – Significant Impact Guidelines, an action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of an important population of a species
- reduce the area of occupancy of an important population
- fragment an existing important population into two or more populations
- adversely affect habitat critical to the survival of a species
- disrupt the breeding cycle of an important population
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
- introduce disease that may cause the species to decline, or
- interfere substantially with the recovery of the species.

A Malleefowl population occurs in the local Bonnievale area, with one old mound recorded within the survey area, six mounds recorded nearby and the species observed foraging approximately 400m south of the survey area. As the species can move over several kilometres (Benshemesh, 1992), is known to breed in adjacent areas and Malleefowl can re-use old mounds (J. Benshemesh, pers. com.) there is the potential for the species to move through the Bonnievale area.

The Malleefowl mound recorded within the survey area was old and abandoned. Due to extensive erosion, vegetative regrowth and the degradation of surrounding habitats, the mound appears to have little conservation value. It is however, indicative of a formerly, more widespread population. The Bonnievale project area is comprised mostly of open Eucalypt Woodland and degraded areas associated with historical mining activities. The presence of the mound reveals the project area formerly supported a breeding population of Malleefowl, however the species does not currently breed in the area; and due to a lack of suitable habitat, most of the

project area remains unsuitable for breeding. Small areas of potentially suitable habitat (densely vegetated *Acacia quadrimarginea* and *A. burkittii* shrublands and Eucalypt Woodlands) occur on the southern margins of the project area (see Figure 2).

The Malleefowl does however, occur in stony habitats associated with Emu Hill (directly to the south of the project area - six mounds recorded and one bird observed, Figure 2) where it is likely to breed in the area. While no active mounds were recorded, several mounds in varying states of age and decay were noted within the area searched, which covered only a small proportion of the available habitat. Large areas of suitable habitat (Eucalypt Woodland with a dense understorey and dense Acacia shrublands) occur on the undulating slopes and gullies of Emu Hill and its surrounds (see Figure 2). As such, while the Malleefowl is unlikely to breed within the survey area, a breeding population is likely to occur in adjacent habitats and the species is likely to be an occasional foraging visitor to the Bonnievale project area.

While the development of the project is unlikely to result in a significant impact to the local population using the criteria listed above (EPBC Significant Impacts Guidelines), as the species is of conservation significance, efforts should be made to minimise impacts to the local population. This includes avoiding disturbance to breeding sites (mounds) as old mounds have the potential to be re-used. The assessment of Malleefowl with regard to the EPBC Significant Impact Criteria are summarised below (Table 11, see Figure 2).

Table 11: Malleefowl Impact Assessment

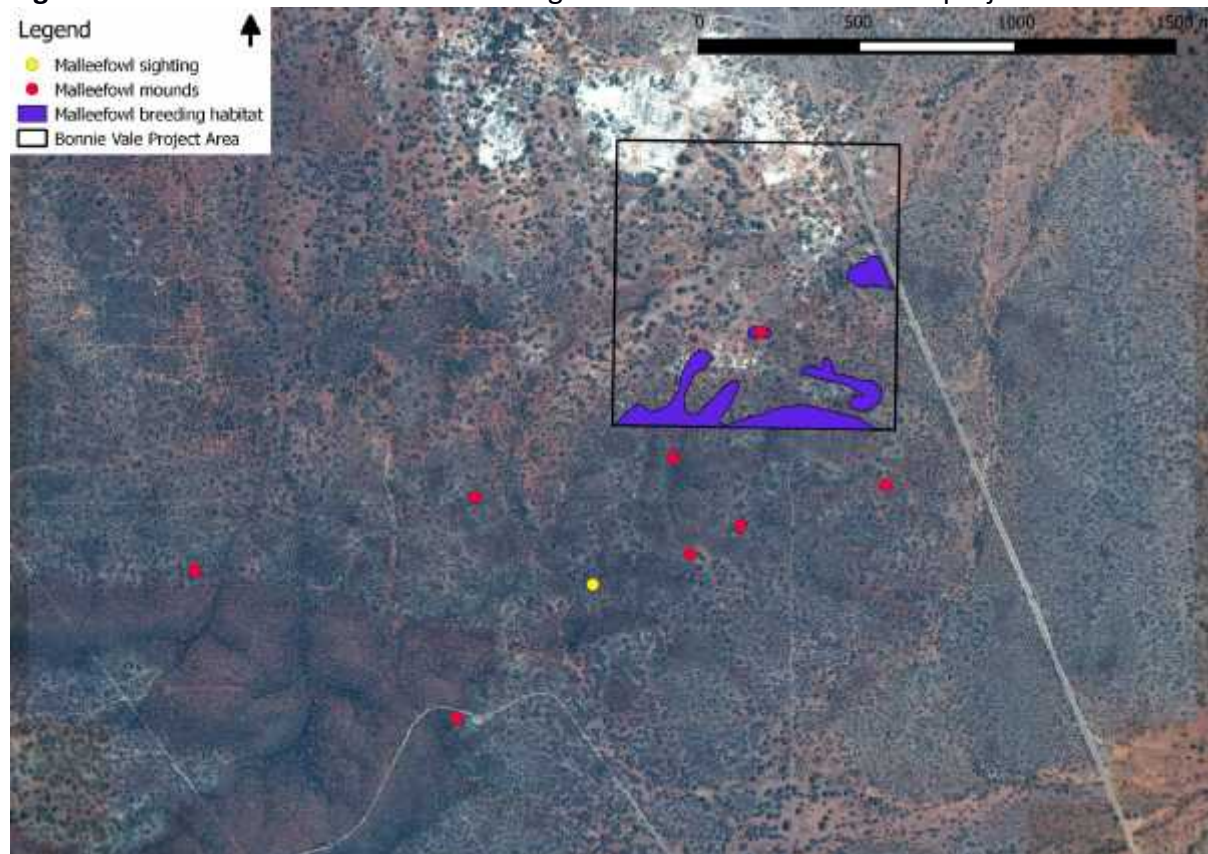
EPBC Criteria	Comment
Lead to a long-term decrease in the size of an important population of a species	The home ranges of individual Malleefowl can vary in size from 0.5 to 4.6 km ² , however can overlap considerably and so an overall breeding density of 1.1 pairs per square kilometre has been recorded (Benshemesh 1992; Booth 1987). The extent of suitable habitat within the survey area is less than 20 ha (see Figure 2) and therefore the survey area (and particularly proposed disturbance areas) may at most, form a component of a pairs foraging range. Therefore, the development of the project is unlikely to lead to a long-term decrease in the size of an important population of a species.
Reduce the area of occupancy of an important population	The home ranges of individual Malleefowl can vary in size from 0.5 to 4.6 km ² , however can overlap considerably and so an overall breeding density of 1.1 pairs per square kilometre has been recorded (Benshemesh 1992; Booth 1987). The extent of available habitat within the survey area is less than 20 ha and therefore the survey area (and particularly proposed disturbance areas) may at most, form a component of a pairs foraging range. Therefore, the development of the project is unlikely to reduce the area of occupancy of an important population.
Fragment an existing important population into two or more populations	The survey area lies on the margins of Malleefowl habitat. It is unlikely to fragment the local population.
Adversely affect habitat critical to the survival of a species	Habitat critical to the survival of the Malleefowl includes breeding sites (mounds). One Malleefowl mound was recorded within the survey area however was abandoned and highly eroded. More recently used mounds were recorded to the south of the project area. Some Malleefowl pairs have been recorded using the same mound for up to nine years while others relocate seasonally between a cluster of two, three or four mounds (Priddel and Wheeler, 2003). As such disturbances to mounds should be avoided.

EPBC Criteria	Comment
Disrupt the breeding cycle of an important population	Some Malleefowl pairs have been recorded using the same mound for up to nine years while others relocate seasonally between a cluster of two, three or four mounds (Priddel and Wheeler, 2003). No active mounds were recorded and most mounds observed had not been used for several years. No mounds of significance were recorded within the project area however some important mounds were recorded outside the project area on the slopes of Emu Hill. If disturbances to Malleefowl mounds can be avoided, the development is unlikely to disrupt the breeding cycle of the local population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The home ranges of individual Malleefowl can vary in size from 0.5 to 4.6 km ² , however can overlap considerably and so an overall breeding density of 1.1 pairs per square kilometre has been recorded (Benshemesh 1992; Booth 1987). The extent of available habitat within the survey area is less than 20 ha and therefore the survey area (and particularly proposed disturbance areas) may at most, form a component of a pairs foraging range. Additionally, much of the project area has suffered some degradation from previous mining and clearing activities. Therefore, the development of the project is unlikely to decrease the availability or quality of habitat to the extent that the species (local population) is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The Malleefowl is vulnerable to predation by feral cats and foxes and chick mortality is high. The species is also vulnerable to land degradation and competition by feral goats and rabbits. However due to the sites location and the presence of existing threats, the development of the project is unlikely to increase such threatening processes beyond that currently present.
Introduce disease that may cause the species to decline, or	Considered unlikely.
Interfere substantially with the recovery of the species.	In the greater area, most Malleefowl records are of old, inactive mounds indicating a potential population decline and that the species occurs in low densities. An extant population has been recorded in adjacent habitats and disturbances to these areas are likely to require management. However, as the project area supports minimal Malleefowl habitat, the development of the project is unlikely to interfere substantially with the recovery of the species.

The Malleefowl may forage widely and could be an occasional visitor to the lease area (as it is known from nearby areas) and as a result disturbances to all old mounds should be avoided where possible. Management strategies are recommended below to reduce the potential impacts of the project on the Malleefowl and other significant fauna species:

- J Avoid disturbance to Malleefowl mounds;
- J Avoid disturbance to Malleefowl habitat - disturbances to the dense shrublands associated with greenstone hills should be avoided where possible;
- J Conduct a pre-clearance assessment prior to the clearance of Malleefowl habitat.
- J Manage traffic to minimise the potential for roadkill; and
- J Monitor Malleefowl population if present.

Figure 2. Malleefowl records and breeding habitat from the Bonnievale project area.



Note: breeding habitat is dense Acacia shrublands on the lower footslopes of Emu Hill.

Migratory Species

A similar process applies to EPBC listed Migratory species. An area of “important habitat” for a listed migratory species is:

- habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species; and/or
- habitat that is of critical importance to the species at particular life-cycle stages; and/or
- habitat utilised by a migratory species which is at the limit of the species range; and/or
- habitat within an area where the species is declining.

The survey area is not expected to contain ecologically significant numbers of listed Migratory species due to a lack of suitable habitat.

EPBC Summary

Actions considered to be at “low risk” of significant impact include those which avoid habitat removal, adopt and implement best practice mitigation and have a management plan in place to monitor significant populations (DOTE, 2013). To minimise impacts on the EPBC listed fauna, disturbances to significant fauna habitats including dense Acacia shrublands should be minimised and avoided where possible.

6. SUMMARY OF FAUNA VALUES

Fauna values within the Bonnievale project area include:

-) Fauna assemblage characteristics – those species recorded and expected to occur;
-) Species of conservation significance – those species listed under legislation or considered threatened or significant;
-) Fauna habitats – the significance of habitats present, particularly those that are rare, unusual and/or support significant fauna; and
-) Sites of significance - Refuge areas, refugia, important breeding areas.

A summary of the fauna values of the Bonnievale Project Area is detailed below.

Fauna assemblage

Terratree recorded 62 fauna species within the survey area. The assemblage expected is relatively intact, despite some previous disturbance and selective logging previously undertaken within the local area.

Species of conservation significance

A total of 24 species of conservation significance are expected to be present at least occasionally within the project area. The Malleefowl and three locally significant bird species were recorded during the field survey. The project area also has the potential to support populations of the Peregrine Falcon, Rainbow Bee-eater, Carpet Python, Shy Heathwren, Central Long-eared Bat and several locally significant bird species. Additional conservation significant fauna species are expected, however only as irregular visitors or vagrants (e.g. Western Rosella, Major Mitchell's Cockatoo, Chuditch).

The Malleefowl is of particular significance as it has a restricted range in the Coolgardie region (DPaW, 2017) and is declining (most Malleefowl records are of old, inactive mounds). As such, remaining populations are of high significance. The species was observed approximately 400m south of the survey area and several mounds were recorded on the stony lower slopes of Emu Hill. Several locally significant bird species occur or are likely to occur within the survey area. The Western Yellow Robin, Gilbert's Whistler and Chestnut Quail Thrush were recorded.

Significant Fauna Habitats

The densely-vegetated gullies associated with the lower slopes of Emu Hill support a significant and restricted fauna assemblage, including the Malleefowl and some locally significant birds. While most of the project area appears to have been historically logged, some large hollow-bearing trees are present and important for some fauna (containing breeding / roosting sites for parrots, bats, treecreepers, carpet python). Areas of dense vegetation are likely to be important for some birds such as the Shy Heathwren and Western Yellow-robin.

Sites of Significance

One old abandoned Malleefowl mound was recorded within the project area and seven mounds were recorded to the south, on the lower slopes of Emu Hill.

The survey area contains habitats that are widespread and extensive in the region. Large areas have also suffered from previous disturbance (clearing, logging and mining). Of the fauna habitats present at Bonnievale, the gullies within Emu Hill are significant but lie mostly outside the areas of proposed development. The Eucalypt Woodland is an area of high species richness and abundance, but the vertebrate assemblage does not appear unique or to contain species not found elsewhere in the area. Large, hollow-bearing Eucalypt trees occur, support conservation significant fauna and contain breeding or roosting sites (tree hollows) for a range of fauna. The lower slopes of Emu Hill contain several Malleefowl mounds.

Overall, impacts of the development and operation of the project upon the fauna assemblage are anticipated to be low. This is due to the site's location and constituents (contains some level of previous disturbance and mostly widespread fauna habitats). However, of particular significance may be impacts to the gullies within Emu Hill and mature Eucalypt trees. Management measures are listed in Table 12 and expanded on below.

Potential impacts to the federally listed Malleefowl are not expected to be significant under the EPBC Significant Impact criteria. However, as the species occurs in low densities in areas adjacent to the Bonnievale Project, and as the species forages widely, if additional areas are proposed to be developed then impacts to the local Malleefowl populations may require consideration. The Malleefowl may also be susceptible to roadkill.

Management strategies recommended to reduce potential impacts of the development to significant fauna species during development and operation include:

- J Avoid disturbance to Malleefowl mounds;
- J Report any sightings of Malleefowl.
- J Avoid disturbance to the dense shrublands within the gullies associated with Emu Hill;
- J Avoid disturbance to large mature, hollow bearing Eucalypt trees;
- J Limit disturbance footprint to minimise the cumulative clearing of the regionally significant Great Western Woodlands.

Table 12: Summary of potential impacts upon key fauna values

Fauna Value	Nature and Significance of Impacts		Recommended Action
	Potential Impacts	Significance	
Fauna assemblage	<ul style="list-style-type: none">) Increased mortality;) Loss of habitat; and) Fauna interaction 	Minor as impacts very localised in a regional context	<ul style="list-style-type: none">) Minimise impact footprint;) Conserve hollow-bearing trees
Fauna Habitats	Loss and degradation of habitat	<p>Most habitats are widespread in the region and some areas degraded.</p> <p>The small area of impact in relation to the surrounding landscape means that the loss of habitat associated with the project's development is unlikely to have long-term impacts upon fauna populations (in the region) and fragmentation is anticipated to be minimal.</p>	<ul style="list-style-type: none">) Minimise footprint;) Minimise disturbance to gullies within Emu Hill and mature Eucalypt trees
Significant fauna (especially Malleefowl)	<ul style="list-style-type: none">) Ongoing mortality;) Loss of habitat; and) Fauna interactions. 	Minor as impacts localised but consideration needed for Malleefowl if additional areas are to be disturbed.	<ul style="list-style-type: none">) Avoid disturbance to Malleefowl mounds;) Habitat preservation – retain / manage important areas;) Retain mature, hollow-bearing trees
Sites of Significance	Loss of habitat.	Minor providing disturbances to Malleefowl mounds outside project area are avoided.	<ul style="list-style-type: none">) Avoid disturbance to Malleefowl mounds

REFERENCES and BIBLIOGRAPHY

- Bamford Consulting Ecologists (2012). Fauna Assessment of the South Kalgoorlie Infrastructure Corridor. Unpublished report for Alacer Gold Corporation.
- Bamford Consulting Ecologists (2015). Cannon Project 2015 Fauna Assessment. Unpublished report for Metals X Limited.
- Bamford Consulting Ecologists (2016). Gunga West Project 2016 Fauna Assessment. Unpublished report for Metals X Limited.
- Barrett, G., Silcocks, A., Barry, S., Cunningham, R. and Poulter, R. (2003). *The new atlas of Australian birds*. Melbourne: Birds Australia.
- Beard, J.S. (1972). The Vegetation of the Kalgoorlie Area, Western Australia. 1:250,000 map and explanatory memoir, Vegmap Publications, Western Australia.
- Benshemesh, J. (2000). National Recovery Plan for Malleefowl. Department of Environment Water Heritage and the Arts.
- BirdLife Australia (2017). Birds Australia Database. www.birdsaustralia.com.au (accessed April 2017).
- Churchill, S. (2008). *Australian Bats*. Reed New Holland Press, Sydney.
- Cowan, M. (2001) Coolgardie 3 (COO3 – Eastern Goldfields subregion). In “A Biodiversity Audit of Western Australia”, Available from the Department of Environment and Conservation at:
<http://www.naturebase.net/content/view/960/1397/>
- Department of the Environment (2014). Key Threatening Processes. Department of Environment and Conservation (2009). Fauna Notes 24 – Western Rosella. Department of Environment and Conservation.
<http://www.environment.gov.au/cgi-bin/sprat/public/publicgetkeythreats.pl> (accessed May 2014).
- Department of Environmental Protection - DotE (2000). Bush Forever Volume 2. Government of Western Australia, Perth.
- Department of the Environment - DotE (2017). Protected Matters Database Search Tool.
- Department of Parks and Wildlife, Western Australia (DPaW) (2017). NatureMap Database. <http://naturemap.dec.wa.gov.au/default.aspx> (accessed April 2017).
- Department of Sustainability, Environment, Water, Population and Communities (2012b). Threatened Species Profiles. Available at:
http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=66699
- Department of Sustainability, Environment, Water, Population and Communities (2011). Key threatening processes under the EPBC Act.
<http://www.environment.gov.au/cgi-bin/sprat/public/publicgetkeythreats.pl>

- Doughty, P., Ellis, R.J. & Bray, R. (2016a). Checklist of the Amphibians of Western Australia. Department of Terrestrial Zoology, Western Australian Museum, Welshpool, Western Australia.
- Doughty, P., Ellis, R.J. & Bray, R. (2016b). Checklist of the Reptiles of Western Australia. Department of Terrestrial Zoology, Western Australian Museum, Welshpool, Western Australia.
- DSEWPac. (2012a). Interim Biogeographic Regionalisation for Australia, Version 7. Map produced by ERIN for the National Reserve Systems Section, Australian Government Department of Sustainability, Environment, Water, Population and Communities, Canberra, May 2012.
- Duncan, S, Traill, B. J. & Watson, C. (2006). Vertebrate fauna of the Honman Ridge-Bremer Range district, Great Western Woodlands, Western Australia. Unpublished report. West Perth: The Wilderness Society.
- Environmental Protection Authority (EPA). (2002). Terrestrial Biological surveys as an Element of Biodiversity Protection. Position Statement No. 3. Environmental Protection Authority, Perth, Western Australia.
- Environmental Protection Authority (EPA). (2004). Guidance for the assessment of environmental factors: Terrestrial fauna surveys for environmental impact assessment in Western Australia. No. 56. Environmental Protection Authority, Perth, Western Australia.
- Environmental Protection Authority and Department of Environment and Conservation (2010) Technical Guide - Terrestrial Vertebrate Fauna surveys for Environmental Impact Assessment (eds B.M. Hyder, J. Dell and M.A. Cowan). Perth, Western Australia.
- Gamblin T., Williams M.R. and Williams A.A.E. (2010). The ant, the butterfly, the leafhopper and the bulldozer. *Landscape* 25(3):54-58.
- Garnett, S. and Crowley, G. (2000). The Action Plan for Australian Birds. Environment Australia and the Royal Australasian Ornithologists Union.
- Garnett, S., Szabo, J. and Dutson, G. (2011). *The Action Plan for Australian Birds 2010*.CSIRO Publishing.
- Harrington, R. (2002). The effects of artificial watering points on the distribution and abundance of avifauna in an arid and semi-arid mallee environment. PhD thesis, Department of Zoology, The University of Melbourne.
- Harvey, M. (2002). Short-range Endemism amongst the Australian fauna: examples from non-marine environments. *Invertebrate Systematics*, 16: 555-570.
- How, R. A., Cooper, N. K. and Bannister, J. L. (2009). Checklist of the Mammals of Western Australia. Department of Terrestrial Zoology, Western Australian Museum, Welshpool, Western Australia.
- Johnstone, R. E. and Darnell, J.C. (2016). Checklist of the Birds of Western Australia. Department of Terrestrial Zoology, Western Australian Museum, Welshpool, Western Australia.
- Johnstone, R.E. and Storr, G.M. (1998). Handbook of Western Australian Birds Vol 1 – Non-passerines (Emu to Dollarbird). Western Australian Museum, Perth.

- Johnstone, R.E. and Storr, G.M. (2004). *Handbook of Western Australian Birds*. Vol 2: Passerines (Blue-winged Pitta to Goldfinch). Western Australian Museum, Perth.
- Mace, G. and Stuart, S. (1994). Draft IUCN Red List Categories, Version 2.2. Species; Newsletter of the Species Survival Commission. IUCN - The World Conservation Union. No. 21-22: 13-24.
- Malleefowl Preservation Group (2013). Malleefowl Species Profile. <http://www.malleefowl.com.au>.
- Menkhorst, P. and Knight, F. (2004). *A Field Guide to the Mammals of Australia*. Oxford University Press, Melbourne.
- Priddel, D. & R. Wheeler (2003). Nesting activity and demography of an isolated population of Malleefowl, *Leipoa ocellata*. *Wildlife Research*. 30:451-464.
- Saunders, D. and Ingram, J. (1995). *Birds of south-western Australia. An atlas of changes in distribution and abundance of the wheatbelt fauna*. Surrey Beatty, Sydney.
- Soule, M. E., Mackey, B. G., Recher, H. F., Williams, J. E., Woinarski, J. C. Z., Driscoll, D., Dennison, W. C. and Jones, M. E. (2004). The role of connectivity in Australian conservation. *Pacific Conservation Biology* 10: 266-279.
- Storr, G.M., Smith, L.A. and Johnstone, R.E. (1983). *Lizards of Western Australia*. II. Dragons and Monitors. W.A. Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone, R.E. (1990). *Lizards of Western Australia*. III. Geckoes and Pygopodids. W.A. Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone, R.E. (1999). *Lizards of Western Australia*. I. Skinks. Revised Edition. W.A. Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone, R.E. (2002). *Snakes of Western Australia*. W.A. Museum, Perth.
- Thackway, R. and Cresswell, I.D. (1995). *An Interim Biogeographic Regionalisation for Australia: A framework for establishing the national system of reserves, Version 4.0*. Australian Nature Conservation Agency, Canberra.
- Travouillon, K. (2016). *Checklist of the Mammals of Western Australia*. Department of Terrestrial Zoology, Western Australian Museum, Welshpool, Western Australia.
- Tyler, M.J., Smith, L.A. and Johnstone, R.E. (2000). *Frogs of Western Australia*. W.A. Museum, Perth.
- Van Dyck, S. and Strahan, R. (Eds.) (2008). *Mammals of Australia*. 3rd Edition. Australian Museum, Sydney.
- Watson, A., Judd, S., Watson, J., Lam, A., and MacKenzie, D. (2008). *The Extraordinary Nature of the Great Western Woodlands*. The Wilderness Society. Available at: <http://www.wilderness.org.au/files/the-great-western-woodlands-report.pdf>
- Western Australian Museum - WAM (2016) *Checklists of the Fauna of Western Australia*. Unpublished checklist. Western Australian Museum, Perth.
- Wilson, S. and Swan, G. (2013). *A Complete Guide to Reptiles of Australia*. Fourth edition. New Holland Publishers (Australia), Sydney.

Appendix 1. Categories used in the assessment of conservation status.

IUCN categories (based on review by Mace and Stuart 1994) as used for the *Environment Protection and Biodiversity Conservation Act 1999* and the *Western Australian Wildlife Conservation Act 1950*.

Extinct	Taxa not definitely located in the wild during the past 50 years.
Extinct in the Wild (Ex)	Taxa known to survive only in captivity.
Critically Endangered (CR)	Taxa facing an extremely high risk of extinction in the wild in the immediate future.
Endangered (E)	Taxa facing a very high risk of extinction in the wild in the near future.
Vulnerable (V)	Taxa facing a high risk of extinction in the wild in the medium-term future.
Near Threatened	Taxa that risk becoming Vulnerable in the wild.
Conservation Dependent	Taxa whose survival depends upon ongoing conservation measures. Without these measures, a conservation dependent taxon would be classed as Vulnerable or more severely threatened.
Data Deficient (Insufficiently Known)	Taxa suspected of being Rare, Vulnerable or Endangered, but whose true status cannot be determined without more information.
Least Concern.	Taxa that are not Threatened.

Schedules used in the *WA Wildlife Conservation Act 1950*

Schedule 1 (S1)	Critically Endangered fauna.
Schedule 2 (S2)	Endangered fauna
Schedule 3 (S3)	Vulnerable Migratory species listed under international treaties.
Schedule 4 (S4)	Presumed extinct fauna
Schedule 5 (S5)	Migratory birds under international agreement
Schedule 6 (S6)	Conservation dependant fauna
Schedule 7 (S7)	Other specially protected fauna

WA Department of Environment and Conservation Priority species (species not listed under the *Wildlife Conservation Act 1950*, but for which there is some concern).

Priority 1 (P1)	Taxa with few, poorly known populations on threatened lands.
Priority 2 (P2)	Taxa with few, poorly known populations on conservation lands; or taxa with several, poorly known populations not on conservation lands.
Priority 3 (P3)	Taxa with several, poorly known populations, some on conservation lands.
Priority 4. (P4)	Taxa in need of monitoring. Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change.
Priority 5 (P5)	Taxa in need of monitoring. Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years (IUCN Conservation Dependent).

Appendix 2. Fauna expected to occur in the survey area (Table 2.1 to Table 2.4).

These lists are derived from the results of database and literature searches and from previous field surveys conducted in the Coolgardie - Kalgoorlie region. These are:

-) Species listed under fauna databases – DPaW Threatened Species Database (DPaW, 2017a), NatureMap (DPaW, 2017b), Birddata (BirdLife Australia, 2017), Atlas of Living Australia (ALA, 2017) or EPBC Protected Matters Search (DotE, 2017), or from the literature;
-) Local records (KEC database) and fauna recorded by J Turpin during previous fauna assessments in the local area including at:
 - Metals X Gunga West Project (7km south-west of Bonnievale) listed under “G”;
 - Alacer Gold Shirl Project (13km south-east of Bonnievale) listed under ‘S’;
 - Mt Marion (34km south-east of Bonnievale) listed as “Mt Ma” (2012) or “Mt Ma2” (2016);
 - Alacer Gold South Kalgoorlie powerline (30km east of Bonnievale) listed under “P”;
 - Alacer Gold South Kalgoorlie operations (45km south-east of Bonnievale) listed under “TSF”;
 - Alacer Gold Mount Martin Project (50km south-east of Bonnievale) listed under “Mt Mt”;
 - Metals X Cannon Project (57km east of Bonnievale) listed under “C”;
 - Excelsior Gold Bardoc Project (58km north-east of Bonnievale).
 - Red Hill, Kambalda (60km south-east of Bonnievale) listed under “K”;
 - Goldfields St Ives Operations, Lake Lefroy (60km south-east of Bonnievale) listed under “Si”;
-) Species recorded during the current survey at Bonnievale (listed under “Bonnie”);
-) Note conservation significant fauna are listed under CS; species listed as “R” were recorded outside the survey area but in the nearby region during surveying and species listed as “C” were recorded in Coolgardie.

Table 2.1. Frog species expected to occur in the survey area.

FROGS		CS	SI	B	TSF	Mt Ma	Mt Ma2	Mt Mt	P	S	C	K	G	Bonnie
Myobatrachidae														
Kunapalri Frog	<i>Neobatrachus kunapalari</i>		X	X			X							
Humming Frog	<i>Neobatrachus pelobatooides</i>													
Shoemaker Frog	<i>Neobatrachus sutor</i>													

FROGS		CS	SI	B	TSF	Mt Ma	Mt Ma2	Mt Mt	P	S	C	K	G	Bonnie
Goldfields Bull Frog	<i>Neobatrachus wilsmorei</i>													
Western Toadlet	<i>Pseudophryne occidentalis</i>		X	X										
Total Number of Species Expected: 5			2	2	0	0	1	0	0	0	0	0	0	0

Table 2.2. Reptile species recorded or expected to occur in the survey area.

REPTILES		CS	SI	B	TSF	Mt Ma	Mt Ma2	Mt Mt	P	S	C	K	G	Bonnie
AGAMIDAE														
Mulga Dragon	<i>Caimanops amphiboluroides</i>													
Crested Dragon	<i>Ctenophorus cristatus</i>	X		X	X	X	X	X	X	X		X		
Mallee Dragon	<i>Ctenophorus fordii</i>	X												
Western Netted Dragon	<i>Ctenophorus reticulatus</i>	X							X					X
Claypan Dragon	<i>Ctenophorus salinarum</i>	X										X		
Lozenge-marked Dragon	<i>Ctenophorus scutulatus</i>	X	X											
Thorny Devil	<i>Moloch horridus</i>	X										X		
Bearded Dragon	<i>Pogona minor</i>	X												
Pebble Dragon	<i>Tympanocryptis cephalus</i>	X									X			
DIPLODACTYLIDAE														
Clawless Gecko	<i>Crenadactylus ocellatus</i>	X												
Western Stone Gecko	<i>Diplodactylus granariensis</i>	X					X					X		
Beautiful Gecko	<i>Diplodactylus pulcher</i>	X										X		
Main's Ground Gecko	<i>Lucasium maini</i>	X										X		
Beaded Gecko	<i>Lucasium damaeum</i>													
Reticulated Velvet Gecko	<i>Hesperoedura reticulata</i>	X					X							
Beaked Gecko	<i>Rhynchoedura ornata</i>						X							
Thorn-tailed Gecko	<i>Strophurus assimilis</i>	X												
Jewelled Gecko	<i>Strophurus elderi</i>	X												
Ring-tailed Gecko	<i>Strophurus strophurus</i>													
CARPHODACTYLIDAE														
Pale Knob-tailed Gecko	<i>Nephrurus laevissimus</i>	X												
Barking Gecko	<i>Nephrurus milii</i>	X	X			X	X					X		
Midline Knob-tail	<i>Nephrurus vertebralis</i>													
GEKKONIDAE														
Marbled Gecko	<i>Christinus marmoratus</i>	X												
Purplish Dtella	<i>Gehyra purpurascens</i>	X												
Tree Dtella	<i>Gehyra variegata</i>	X				X	X			X		X	X	
Bynoe's Gecko	<i>Heteronotia binoei</i>	X	X				X	X	X	X		X		X
PYGOPODIDAE														

REPTILES		CS	SI	B	TSF	Mt Ma	Mt Ma2	Mt Mt	P	S	C	K	G	Bonnie
Marble-faced Delma	<i>Delma australis</i>		X											
Unbanded Dema	<i>Delma butleri</i>		X											
Fraser's Delma	<i>Delma fraseri</i>		X											
Burton's Legless-Lizard	<i>Lialis burtonis</i>		X											
Common Scaly-foot	<i>Pygopus lepidopodus</i>		X											
Western Scaly-foot	<i>Pygopus nigriceps</i>													
SCINCIDAE														
A skink	<i>Cryptoblepharus australis</i>													
A skink	<i>Cryptoblepharus buehannii</i>		X											
Southern Mallee Skink	<i>Ctenotus atlas</i>		X											
Leonhardi's Ctenotus	<i>Ctenotus leonhardii</i>		X											
Barred Wedge-snouted Ctenotus	<i>Ctenotus schomburgkii</i>		X											
Rock Ctenotus	<i>Ctenotus severus</i>													
Spotted Ctenotus	<i>Ctenotus uber</i>		X						X					X
Spinifex Slender Blue-tongue	<i>Cyclodomorphus melanops</i>		X											
Pygmy Spiny-tailed Skink	<i>Egernia depressa</i>			X				X	X					X
Goldfields Crevice Skink	<i>Egernia formosa</i>		X	X	X		X			X				
Desert Skink	<i>Egernia inornata</i>		X											
Woodland Crevice Skink	<i>Egernia richardi</i>													
Night Skink	<i>Egernia striata</i>													
Broad-banded Sandswimmer	<i>Eremiascincus richardsonii</i>		X											
Southern Five-toed Mulch Skink	<i>Hemiernis initialis</i>		X											
Four-toed Mulch Skink	<i>Hemiernis peronii</i>													
South-west Four-toed Lerista	<i>Lerista distinguenda</i>		X											
King's Lerista	<i>Lerista kingi</i>													
Goldfields Robust Lerista	<i>Lerista picturata</i>		X											
Common Mulch Lerista	<i>Lerista timda</i>													
Bull-headed Skink	<i>Liopholis multiscutata</i>		X											
Common Dwarf Skink	<i>Menetia greyii</i>		X											
Saltbush Flecked Skink	<i>Morethia adelaidensis</i>		X											
Woodland Dark Fleck Skink	<i>Morethia butleri</i>		X											
Woodland Flecked Skink	<i>Morethia obscura</i>		X											
Western Blue-tongue	<i>Tiliqua occipitalis</i>		X											
Bobtail	<i>Tiliqua rugosa</i>		X			X		X		X	X	X	X	X
VARANIDAE														
Pygmy Mulga Monitor	<i>Varanus caudolineatus</i>													
Sand Monitor	<i>Varanus gouldii</i>		X	X	X	X	X	X	X	X	X	X		
Racehorse Monitor	<i>Varanus tristis tristis</i>							X						
TYPHLOPIDAE														

REPTILES		CS	SI	B	TSF	Mt Ma	Mt Ma2	Mt Mt	P	S	C	K	G	Bonnie
Southern Blind Snake	<i>Anilius australis</i>		X											
Dark-spined Blind Snake	<i>Anilius bicolor</i>		X											
Prong-snouted Blind Snake	<i>Anilius bituberculatus</i>		X											
Hook-Snouted Blind Snake	<i>Anilius hamatus</i>													
Common Beaked Blind Snake	<i>Anilius waitii</i>													
BOIDAE														
Stimson's Python	<i>Antaresia stimsoni</i>													
Carpet Python	<i>Morelia spilota imbricata</i>	1	X											
ELAPIDAE														
Desert Death Adder	<i>Acanthopis pyrrhus</i>													
Narrow-banded Shovel-nosed Snake	<i>Brachyuropis fasciolata</i>		X											
Southern Shovel-nosed Snake	<i>Brachyuropis semifasciata</i>		X											
Yellow-faced Whipsnake	<i>Demansia psammophis</i>		X											
Bardick	<i>Echiopsis curta</i>													
Moon Snake	<i>Furina ornata</i>													
Black-naped Snake	<i>Neelaps bimaculatus</i>													
Gould's Snake	<i>Parasuta gouldii</i>		X											
Monk Snake	<i>Parasuta monachus</i>		X											
Black-backed Hooded Snake	<i>Parasuta nigriceps</i>													
Mulga Snake	<i>Pseudechis australis</i>		X											
Dugite	<i>Pseudonaja affinis</i>													
Ringed Brown Snake	<i>Pseudonaja modesta</i>		X											
Western Brown Snake	<i>Pseudonaja mengdeni</i>		X									X		
Jan's Banded Snake	<i>Simoselaps bertholdi</i>		X											
Rosen's Snake	<i>Suta fasciata</i>													
Total Number of Species Expected: 85														
Total Recorded during BCE Surveys: 15			59	6	6	3	9	5	3	6	3	12	2	5

Table 2.3. Bird species recorded or expected to occur in the survey area.

Birds		CS	SI	B	TSF	Mt Ma	Mt Ma 2	Mt	P	S	K	G	C	Bonnie
CASUARIIDAE														
<i>Dromaius novaehollandiae</i>	Emu		X	X		X	X		X	X		X	X	X
PHASIANIDAE														
<i>Coturnix pectoralis</i>	Stubble Quail													
MEGAPODIIDAE														
<i>Leipoa ocellata</i>	Malleefowl	1	X				X	X			X	X	X	X
ANATIDAE														
<i>Cygnus atratus</i>	Black Swan									X				
<i>Tadorna tadornoides</i>	Australian Shelduck									X				
<i>Chenonetta jubata</i>	Australian Wood Duck									X				
<i>Anas superciliosa</i>	Pacific Black Duck									X				
<i>Anas rhynchotis</i>	Australasian Shoveler													
<i>Malacorhynchus membranaceus</i>	Pink-eared Duck									X				
<i>Anas gracilis</i>	Grey Teal									X				
<i>Anas castanea</i>	Chestnut Teal													
<i>Aythya australis</i>	Hardhead													
<i>Stictonetta naevosa</i>	Freckled Duck													
<i>Biziura lobata</i>	Musk Duck													
PODICIPEDIDAE														
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe			X	X					X				
<i>Poliiocephalus</i>	Hoary-headed Grebe													
COLUMBIDAE														
<i>Phaps chalcoptera</i>	Common Bronzewing		X	X			X				X	X	X	X
<i>Ocyphaps lophotes</i>	Crested Pigeon		X	X						X	X		X	C
<i>Geopelia cuneata</i>	Diamond Dove				X									
PODARGIDAE														
<i>Podargus strigoides</i>	Tawny Frogmouth			X	X	X	X		X	X		X	X	
EUROSTOPODIDAE														
<i>Eurostopodus argus</i>	Spotted Nightjar						X							
AEGOTHELIDAE														
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar		X			X					X			
APODIDAE														
<i>Apus pacificus</i>	Fork-tailed Swift	1												
ANHINGIDAE														
<i>Microcarbo melanoleucos</i>	Little Pied Cormorant													

Birds		CS	SI	B	TSF	Mt Ma	Mt Ma 2	Mt	P	S	K	G	C	Bonnie
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant													
ARDEIDAE														
<i>Egretta novaehollandiae</i>	White-faced Heron			X						X				C
<i>Ardea pacifica</i>	White-necked Heron													
<i>Ardea modesta</i>	Eastern Great Egret	1												
PLATALEIDAE														
<i>Threskiornis spinicollis</i>	Straw-necked Ibis													
<i>Platalea flavipes</i>	Yellow-billed Spoonbill													
ACCIPITRIDAE														
<i>Elanus axillaris</i>	Black-shouldered Kite													
<i>Lophoictinia isura</i>	Square-tailed Kite	L												
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard													
<i>Haliastur sphenurus</i>	Whistling Kite													
<i>Milvus migrans</i>	Black Kite													
<i>Accipiter fasciatus</i>	Brown Goshawk		X	X									X	
<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk													
<i>Circus assimilis</i>	Spotted Harrier													
<i>Aquila audax</i>	Wedge-tailed Eagle		X	X					X			X	X	X
<i>Hieraaetus morphnoides</i>	Little Eagle										X			
FALCONIDAE														
<i>Falco cenchroides</i>	Nankeen Kestrel			X							X			
<i>Falco berigora</i>	Brown Falcon		X	X	X		X			X	X		X	
<i>Falco longipennis</i>	Australian Hobby													
<i>Falco peregrinus</i>	Peregrine Falcon	1												
RALLIDAE														
<i>Fulica atra</i>	Eurasian Coot													
<i>Rallus philippensis</i>	Buff-banded Rail													
<i>Porzana pusilla</i>	Baillon's Crane													
<i>Porzana tabuensis</i>	Spotless Crane													
<i>Porzana fluminea</i>	Australian Crane									X				
<i>Tribonyx ventralis</i>	Black-tailed Native-hen													
RECURVIROSTRIDAE														
<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet													
<i>Himantopus</i>	Black-winged Stilt									X				
<i>Cladorhynchus leucocephalus</i>	Banded Stilt									X				

Birds		CS	SI	B	TSF	Mt Ma	Mt Ma 2	Mt	P	S	K	G	C	Bonnie
OTIDIDAE														
<i>Ardeotis australis</i>	Australian Bustard	L												
BURHINIDAE														
<i>Burhinus grallarius</i>	Bush Stone-curlew	L												
CHARADRIIDAE														
<i>Charadrius ruficapillus</i>	Red-capped Plover													
<i>Elseynornis melanops</i>	Black-fronted Dotterel				X									
<i>Erythrogonys cinctus</i>	Red-kneed Dotterel													
<i>Thinornis rubricollis</i>	Hooded Plover	2												
<i>Charadrius australis</i>	Inland Dotterel													
<i>Vanellus tricolor</i>	Banded Lapwing													
SCOLOPACIDAE														
<i>Tringa nebularia</i>	Common Greenshank	1												
<i>Tringa glareola</i>	Wood Sandpiper	1												
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	1												
<i>Calidris ferruginea</i>	Curlew Sandpiper	1												
<i>Calidris ruficollis</i>	Red-necked Stint	1												
TURNICIDAE														
<i>Turnix velox</i>	Little Button-quail						R			X				
CACATUIDAE														
<i>Eolophus roseicapillus</i>	Galah										X			
<i>Cacatua sanguinea</i>	Little Corella													
<i>Nymphicus hollandicus</i>	Cockatiel													
<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	1												
PSITTACIDAE														
<i>Glossopsitta porphyrocephala</i>	Purple-crowned Lorikeet	L	X	X		X	X				X	X	X	X
<i>Platycercus icterotis</i>	Western Rosella	1												
<i>Polytelis anthopeplus</i>	Regent Parrot	L	X											
<i>Barnardius zonarius</i>	Australian Ringneck		X	X	X	X	X	X	X	X	X	X	X	X
<i>Psephotus varius</i>	Mulga Parrot		X	X			X					X	X	R
<i>Melopsittacus undulatus</i>	Budgerigar		X								X			
<i>Neophema splendida</i>	Scarlet-chested Parrot	L	X											
CUCULIDAE														
<i>Chalcites basalis</i>	Horsfield's Bronze-Cuckoo		X		X						X		X	
<i>Chalcites osculans</i>	Black-eared Cuckoo						X				X		X	X
<i>Cacomantis pallidus</i>	Pallid Cuckoo													
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo													

Birds		CS	SI	B	TSF	Mt Ma	Mt Ma 2	Mt	P	S	K	G	C	Bonnie
STRIGIDAE														
<i>Ninox novaeseelandiae</i>	Southern Boobook													
TYTONIDAE														
<i>Tyto alba</i>	Eastern Barn Owl													
HALCYONIDAE														
<i>Todiramphus pyrrophygius</i>	Red-backed Kingfisher					X								
<i>Todiramphus sanctus</i>	Sacred Kingfisher				X									
MEROPIDAE														
<i>Merops ornatus</i>	Rainbow Bee-eater	1	X		X	X	X		X	X	X			
CLIMACTERIDAE														
<i>Climacteris affinis</i>	White-browed Treecreeper	L											X	
<i>Climacteris rufa</i>	Rufous Treecreeper	L	X			X	X						X	
MALURIDAE														
<i>Malurus splendens</i>	Splendid Fairy-wren			X				X	X	X			X	X
<i>Malurus leucopterus</i>	White-winged Fairy-wren		X	X				X	X	X	X			
<i>Malurus lamberti</i>	Variegated Fairy-wren													
<i>Malurus pulcherrimus</i>	Blue-breasted Fairy-wren					X	X	X	X	X	X	X		X
ACANTHIZIDAE														
<i>Sericornis frontalis</i>	White-browed Scrubwren													
<i>Hylacola cauta whitlocki</i>	Shy Heathwren	L	X											
<i>Calamanthus campestris</i>	Rufous Fieldwren													
<i>Pyrholaemus brunneus</i>	Redthroat		X	X	X	X	X	X	X	X	X	X	X	X
<i>Smicronis brevirostris</i>	Weebill		X	X	X	X	X	X	X	X	X	X	X	X
<i>Gerygone fusca</i>	Western Gerygone													
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill			X	X		X		X	X	X		X	X
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill		X	X	X	X	X	X	X	X	X	X	X	X
<i>Acanthiza robustirostris</i>	Slaty-backed Thornbill										X			
<i>Acanthiza apicalis</i>	Inland Thornbill		X	X	X	X	X	X	X		X	X	X	X
<i>Acanthiza iredalei</i>	Slender billed Thornbill	L												
<i>Aphelocephala leucopsis</i>	Southern Whiteface												X	
PARDALOTIDAE														
<i>Pardalotus punctatus</i>	Spotted Pardalote					X								X
<i>Pardalotus striatus</i>	Striated Pardalote		X	X	X	X	X	X	X	X	X	X	X	X
MELIPHAGIDAE														
<i>Certhionyx variegatus</i>	Pied Honeyeater													
<i>Lichenostomus virescens</i>	Singing Honeyeater		X	X	X	X		X	X		X	X	X	X

Birds		CS	SI	B	TSF	Mt Ma	Mt Ma 2	Mt	P	S	K	G	C	Bonnie
<i>Lichenostomus leucotis</i>	White-eared Honeyeater			X	X	X	X	X	X	X	X	X	X	X
<i>Lichenostomus cratitius</i>	Purple-gaped Honeyeater	L												
<i>Lichenostomus ornatus</i>	Yellow-plumed Honeyeater	L	X	X	X	X	X	X	X	X	X	X	x	X
<i>Lichenostomus plumulus</i>	Grey-fronted Honeyeater			X										
<i>Purnella albifrons</i>	White-fronted Honeyeater		X	X		X	X	X		X	X		X	X
<i>Manorina flavigula</i>	Yellow-throated Miner		X	X	X	X	X				X		X	X
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater		X	X	X	X	X	X	X	X	X		X	X
<i>Anthochaera carunculata</i>	Red Wattlebird		X	X	X	X	X	X	X	X	X	X	X	X
<i>Epthianura albifrons</i>	White-fronted Cat									X				
<i>Epthianura tricolor</i>	Crimson Chat													
<i>Epthianura aurifrons</i>	Orange Chat													
<i>Sugomel niger</i>	Black Honeyeater													
<i>Lichmera indistincta</i>	Brown Honeyeater		X	X	X	X	X	X	X		X	X	X	X
<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater		X	X	X	X	X	X	X		X	X	X	X
<i>Phylidonyris nigra</i>	White-cheeked Honeyeater													
POMATOSTOMIDAE														
<i>Pomatostomus superciliosus</i>	White-browed Babbler			X	X	X	X	X		X	X	X	X	X
PSOPHODIDAE														
<i>Cinclosoma castanotus</i>	Chestnut Quail-thrush	L			X	X	X	X	X	X	X	X	x	X
NEOSITTIDAE														
<i>Daphoenositta chrysoptera</i>	Varied Sittella		X		X	X	X		X	X	X	X	X	X
CAMPEPHAGIDAE														
<i>Coracina maxima</i>	Ground Cuckoo-shrike													
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike		X	X	X	X	X	X		X	X		X	X
<i>Lalage sueurii</i>	White-winged Triller									X				
PACHYCEPHALIDAE														
<i>Pachycephala inornata</i>	Gilbert's Whistler	L		X	X	X	X			X	X		X	X
<i>Pachycephala rufiventris</i>	Rufous Whistler			X			X	X	X		X	X	X	X
<i>Pachycephala pectoralis</i>	Golden Whistler	L					X							R
<i>Colluricincla harmonica</i>	Grey Shrike-thrush		X	X	X	X	X		X	X	X	X	X	X
<i>Oreoica gutturalis</i>	Crested Bellbird		X	X	X	X	X	X	X	X	X	X	X	X
ARTAMIDAE														
<i>Artamus personatus</i>	Masked Woodswallow		X						X		X			
<i>Artamus cinereus</i>	Black-faced Woodswallow			X		X					X			
<i>Artamus cyanopterus</i>	Dusky Woodswallow		X			X	X					X	X	
<i>Artamus minor</i>	Little Woodswallow													

Birds		CS	SI	B	TSF	Mt Ma	Mt Ma 2	Mt	P	S	K	G	C	Bonnie
<i>Cracticus torquatus</i>	Grey Butcherbird		X	X	X	X	X				X	X	X	X
<i>Cracticus nigrogularis</i>	Pied Butcherbird				X	X			X			X	X	X
<i>Cracticus tibicen</i>	Australian Magpie		X	X				X	X	X	X		X	X
<i>Strepera versicolor</i>	Grey Currawong		X	X		X	X	X	X	X	X	X	X	X
RHIPIDURIDAE														
<i>Rhipidura albiscapa</i>	Grey Fantail													X
<i>Rhipidura leucophrys</i>	Willie Wagtail		X		X	X	X	X	X		X	X	X	X
CORVIDAE														
<i>Corvus bennetti</i>	Little Crow										X		X	X
<i>Corvus orru</i>	Torresian Crow													
<i>Corvus coronoides</i>	Australian Raven		X	X	X	X	X		X	X	X	X	X	X
MONARCHIDAE														
<i>Grallina cyanoleuca</i>	Magpie-lark				X									C
PETROICIDAE														
<i>Petroica goodenovii</i>	Red-capped Robin		X	X		X		X	X		X		X	X
<i>Melanodryas cucullata</i>	Hooded Robin													
<i>Microeca fascians</i>	Jacky Winter			X	X	X	X	X				X	X	X
<i>Eopsaltria griseogularis</i>	Western Yellow Robin	L					X			X	X	X	X	X
<i>Drymodes brunneopygia</i>	Southern Scrub-robin	L					R							
ZOSTEROPIDAE														
<i>Zosterops lateralis</i>	Silvereye		X						X					
MEGALURIDAE														
<i>Cincloramphus mathewsi</i>	Rufous Songlark													
<i>Cincloramphus cruralis</i>	Brown Songlark													
HIRUNDINIDAE														
<i>Cheramoeca leucosterna</i>	White-backed Swallow		X		X						X	X		X
<i>Hirundo neoxena</i>	Welcome Swallow				X	X	X	X			X	X		X
<i>Petrochelidon ariel</i>	Fairy Martin									X				
<i>Petrochelidon nigricans</i>	Tree Martin		X		X	X	X				X	X	X	
NECTARINIIDAE														
<i>Dicaeum hirundinaceum</i>	Mistletoebird		X	X			X		X	X	X		X	X
ESTRILDIDAE														
<i>Taeniopygia guttata</i>	Zebra Finch													
MOTACILLIDAE														
<i>Anthus novaeseelandiae</i>	Australasian Pipit		X		X					X	X			
Total Number of Species Expected: 164			49	45	40	42	47	29	35	48	55	38	53	47

Table 2.4. Mammal species recorded or expected to occur in the survey area.

MAMMALS		CS	SI	B	TSF	Mt Ma	Mt Ma2	Mt Mt	P	S	C	K	G	Bonnie
Tachyglossidae														
<i>Tachyglossus aculeatus</i>	Echidna		X	X	X	X	X	X	X	X	X	X	X	X
Dasyuridae														
<i>Ningauai ridei</i>	Ride's Ningauai		X											
<i>Ningauai yvonneae</i>	Mallee Ningauai		X											
<i>Antechinomys laniger</i>	Kultarr	L												
<i>Pseudantechinus woolleyae</i>	Woolley's Pseudantechinus													
<i>Sminthopsis crassicaudata</i>	Fat-tailed Dunnart		X											
<i>Sminthopsis dolichura</i>	Little Long-tailed Dunnart		X										X	
<i>Sminthopsis gilberti</i>	Gilbert's Dunnart													
Burramyidae														
<i>Cercartetus concinnus</i>	Western Pygmy Possum		X											
Macropodidae														
<i>Macropus fuliginosus</i>	Western Grey Kangaroo		X	X	X	X	X	X	X	X	X	X	X	X
<i>Macropus robustus</i>	Euro		X				X					X	X	X
<i>Macropus rufus</i>	Red Kangaroo		X											
Molossidae														
<i>Mormopterus sp. 3</i>	Inland Freetail Bat		X											
<i>Mormopterus sp. 4</i>	Southern Freetail Bat					X		X	X					X
<i>Tadarida australis</i>	White-striped Freetail Bat		X		X	X		X	X					X
Vespertilionidae														
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat		X		X	X		X	X					X
<i>Chalinolobus morio</i>	Chocolate Wattled Bat					X		X						
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat													
<i>Nyctophilus timoriensis</i>	Greater Long-eared Bat	CS2												
<i>Scotorepens balstoni</i>	Inland Broad-nosed Bat							X						
<i>Vespadelus regulus</i>	Southern Forest Bat					X			X					X
<i>Vespadelus baverstocki</i>	Inland forest bat				X	X		X						
Muridae														
<i>Notomys alexis</i>	Spinifex Hopping Mouse													
<i>Notomys mitchelli</i>	Mitchell's Hopping Mouse		X									X		
<i>Pseudomys bolami</i>	Bolam's Mouse		X											
<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse		X											

MAMMALS		CS	SI	B	TSF	Mt Ma	Mt Ma2	Mt Mt	P	S	C	K	G	Bonnie
INTRODUCED MAMMALS														
<i>Canis lupus</i>	Dingo		X							X				X
<i>Vulpes vulpes</i>	European Red Fox			X						X			X	
<i>Felis catus</i>	Feral Cat		X	X			X			X		X	X	X
<i>Oryctolagus cuniculus</i>	Rabbit		X	X	X	X	X	X	X	X	X	X	X	X
<i>Mus musculus</i>	House Mouse		X		X			X	X	X				
<i>Capra hircus</i>	Goat			X	X	X	X	X	X	X	X	X	X	
<i>Equus caballus</i>	Horse											X		
<i>Camelus dromedarius</i>	Dromedary Camel													
<i>Bos taurus</i>	Cattle					X		X	X	X				
<i>Ovis aries</i>	Sheep													
Total Number of Native Species Expected: 26			16	2	5	8	3	7	6	6	2	4	4	7
Total Number of Introduced Species Expected: 10			4	4	3	3	3	4	4	7	2	4	4	3

Appendix 3. Habitat Photographs

Three major fauna habitats were identified during the survey. The following plates depict those fauna habitats recorded from the survey area (see table below).

LANDFORM	VEGETATION
Undulating loam and stony plains	Eucalypt Woodland and Mallee dominated by <i>E. salubris</i> , <i>E. lesouefii</i> and <i>E. salmonophloia</i> with an open understorey including <i>Eremophila scoparia</i> , <i>Santalum spicatum</i> and sparsely occurring chenopods.
Greenstone Hills	Shrublands dominated by <i>A. quadrimarginea</i> with <i>A. tetragonophylla</i> , <i>A. burkitii</i> , <i>Scaevola spinescens</i> and <i>Eremophila</i> species (e.g. <i>E. oldfieldii</i>). Occasional smaller stands of <i>Eucalyptus</i> Woodland occur.
Lower stony slopes	Sheaok (<i>Casuarina pauper</i>) Woodland with a variable understorey occurs on the lower slopes and foothills of Emu Hill.

Habitat 1: Eucalypt Woodland and Mallee on loam or stony plains.



Habitat 2: Acacia shrublands on Greenstone Hills.



Habitat 3: Sheoak Woodland on lower stony slopes.





**CNX Three Mile Hill
Coolgardie Gold Project**

Biological Surveys

**Prepared for
Focus Minerals Limited**

June 2022

● people ● planet ● professional

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Executive Summary

Focused Mineral Limited commissioned 360 Environmental (part of SLR Consulting) to undertake a detailed flora and vegetation survey and basic vertebrate fauna and habitat survey at selected sites within the Three Mile Mine Project, Coolgardie. The Survey Area consists of four defined survey areas adjacent to the townsite of Coolgardie, Western Australia, and covers approximately 1360.72 ha.

The purpose of the assessment was to identify key biological values to inform decisions regarding the specific lease areas for proposed construction sites within the Survey Area.

Flora and Vegetation

The flora desktop assessment identified 90 conservation significant taxa occurring within 50 km of the Survey Area, including three Threatened taxa (*Gastrolobium graniticum*, *Tetratheca spenceri* and *Thelymitra stellata*). A pre-survey likelihood of occurrence assessment was undertaken and determined 20 taxa as having a high likelihood of occurrence, 18 taxa as having a medium likelihood of occurrence, and 51 taxa as having a low likelihood of occurrence. Following the survey, two taxa retained a high likelihood of occurrence.

The detailed flora and vegetation survey was undertaken in between the 11 - 15 October 2021 (Trip 1) and 15 - 19 November 2021 (Trip 2), with the survey recording the floristic composition and vegetation types from 74 quadrats, 22 relevés and 91 mapping notes. A total of 149 taxa were recorded from 78 genera across 35 families.

No Threatened flora taxa pursuant to the Environment Protection and Biodiversity Conservation Act 1999 and/or gazetted as Threatened pursuant to the Biodiversity and Conservation Act 2016 were recorded during the survey.

One Priority listed flora taxon was identified; a single population of *Austrostipa blackii* (P3) consisting of approximately 10 individuals was recorded within a single quadrat. The vegetation it was recorded in was heavily surveyed and no further populations were recorded.

Thirteen introduced taxa were recorded in the Survey Area, of which one, the Common Prickly Pear (**Opuntia stricta*) is listed as a Declared Pest, and a Weed of National Significance.

Ten vegetation types were described and mapped within the Survey Area. Vegetation in the Survey Area was representative of existing broad scale vegetation, as well as soil and land system mapping for the area.

Vegetation condition ranged from Excellent to Completely Degraded with the majority considered to be in Excellent condition. Evidence of disturbance across the Survey Area included mine works, cattle grazing, vehicle tracks, weeds, and litter.

Vertebrate Fauna

The fauna desktop assessment identified 20 conservation significant species occurring within 50 km of the Coolgardie Survey Area comprising 17 bird species and 3 mammal species.

Fauna habitat mapping was undertaken based on a combination of aerial imagery, field observations and fauna habitat assessment data. Five fauna habitats were mapped within the Survey Area, of which the *Eucalyptus* Woodland and the *Acacia* Shrubland habitat types represent the most value to conservation significant fauna and overall fauna assemblage.

The basic terrestrial vertebrate fauna survey was undertaken in between the 11 – 15 October 2021 (Trip 1) and 15 – 19 November 2021 (Trip 2). This is considered suitable timing to survey for birds, mammals, reptiles, and summer breeding amphibians, but outside the optimal survey period for autumn and winter breeding amphibians. A total of 61 fauna taxa from 33 families comprising of: 42 birds from 21 families, ten mammals from seven families and nine reptiles from five families. No amphibian taxa were recorded.

One conservation significant taxon, the Western Quoll, Chuditch (*Dasyurus geoffroii fortis*) which is listed as Vulnerable under the Biodiversity Conservation Act and Environment Protection and Biodiversity Conservation Act, was recorded within the Survey Area. Chuditch scat was observed during the field survey.

Seven introduced mammal taxa were recorded during the survey, Goat (*Capra hircus*), European Cattle (*Bos primigenius taurus*), Dog/Dingo (*Canis familiaris*), Red Fox (*Vulpes vulpes*), Horse (*Equus caballus*), Cat (*Felis catus*) and Rabbit (*Oryctolagus cuniculus*).

Although outside the scope of this report, potential habitat for Arid Bronze Azure Butterfly (*Ogyris subterrestris petrina*), which is listed as Critically Endangered under the Biodiversity Conservation Act and Environment Protection and Biodiversity Conservation Act, and the Inland Hairstreak butterfly (*Jalmenus aridus*), which is listed as Priority 1 by the Department of Biodiversity, Conservation and Attractions, was observed within the Survey Area.

Abbreviations

Abbreviations used through the report are described below in Table 1.

Table 1: Abbreviations

Abbreviation	Description
BAM Act	Biosecurity and Agriculture Management Act 2007
BC Act	Biodiversity Conservation Act 2016
BoM	Bureau of Meteorology
CD	Conservation Dependent Fauna
CR	Critically Endangered
DAWE	Department of Agriculture, Water, and the Environment
DBCA	Department of Biodiversity, Conservation and Attractions
DoE	Department of Environment
DP	Declared Pest
DWER	Department of Water and Environmental Regulation
EIA	Environmental Impact Assessment
EN	Endangered
EP Act	Environmental Protection Act 1986
EPA	Environmental Protection Authority
EPBC Act	Environment Protection Biodiversity and Conservation Act 1999
ESA	Environmentally Sensitive Area
FML	Focus Minerals Limited
GDE	Groundwater Dependent Ecosystem
IBRA	Interim Biogeographic Regionalisation for Australia
IBSA	Index of Biodiversity Surveys for Assessments
MI	Migratory
MNES	Matters of National Environmental Significance
NVIS	National Vegetation Information System
OS	Other Specially Protected Fauna
P	Priority
PEC	Priority Ecological Community
PMST	Protected Matters Search Tool
T	Threatened
TEC	Threatened Ecological Community
TPFL	Threatened and Priority Flora Database
VU	Vulnerable
WAH	Western Australian Herbarium

Abbreviation	Description
WAM	Western Australian Museum
WoNS	Weeds of National Significance

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1 Introduction

1.1 The Project

Focus Mineral Limited (FML) commissioned 360 Environmental (part of SLR Consulting) to undertake a detailed flora, vegetation, and basic terrestrial vertebrate fauna assessment to support the environmental and planning approvals for proposed expansions to the FML mining operation in Coolgardie Western Australia (the Project).

The 1360.72 ha FML Coolgardie (the Survey Area) is located approximately 40 km southwest of Kalgoorlie in the Coolgardie bioregion of Western Australia. The Survey Area includes multiple polygons representing potential deposits, waste pits, haul roads, and associated infrastructure.

1.2 Objectives and Scope

The purpose of the biological survey was to delineate key flora, vegetation and terrestrial vertebrate fauna values within the Survey Area and identify potential environmental sensitivities that may impact The Project.

The scope of works includes:

- Undertake a desktop assessment including relevant database searches and a literature review to compile and summarise existing records of flora, vegetation, and terrestrial vertebrate fauna (including conservation significant species and communities) within the vicinity of the Survey Area
- Undertake a detailed flora and vegetation survey in accordance with EPA Technical Guidance (Environmental Protection Authority, 2016)
- Undertake targeted searching for flora of conservation significance within the Survey Area
- Undertake a basic terrestrial vertebrate fauna survey in accordance with EPA Technical Guidance (Environmental Protection Authority, 2020)
- Identify and assess conservation significant terrestrial vertebrate fauna or suitable conservation significant terrestrial vertebrate fauna habitat potentially occurring within the Survey Area
- Produce a technical report based on the findings of the above
- Supply a geospatial data package prepared in accordance with IBSA requirements.

This report presents the outcomes of the FML Coolgardie flora, vegetation, and terrestrial vertebrate fauna assessment undertaken to support the above objectives.

2 Background

2.1 Protection of Flora, Vegetation and Fauna

Western Australian flora and fauna is protected formally and informally by legislative and non-legislative measures:

Legislative measures:

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

Non-legislative measures:

- WA Department of Biodiversity Conservation and Attractions (DBCA) Priority lists for fauna, flora, and ecological communities
- Weeds of National Significance (WoNS)
- Recognition of locally significant populations by DBCA.

These protection mechanisms are supported by guidance documents published by the Environmental Protection Authority (EPA) and Department of Agriculture, Water, and the Environment (DAWE):

- *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (Environmental Protection Authority, 2016)
- *Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* (Environmental Protection Authority, 2020)
- *Matters of National Environmental Significance Significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999* (Department of the Environment, 2013)
- *Survey Guidelines for Australia's Threatened Mammals* (Department of Sustainability Environment Population and Communities, 1999)
- *Survey Guidelines for Australia's Threatened Reptiles* (Department of Sustainability Environment Water Population and Communities, 2011)
- *Survey Guidelines for Australia's Threatened Birds Under the Environment Protection And Biodiversity Conservation Act 1999* (Department of the Environment Water Heritage and the Arts, 2010).

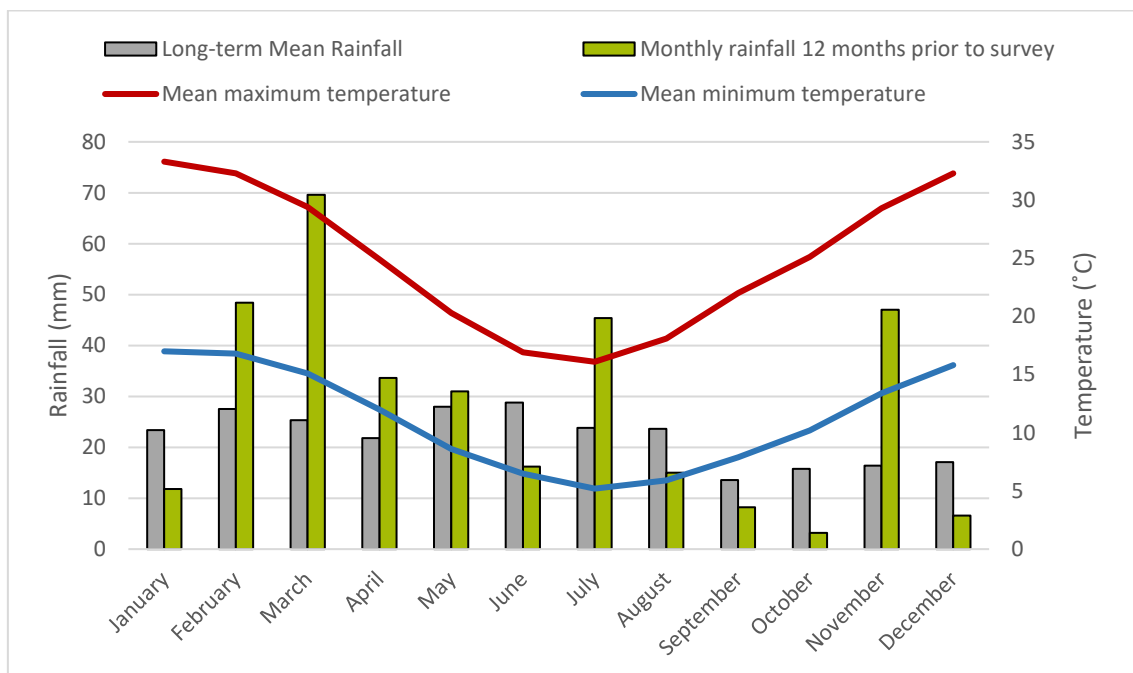
2.2 Existing Environment

2.2.1 Climate

The closest long-term Bureau of Meteorology weather station with a complete dataset is Coolgardie weather station (Station 012018) for climate data (i.e. temperature) and Koorarawalyee weather station (Station 012152) for rainfall data. The Coolgardie weather station is located approximately 75 km south of the Survey Area. Koorarawalyee weather station is located approximately 124 km southwest of the Survey Area.

The long-term mean minimum temperature for Coolgardie Weather Station ranges from 5.2°C (July) to 16.8°C (February) (1893 to 2020) and the long-term mean maximum temperature ranges from 16.1°C (July) to 33.3°C (January) (Graph 1) (Bureau of Meteorology, 2021).

The Koorarawalyee weather station recorded 336 mm of rainfall in the 12 months prior to the survey (October 2021 to November 2021), which is 66.4 mm above the long-term average of 269.6 for the same period (Bureau of Meteorology, 2021). In the three months prior to the survey (July 2021 to September 2021), 68.6 mm of rainfall was recorded, which is 7.6 mm above the long-term average of 61 mm for the same period (Bureau of Meteorology, 2021).



Graph 1: Long term and 2021 monthly weather and climate data for Coolgardie and Koorarawalyee

2.2.2 Interim Biogeographic Regionalisation of Australia

The Interim Biogeographic Regionalisation of Australia (IBRA) divides Australia into 89 bioregions based on major biological, geographical, and geological attributes. These bioregions are subdivided into 419 subregions as part of a refinement of the IBRA framework (Department of the Environment and Energy, 2016). The Survey Area occurs within the Coolgardie bioregion and Eastern Goldfield (COO3) subregion.

The Eastern Goldfield (COO3) subregion lies on the Yilgarn Cratons '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.

2.2.3 Soils and Land Systems

Soil landscapes and land system mapping of Western Australia describes broad soil and landscape characteristics from regional to local scales, ranging from 1:20,000 to 1:250,000 (Department of Primary Industries and Regional Development, 2018). The Survey Area occurs entirely within the BB5 land system, characterised by rocky ranges and hills of greenstones with basic igneous rocks as well as sandplains with brown calcareous loam (Figure 2) (Department of Primary Industries and Regional Development, 2018).

2.2.4 Hydrography

The Survey Area contains one small-permanent pool which is just south of Coolgardie-Esperance Highway, named Coolgardie Gorge. The Survey Area also contains four decommissioned deep abandoned mining pits which contain water and several minor watercourses that don't influence vegetation types present. The nearest major hydro geographical feature is a seasonally filled salt lake approximately 6 km east of the Survey area. The salt lake joins the Red, White and Douglas lakes as part of a larger interconnected salt lake system, which flows in a south westerly direction (Figure 2) (Department of Water and Environmental Regulation, 2018).

2.2.5 Broad Vegetation Types

Mapping of pre-European vegetation in Western Australia was completed on a broad scale (1:1,000,000) by Beard, (1976). These vegetation types were later refined by Shepherd, Beeston and Hopkins, (2002) resulting in 819 vegetation types.

Two broad vegetation associations are mapped over the Survey Area (Figure 3). Representation of the vegetation associations at a local, regional, and state level is shown in Table 2.

- **Coolgardie 9** – Medium woodland; Eucalyptus woodland / Eremophila sparse shrubland. Associated species are coral gum (*Eucalyptus torquata*) and goldfields blackbutt (*E. lesouefii*)
- **Coolgardie 1294** – Eucalyptus woodland. Wheatbelt; York gum, salmon gum etc. (*Eucalyptus loxophleba*, *E. salmonophloia*). Goldfields; gimlet, redwood etc. (*E. salubris*, *E. oleosa*). Riverine; rivergum (*E. camaldulensis*). Tropical; messmate, woolybush.

Table 2: Broad Vegetation Types within the Survey Area and their Representation at the State, Regional and Local Levels (Government of Western Australia, 2019)

System and Vegetation Association	Extent			
	Pre-European (ha)	Current (ha)	Remaining (%)	Managed in DBCA Lands (%)*
Representation across Western Australia				
9	240,509.33	235,161.94	97.78	8.07
1294	6,295.55	6,047.45	96.06	1.90
Representation across the Coolgardie Bioregion				
9	240,441.99	235,100.97	97.78	8.07
1294	6,295.55	6,047.45	96.06	1.90
Representation across the Eastern Goldfields Subregion				
9	235,047.15	229,757.07	97.75	8.26
1294	6,295.55	6,047.45	96.06	1.90
Representation across the Shire of Coolgardie				
9	166,572.37	163,720.39	98.29	9.81
1294	3,385.95	3,378.94	99.79	3.40

*as a portion of the current extent

2.2.6 Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are declared by the Department of Water and Environmental Regulation (DWER) to prevent the degradation of important environmental values such as Threatened flora, Threatened Ecological Communities (TECs) or significant wetlands.

The Survey Area does not occur within a mapped ESA. The nearest ESA is the Rowles Lagoon Conservation Park located approximately 52 km north-west of the Survey Area (Department of Water and Environmental Regulation, 2020).

2.2.7 Conservation Areas

The Survey Area is not located within any listed conservation area (Department of Biodiversity Conservation and Attractions, 2021a). The nearest conservation area is the Kangaroo Hills Timber Reserve which is situated adjacent to the southernmost section of the Survey Area separated by Nepean Road (Figure 4).

2.2.8 Land Use

The dominant land use of the Eastern Goldfields subregion include: Unoccupied Crown Land (UCL) and Crown reserves, Grazing-Native pastures-leasehold, freehold, conservation, and Mining leases (Cowan, 2001).

The Survey Area covers sections of land classified as: mining lease, prospecting licence, and miscellaneous licence (Data WA, 2021). The Survey Area has a long history of mining activities, with extensive mine diggings including deep open pits and deep localised mine shafts.

3 Methods

3.1 Desktop Assessment

3.1.1 Literature Review

Background information on the Survey Area and surrounds was compiled prior to the field survey (see Section 3.1.1). Historical vegetation mapping (Beard, 1976; Shepherd, Beeston and Hopkins, 2002), land systems mapping (Department of Agriculture and Food WA, 2012), and the IBRA classification system (Cowan, 2001) were consulted to provide broad contextual knowledge of the vegetation units and habitat likely to be encountered within the Survey Area.

The literature review also considered a selection of biological reports detailing assessments undertaken in the region that were publicly available:

- Coolgardie Landfill - Flora, vegetation and fauna habitat assessment (Strategen Environmental, 2019)
- Fauna survey for Mungari Gold Operations Cutters Ridge Project (Phoenix Environmental Sciences, 2019)
- Flora and Vegetation Impact Assessment - Medcalf Project (Botanica Consulting, 2020)
- Level 1 Vertebrate Fauna Risk Assessment for Lot 500 Kalgoorlie West (Terrestrial Ecosystems, 2018)
- Reconnaissance Flora and Vegetation Survey for the Mt Marion Project Area (Native Vegetation Solutions, 2019)
- Reconnaissance Flora and Vegetation Survey of Lot 500 Great Eastern Highway Kalgoorlie (Native Vegetation Solutions, 2018)
- Reconnaissance Flora and Vegetation Survey of the Spargos Project - October 2020 (Native Vegetation Solutions, 2020)
- Vegetation Clearing - Fauna Assessment (Davyhurst, Callion, Waihi, Siberia, Riverina Clearance Areas) (Biostat Pty Ltd, 2020).

3.1.2 Database Searches

Database searches were undertaken to compile a list of potential flora and fauna and identify potential conservation significant flora, fauna, and ecological communities within or surrounding the Survey Areas (Table 3). In addition, an EPBC Protected Matters Search (PMST) was undertaken to identify the potential for Matters of National Environmental Significance (MNES) to occur within or surrounding the Survey Areas (Department of Agriculture Water and the Environment, 2020).

The search area for each parameter was varied to reflect distances recommended by DBCA. The search areas are herein referred to collectively as the Study Area.

Table 3 Database Searches of the Survey Area

Database Name	Date Received	Search Target	Search Area
Threatened and Priority Ecological Communities database search (Department of Biodiversity Conservation and Attractions, 2022)	7 October 2021	TECs and PECs	50 km buffer around the Survey Area
Threatened and Priority Flora (TPFL) database search (Department of Biodiversity Conservation and Attractions, 2021d)	7 October 2021	Threatened and Priority Flora	60 km buffer around the Survey Area
Western Australian Herbarium flora database search (Department of Biodiversity Conservation and Attractions, 2021e)			60 km buffer around the Survey Area
DBCA Threatened and Priority Fauna database search (Department of Biodiversity Conservation and Attractions, 2021c)	18 October 2021	Threatened and Priority Fauna	50 km buffer around Survey Area
NatureMap (Department of Biodiversity Conservation and Attractions, 2021b)	27 October 2021 (flora)	Threatened and Priority flora and fauna, and inventory of potential flora and fauna	20 km buffer around the Survey Area (flora)
	02 November 2021 (fauna)		40 km buffer around Survey Area (fauna)
Protected Matters Search Tool (PMST) (Department of Agriculture Water and the Environment, 2021a)	25 October 2021	Commonwealth listed Threatened flora and fauna and TECs	50 km buffer around the Survey Area

3.1.3 Likelihood of Occurrence

Conservation significant flora and fauna species identified from the desktop assessment were assessed to determine the likelihood of their occurrence within the Survey Area, both prior to and post field survey. The assessment was completed based on the likelihood of occurrence criteria presented in Table 4.

Only species either recorded within the Survey Area or considered as having a high or medium likelihood of occurrence will be discussed in detail. Species classified as having a low likelihood of occurrence based on the above criteria will not be discussed unless a justification for this classification is required.

For fauna, taxa listed as Marine only under the EPBC Act were not included as conservation significant taxa because the Marine only listed taxa identified by the desktop assessment and field survey were common and widespread, taxa listed as Marine only do not constitute matters

of national environmental significance (MNES) under the EPBC Act, and the Survey Area does not contain any marine habitat.

Table 4 Likelihood of Occurrence Criteria

Rank	Criteria
Previously Recorded	The species has been previously recorded in the Survey Area
High (Likely to occur)	<ul style="list-style-type: none"> • Preferred habitat capable of supporting individuals or populations is present within the Survey Area • The survey Areas is within the taxon’s known distribution • There are existing records of the species near the Survey Area (within 15 km) (flora) • There are existing records of the species near the Survey Area recorded within the last 15 years (fauna) • The species is strongly linked to a specific habitat, which is present in the Survey Area • The species has more general habitat preferences, and suitable habitat is present.
Medium (May occur)	<ul style="list-style-type: none"> • There is suitable (not necessarily preferred) habitat in the Survey Area, but the species is recorded infrequently in the locality • The Survey Area is within or near the taxon’s known distribution • They Survey Area and surrounding area may support individuals or populations present within the Survey Area • There are existing records of the species from the locality (within 30 km for flora and 50 km for fauna), however: <ul style="list-style-type: none"> ○ The species is strongly linked to a specific habitat, of which only a small amount is present in the Survey Area ○ The species has more general habitat preferences, but only some suitable habitat is present.
Low (Unlikely to occur)	<ul style="list-style-type: none"> • No suitable habitat is present within the Survey Area, or the Survey Area is well outside the taxon’s known distribution for the taxon is considered locally or regionally extinct • The Survey Area and surrounding habitat are unlikely to support individuals or populations of the taxon, however individuals may rarely occur as transients or vagrants • The species is linked to a specific habitat, which is absent from the Survey Area; or • Suitable habitat is present, however there are no existing records of the species from the locality despite reasonable previous search effort in suitable habitat; or • There is some suitable habitat in the Survey Area, however the species is very infrequently recorded in the locality.

3.2 Field Survey Effort

3.2.1 Trip 1

The biological survey was undertaken between the 11 - 15 October 2021.

The flora, vegetation and fauna survey was undertaken by Senior Botanist Jason Webb, Principal Zoologist Dr Michael Lohr and Ecologist Lachlan Crossley. The field team has over 20 years of combined experience conducting surveys of similar scope throughout Western Australia.

3.2.2 Trip 2

The biological survey was undertaken between the 15 - 19 November 2021.

The flora, vegetation and fauna survey was undertaken by Senior Botanist Jason Webb, Principal Ecologist Scott Walker and Ecologists Bridget Duncan and Lachlan Crossley. The field team has over 20 years of combined experience conducting surveys of similar scope throughout Western Australia.

The survey effort from both trips is shown in Figure 5.

3.3 Flora and Vegetation

3.3.1 Establishment of Flora Sites

Indicative flora sites were identified prior to the survey using aerial photography to estimate broad vegetation patterns within the Survey Area. The location and number of flora sites completed were adjusted on site to achieve sites most representative of the vegetation present.

Where possible, at least three flora sites were sampled for each vegetation type observed within the Survey Area. Some vegetation types that were not large enough to accommodate three flora sites had only one or two sites sampled.

Flora sites consisted of quadrats (20 m x 20 m) and relevés of approximately 400 m² where possible, or alternate configurations approximately equating to 400 m² (as required in areas such as drainage lines, gullies, and narrow ridge lines). A comprehensive record of the flora present at the time of sampling was recorded for both quadrat and relevé sites.

Flora site locations were recorded using a handheld GPS, the start and finish point of linear relevés, and the central point of circular relevés. At each flora site, the following was recorded:

- Site code
- Date and personnel
- Landform and soil description
- Relevant site descriptors including, slope, aspect, litter cover, bare ground cover and fire history
- Inventory of vascular flora including the approximate average height and percent foliar cover for each taxon recorded
- Vegetation description in accordance with the National Vegetation Information System (NVIS), Level 5 'association', whereby the dominant growth form, height, cover, and species (three species) for the three traditional strata (upper, mid, and ground) are described

- Vegetation condition in accordance with the Southwest and Interzone Botanical Provinces/Eremaean and Northern Botanical Provinces vegetation condition scale (Environmental Protection Authority, 2016a), and evidence of disturbance (for example clearing, rubbish, feral animals, weed incursion and evidence of feral animals and dieback) where present, and
- Photograph of the vegetation occurring within the site.

A total of 74 quadrats, and 22 relevés were established within the Survey Area. An additional 91 mapping notes were completed to aid vegetation mapping delineation.

3.3.2 Opportunistic Flora

Additional flora taxa observed opportunistically around flora sites or while traversing on foot within the Survey Area were also recorded. Where populations of conservation significant flora taxa, Declared Pests (DPs) or WoNS were encountered, a GPS location and a count of the individuals present was recorded.

3.3.3 Targeted Searching

Prior to the survey conservation significant flora with the likelihood or potential to occur within the Survey Area was compiled (see section 3.1.3). Field personnel familiarised themselves with photographs, reference samples and descriptions of these taxa before conducting the survey.

The entire Survey Area was not systematically searched. Rather, targeted searching focussed on habitat suitable for Conservation Significant Flora. Furthermore, potential habitat within the proposed footprint was prioritised for targeted searching over areas outside the proposed footprint.

Personnel also actively searched for conservation significant flora species in and around flora sites, while traversing on foot within the Survey Area and in known locations or preferred habitat encountered in the Survey Area.

Where Threatened or Priority flora were encountered in the field a GPS location was taken and a count of individuals was recorded, followed by a search in the local vicinity to determine if any other individuals were present nearby and delineate population boundaries where relevant. Specimens of any potential conservation significant flora that could not be identified in the field were collected for identification and lodgement at the Western Australian Herbarium (WAH).

3.3.4 Statistical Analyses

Statistical analysis of quadrat data was undertaken in accordance with EPA guidelines for a detailed flora and vegetation survey.

3.3.4.1 Species Accumulation Curve

Species accumulation curves were plotted using Primer-E version 6.1.5. to determine the adequacy of the survey (Clarke and Gorley, 2006). The treatments comprised Sobs (Mao Tao), to reflect the number of species observed (based on a given total of species recorded), and richness estimators Chao 1, Chao 2, Jackknife 1, Bootstrap and Michaelis-Menton to estimate the total sample size of flora taxa present. Species accumulation curves for this survey were calculated using data collected from the flora sites within the Survey Area. All flora taxa, both annual and perennial, within each flora site were used in generating the species accumulation curve. Unconfirmed flora were included if they were the only species present from a Genus.

3.3.5 Taxonomy and Nomenclature

Where field identification of plant taxa was not possible, specimens were collected for identification using resources of the WAH. Identification of flora collections was completed by experienced Taxonomist Frank Obbens.

The finalised species list was cross-referenced against current flora databases and relevant taxonomic literature (Western Australian Herbarium, 2021) to determine name currency, conservation status and known distribution of each taxon. Introduced species were compared against the current BAM Act Declared Plants list the WoNS list to determine their control status (Department of Agriculture Water and the Environment, 2021b; Department of Primary Industries and Regional Development, 2021).

Any conservation significant flora taxa, including potential Threatened and Priority species, range extensions and potential new taxa were submitted to the WAH for verification and lodgement. Where relevant, Threatened and Priority Flora Report Forms (TPFRFs) were submitted to DBCA.

3.3.6 Vegetation Unit and Condition Mapping

Broad vegetation and condition mapping was conducted in the field, with boundaries delineated over aerial photography, at a scale of 1:5,000. Broad vegetation units were refined based on taxonomic identification of flora collections, statistical analysis of data collected from the quadrats and relevés, and mapping notes taken during the field survey. Vegetation condition mapping was refined based on site data and mapping notes. Finalised polygons were digitised and produced as electronic mapping data using GIS software.

3.4 Vertebrate Fauna

3.4.1 Vertebrate Fauna Habitat Assessment

Fauna habitat assessments were undertaken throughout the Survey Area to identify fauna habitat values. Habitat assessment locations are displayed in Figure 5. The following information, which has been adapted from the habitat attributes listed in the Technical Guidance (Environmental Protection Authority, 2020), was collected at each habitat assessment site using Fulcrum, a mobile data collection app:

- Site photo
- Landform
- Soil type and colour
- Rock types, surface stone cover and size classes
- Key habitat and microhabitat features including leaf litter, logs, burrows, rocky outcrops, rock crevices, hollows, water sources
- Habitat quality, fire history and evidence of disturbance
- General description of vegetation structure.

Fauna habitat mapping boundaries were delineated over aerial imagery at a scale of approximately 1:5,000 based on field observations and fauna habitat assessment data. Polygons were digitised and produced as electronic mapping data using GIS software.

3.4.2 Opportunistic Fauna Records and Active Searches

Opportunistic observations of fauna were recorded throughout the Survey Area. Observations of primary evidence (direct sightings, calls) and secondary evidence (tracks, scats, diggings etc.) were recorded. Active searches were undertaken throughout the Survey Area in microhabitats likely to contain fauna. They primarily involved raking leaf litter, peeling bark, and splitting dead wood.

3.4.3 Identification and Taxonomy

Where there was doubt on a species name (through subsequent name changes or taxonomic reviews), an effort was made to determine the current scientific name for each taxon. Taxonomy and nomenclature in this report follows the WA Museum checklist 2021 (Western Australian Museum, 2021) where relevant.

4 Results

4.1 Limitations

Limitations and constraints of the flora, vegetation and fauna survey are detailed below in Table 5

Table 5: Limitations and Constraints Associated with the Survey

Variable	Degree of Limitation	Potential Constraints on Survey Outcomes
Survey Scope	Not a constraint	<p>The detailed flora and vegetation survey was undertaken in accordance with EPA Technical Guidance (Environmental Protection Authority, 2016) and was considered appropriate to support approvals applications.</p> <p>Targeted searching for flora of conservation significance was undertaken, however, systematic searches were not feasible. Rather, targeted searching focused on habitat suitable for conservation listed flora within the proposed development footprint.</p> <p>A basic terrestrial vertebrate fauna survey was undertaken in accordance with EPA Technical Guidance (Environmental Protection Authority, 2020) and was considered appropriate to support approvals applications.</p>
Availability of Data	Not a constraint	All data required to complete the scope of works including regional and local contextual information was available.
Site Access	Not a constraint	The Survey Area was able to be accessed by vehicle and on foot.
Survey Intensity and Resources	Not a constraint	<p>A total of 96 flora sites (comprising 74 quadrats and 22 relevés) were sampled across the Survey Area. An additional 91 mapping notes were undertaken to aid vegetation mapping and delineation.</p> <p>Sufficient time was allocated to the flora and vegetation survey, given the size and complexity of the Survey Area, and the expected level of survey intensity.</p> <p>The survey effort was considered adequate to assess the flora and vegetation values of the Survey Area and provide information required to support approvals applications.</p> <p>Eighty fauna habitat assessments were completed, and 61 fauna taxa were recorded opportunistically throughout the Survey Area. The survey effort was appropriate for a basic terrestrial vertebrate fauna survey.</p>

Variable	Degree of Limitation	Potential Constraints on Survey Outcomes
Experience	Not a constraint	<p>The flora and vegetation surveys were undertaken by Senior Botanist Jason Webb and Botanist Bridget Duncan, who have over 5 years combined experience conducting surveys of similar scope throughout Western Australia.</p> <p>Identification of flora collections was completed by experienced taxonomist Frank Obbens at the WAH. Any specimens with novel characteristics were submitted to the WAH for formal identification.</p> <p>The fauna survey was undertaken by Lachlan Crossley (Ecologist), Dr. Michael Lohr (Principal Zoologist) and Scott Walker (Principal Ecologist), who have 25 years of combined experience conducting fauna surveys.</p> <p>Fauna identification was reviewed by Dr. Michael Lohr (Principal Zoologist) and Evan Webb (Senior Zoologist), using photos of tracks and scats taken during the field survey.</p>
Timing, weather, season	<p>Not a constraint</p> <p>Partial limitation for fauna (Amphibians)</p>	<p>The recommended primary survey period for the region as per the EPA Technical Guidance, is September to November. Survey was conducted in October and November 2021. Rainfall was sufficient prior to the commencement of the field survey and air temperatures were slightly below average. Therefore, weather conditions were not a constraint.</p> <p>According to the EPA Technical Guidance, mammals do not have a preferred time of year for optimal observation.</p> <p>For reptiles, the guidance suggests October to December (for primary survey). As the surveys were conducted in October and November, timing was suitable for reptiles.</p> <p>The optimum timing for observation of amphibians is between May and August (autumn-winter breeders) and November-December (summer breeders). Therefore, the timing of the surveys was not suitable for autumn-winter breeders.</p> <p>The optimum time to observe birds is between September and December for most bush birds and between November and March for migratory birds. As the surveys were conducted in October and November, timing was suitable for birds.</p>
Life Forms Sampled	Not a constraint	<p>The Survey Area was traversed by vehicle and on foot and representative sites of all remnant vegetation were sampled. All flora species encountered within the Survey Area were recorded.</p> <p>A total of 145 vascular flora taxa were recorded from the Survey Area, comprising 93.8% native flora taxa and 6.2% introduced flora taxa.</p> <p>Of the 145 flora taxa recorded, 18 taxa (12.4%), could not be identified to species level because they were sterile at</p>

Variable	Degree of Limitation	Potential Constraints on Survey Outcomes
		<p>the time of the survey. This was not considered a constraint as it represented a very small portion of the flora sampled.</p> <p>None of the unknown flora taxa collected were analogous to Threatened or Priority flora taxa identified by the database searches as likely to occur within the Survey Area, nor were they representative of flora of other significance.</p> <p>The basic vertebrate fauna survey used a range of techniques to detect fauna taxa within the Survey Area.</p> <p>A total of 61 vertebrate fauna taxa were recorded within the Survey Area, comprising 54 confirmed native taxa and seven introduced taxa.</p> <p>All fauna taxa recorded were able to be identified to species level by direct or indirect observation with a high level of confidence.</p>
Mapping Reliability	Not a constraint	<p>Vegetation types were described and mapped based on quadrat/relevé data and additional mapping notes taken during the field survey. The number of sites and coverage of the Survey Area was considered sufficient to inform the survey.</p> <p>Fauna habitat mapping was based largely on vegetation mapping and there were no constraints on mapping reliability.</p>
Disturbances (fire, flood etc.)	Not a constraint	<p>No disturbances occurred during any of the surveys.</p> <p>Areas of disturbance associated with clearing, mining, rubbish, weeds, and the presence of introduced fauna were recorded but were not a constraint on the results of the survey.</p>
Completeness	Not a constraint	<p>The survey was considered complete for a detailed flora and vegetation survey and basic vertebrate fauna survey.</p> <p>All vegetation types and fauna habitats were surveyed and delineated within the Survey Area, however not all vegetation types were surveyed with three flora sites; five vegetation types were surveyed with one or two flora sites.</p>

4.2 Flora and Vegetation

4.2.1 Literature Review

The key findings of the flora and vegetation reports reviewed are summarised in Appendix A1.

4.2.2 Database Searches

Database searches identified 90 conservation significant flora species occurring within 50 km of the Survey Area (Figure 6, Appendix B), comprising:

- Three Threatened taxa
- Twenty-seven Priority 1 taxa

- Fourteen Priority 2 taxa
- Forty Priority 3 taxa, and
- Six Priority 4 taxa.

4.2.3 Likelihood of Occurrence

The pre-survey likelihood of occurrence assessment identified that of the 90 conservation significant flora species identified by the desktop assessment:

- 20 were considered to have a high likelihood of occurrence
- 18 were considered to have a medium likelihood of occurrence
- 51 were considered to have a low likelihood of occurrence.

Following the survey, the likelihood of occurrence was re-assessed and found:

- Two taxa were considered to have a high likelihood of occurrence, due to close records and existing, contiguous habitat within the Survey Area.

The likelihood of occurrence assessment is provided in Appendix C.

4.2.4 Vegetation of Conservation Significance

Database searches did not return any listed Threatened Ecological Communities or Protected Ecological Communities within 50 km of the Survey Area.

4.2.5 Flora Composition

The survey recorded a total of 149 taxa from 78 genera across 35 families (Appendix D). The dominant families were Chenopodiaceae (26 taxa) and Myrtaceae (15 taxa). The most dominant genera were *Eucalyptus* (12 taxa) and *Eremophila* (10 taxa).

4.2.6 Flora of Conservation Significance

4.2.6.1 Threatened or Priority Flora

No Threatened flora species pursuant to the EPBC Act 1999 and/or gazetted as Threatened pursuant to the BC Act 2016 were recorded during the survey.

One Priority taxon was recorded within the Survey Area (Figure 7a, Plate 1). A population consisting of approximately 10 individuals of *Austrostipa blackii* (P3) was recorded in quadrat C1Q01. This taxon is a tufted, perennial, grass, typically growing up to 1 m high that flowers between September and November. The WAH has 41 specimens lodged with records across the Avon Wheatbelt, Coolgardie and Yalgoo bioregions (Western Australian Herbarium, 2022). The habitat descriptions for this taxon are typically mixed Eucalypt species, tall Acacia shrublands and open woodlands of *Allocasuarina dielsiana* and *Allocasuarina tessellata* (Western Australian Herbarium, 2022). *Austrostipa blackii* (P3) grows on gently inclined lower slopes of basalt with red-brown deep sandy clay loam soils (Western Australian Herbarium, 2022).



Plate 1: *Austrostipa blackii* (P3)

Within the Survey Area it was recorded within vegetation unit AcEoaDI (quadrat C1Q01), in association with *Acacia collegialis*, *Eremophila* spp. and *Dodonaea lobulata*. This vegetation type was sampled heavily and was not recorded at any other site.

4.2.7 Introduced Taxa

A total of 13 introduced taxa were recorded within the Survey Area, representing 8.7% of the total taxa recorded (Table 6). One taxon (**Opuntia stricta*) is a Declared Pest and listed as a WoNS (DAWE, 2021b; DPIRD, 2021). Eight individuals of **O. stricta* were recorded (Figure 8).

Three introduced taxa are unlisted under the BAM Act, which prohibits them access to Western Australia, however they are not assigned a control management category (DPIRD, 2021).

Table 6: Introduced Flora Species within the Survey Area

Species	Common Name	Status under BAM Act	WoNS
<i>*Agave americana</i>	Century plant	Permitted - s11	No
<i>*Asphodelus fistulosus</i>	Onion Weed	Permitted - s11	No
<i>*Carrichtera annua</i>	Ward's Weed	Permitted - s11	No
<i>*Centaurea melitensis</i>	Maltese Cockspur	Permitted - s11	No
<i>*Crassula ovata</i>	Jade Tree	Permitted - s11	No

Species	Common Name	Status under BAM Act	WoNS
* <i>Heliotropium europaeum</i>	Common Heliotrope	Permitted - s11	No
* <i>Nicotiana glauca</i>	Tree Tobacco	Permitted - s11	No
* <i>Oligocarpus calendulaceus</i>	-	Unlisted – s14	No
* <i>Rumex vesicaria</i>	Ruby Dock	Unlisted – s14	No
* <i>Salvia verbenaca</i>	Wild Sage	Permitted - s11	No
* <i>Schinus molle</i> var. <i>areira</i>	-	Unlisted – s14	No
* <i>Sonchus asper</i>	Rough Sowthistle	Permitted - s11	No
* <i>Opuntia stricta</i>	Common Prickly Pear	Declared Pest - s22(2)	Yes

4.2.8 Unconfirmed Flora

Eighteen specimens (12.1% of the taxa recorded) could not be identified to species level because the taxa were sterile at the time of the survey (Appendix D). Of these, all but one, Malvaceae sp., were able to be identified to genus level, and two were assigned a tentative genus, ?*Enchylaena tomentosa* and ?*Pimelea* sp.

None of the unconfirmed flora taxa were analogous to Priority flora taxa identified by the database searches.

4.2.9 Vegetation Condition

The Survey Area has been subjected to medium to high level disturbances, including historical small and large scale mine excavations, makeshift tracks, cattle grazing, weeds, and litter. As such, vegetation condition with the Survey Area was predominantly Excellent, and ranged to Completely Degraded (where all vegetation had been completely cleared) (Keighery, 1994) (Table 7, Figure 7).

Table 7 Area (ha) covered by each vegetation condition category within the Survey Area

Vegetation Condition	Area (ha)	% of Survey Area
Excellent	790.6	58.1%
Very Good	327.9	21.2%
Good	78.4	5.8%
Completely Degraded	163.6	12%
Total	1360.7	100



4.2.10 Vegetation Types

Ten vegetation types were described and mapped across four broad landforms within the Survey Area (plains, rocky hills, claypan, and lake) (Table 8, Figure 8). The majority of the Survey Area was dominated by open plains with a mosaic of low *Eucalyptus* spp. (34.8%) which grew together across the plains, and Salmon Gum (*Eucalyptus salmonophloia*) open woodlands (31.4%). Small rocky hills dominated by *Acacia collegialis* shrubland also covered 13.1% of the Survey Area. While 11.5% of the Survey Area was considered to be 'Cleared', some of this was showing signs of revegetation with both native species (such as *Atriplex* and *Maireana*) and introduced (weed) species. These areas did not appear to have been intentionally revegetated.



Detailed data sheets for each flora site are provided in Appendix E.

Table 8: Vegetation Types Occurring within the Survey Area


Vegetation Unit and Description*	Local Landform	Total Area, Proportion of the Survey Area	Sites	Photograph
<p><u>AcEoaDI</u> <i>Acacia collegialis</i> (<i>A. acuminata</i>) tall shrubland over <i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>, <i>E. georgei</i>, <i>A. tetragonophylla</i> (<i>Senna artemisioides</i> subsp. <i>filifolia</i>, <i>Exocarpos aphyllus</i>) mid shrubland over <i>Dodonaea lobulata</i> (<i>Atriplex vesicaria</i>, <i>Ptilotus obovatus</i> var. <i>obovatus</i>) low shrubland</p>	Rocky hills	178.5 ha 13.1%	C1Q01, C1Q04, C1Q06, C1Q09, C1Q21, C1Q25, C1Q26, C1Q28, C1Q29, C1Q30, C1R04, C2Q07, C2Q09, C2Q14, C2Q18, C2Q32, C2Q33, C2Q34, C2Q35, C2Q38, C2Q40	
<p><u>Ec</u> <i>Eucalyptus celastroides</i> low woodland</p>	Low slopes of rocky hills	7.4 ha 0.5%	C2Q43, C2R17	

Vegetation Unit and Description*	Local Landform	Total Area, Proportion of the Survey Area	Sites	Photograph
<p><u>EgAhSaf</u> <i>Eucalyptus griffithsii</i> low open woodland over <i>Acacia hemiteles</i> and <i>Dodonaea stenozyga</i> (<i>A. jennerae</i>, <i>Alyxia buxifolia</i>) mid shrubland over <i>Senna artemisioides</i> subsp. <i>filifolia</i> and <i>Atriplex vesicaria</i> (<i>Olearia muelleri</i>) low open shrubland</p>	Plains	75.6 ha 5.6%	C1Q10, C1Q20, C1R13, C2Q27, C2Q29, C2Q31, C2Q41, C2Q50, C3Q01, C3Q02A, C3R01	
<p><u>EooEiiDs</u> <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> low open woodland over <i>Eremophila interstans</i> subsp. <i>interstans</i> mid isolated shrubs over <i>Dodonaea stenozyga</i>, <i>Eremophila glabra</i> subsp. <i>glabra</i>, and <i>Olearia muelleri</i> low open shrubland</p>	Plains	11.1 ha 0.8%	C2Q11, C2Q37	

Vegetation Unit and Description*	Local Landform	Total Area, Proportion of the Survey Area	Sites	Photograph
<p><u>ErMhOm</u> <i>Eucalyptus ?ravida</i> low open woodland over <i>Melaleuca ?hamata</i> (<i>M. pauperiflora</i> subsp. <i>fastigiata</i>, <i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>) tall open shrubland over <i>Olearia muelleri</i> low isolated shrubs</p>	Plains	4.7 ha 0.3%	C2Q02, C2Q04, C2Q06	
<p><u>EsEiiAv</u> <i>Eucalyptus salmonophloia</i> mid open woodland over <i>Eremophila intertans</i> subsp. <i>interstans</i> (<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>, <i>Senna artemisioides</i> subsp. <i>filifolia</i>) tall to mid isolated shrubs over <i>Atriplex vesicaria</i> low open shrubland</p>	Plains	428.0 ha 31.4%	C1Q03, C1Q22, C1Q23, C1Q24, C2Q12, C2Q19, C2Q20, C2Q21, C2Q24, C2Q26, C2Q28, C2Q46, C2Q52, C2Q54	

Vegetation Unit and Description*	Local Landform	Total Area, Proportion of the Survey Area	Sites	Photograph
<p><u>EsppEiiSaa</u> <i>Eucalyptus salmonophloia</i> mid isolated trees over a mosaic of <i>E. celastroides</i>, <i>E. clelandiorum</i>, and <i>E. torquata</i> low open woodland over <i>Eremophila interstans</i> subsp. <i>interstans</i> (<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>) mid isolated shrubs over <i>Senna artemisioides</i> subsp. <i>artemisioides</i>, <i>S. artemisioides</i> subsp. <i>filifolia</i>, and <i>Atriplex vesicaria</i> low open shrubland</p>	Plains, low hills	472.3 ha 34.8%	C1Q02, C1Q05, C1R05, C1R09, C1R10, C2Q01, C2Q03, C2Q05, C2Q08, C2Q10, C2Q13, C2Q15, C2Q16, C2Q36, C2Q39, C2Q42, C2Q45, C2R09, C3Q02, C3Q02B, C3Q06	
<p><u>EtEaEpa</u> <i>Eucalyptus torquata</i> low open woodland over <i>Exocarpos aphyllus</i> mid isolated shrubs over <i>Eremophila parvifolia</i> subsp. <i>auricampi</i>, <i>Westringia rigida</i>, and <i>Scaevola spinescens</i> (<i>Olearia muelleri</i>) low open shrubland</p>	Plains, lower slopes of rocky hills	20.7 ha 1.5%	C1Q07, C1Q08, C1Q27, C1R01, C1R02, C1R03, C1R11	

Vegetation Unit and Description*	Local Landform	Total Area, Proportion of the Survey Area	Sites	Photograph
<p>SI <i>Streptoglossa liatroides</i> low open herbland</p>	Clay	0.3 ha <0.1%	C2R44	
<p>Lake Coolgardie Gorge, natural semi-permanent pool system, with a fringe of native and introduced flora taxa including <i>Eucalyptus spp.</i>, <i>*Schinus molle</i> var. <i>areira</i>, <i>*Heliotropium europaeum</i>, and <i>*Sonchus asper</i>.</p>	Lake system	5.6 ha 0.4%	C2R07	

Vegetation Unit and Description*	Local Landform	Total Area, Proportion of the Survey Area	Sites	Photograph
<p><u>Cleared</u> Cleared or historically cleared areas including mine pits and borrow pits (often filled with water), bitumen roads, and dirt tracks. Some of these areas were showing signs of revegetation. With occasional <i>Eucalyptus griffithsii</i>, <i>Atriplex vesicaria</i>, <i>Maireana</i> spp., and assorted weed species.</p>	Plains	156.9 ha 11.5%	C2Q17, C2Q25	

*Brackets indicate species that may or may not be present, but were observed as dominant/sub-dominant at some of the sites that make up the vegetation type

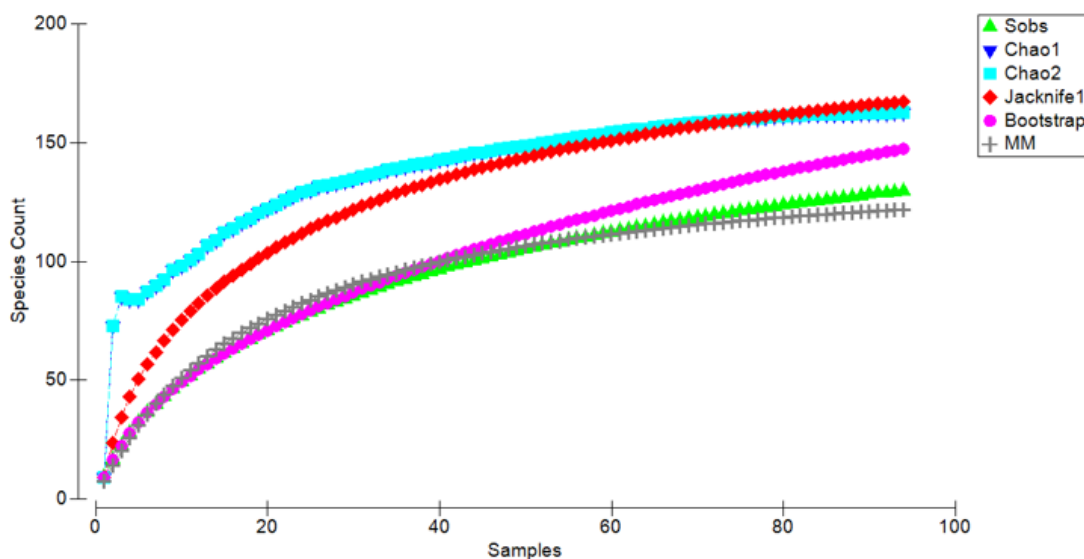
4.2.11 Groundwater Dependent Ecosystems

The Groundwater Dependent Ecosystem (GDE) Atlas identified the Survey Area did not contain any GDEs (Bureau of Meteorology, 2022). The results from the flora and vegetation survey support the GDE Atlas as vegetation in the Survey Area comprised xerophytic species that are not groundwater dependent.

4.2.12 Survey Adequacy

Ninety-six flora sites (74 quadrats and 22 relevés) were sampled across the Survey Area. This was adequate to ensure sufficient coverage given the overall size of the Survey Area. Two vegetation types were sampled with only two sites, while a further two were sampled with a single site. This was due to the vegetation being highly restricted in the Survey Area.

The sample rarefaction (Mao Tau) for the Survey Area produced a smooth S_{obs} curve, steadily increasing towards asymptote indicating that the survey captured the majority of flora taxa present with the Survey Area (Graph 2).



Graph 2: Flora Species Accumulation Curve (Sample rarefaction)

Estimated species richness for the Survey Area ranged from 122.1 to 167.6, with an observed value of 130 taxa (Table 9). Richness estimators indicated that the survey was approximately 77.5% to 106.4% adequate in recording the full complement of vascular flora taxa within the Survey Area (Table 9).

The data used to produce the species accumulation curve was conservative because opportunistic species (which are not associated with a site) were not included. Unconfirmed flora taxa were included if they were the only species present from a Genus.

Table 9: Species Richness Indicators

Treatment	Expected Species Richness	Percentage Adequate
Chao 1	162.8	79.8
Chao 2	162.8	79.8
Jackknife 1	167.6	77.5
Bootstrap	147.6	88.0
Michaelis-Menton	122.14	106.4

4.3 Vertebrate Fauna

4.3.1 Desktop Assessment

The desktop assessment identified 20 conservation significant terrestrial vertebrate fauna species potentially occurring within the Survey Area, comprising 17 birds and three mammals.


Key findings of the literature review are summarized in Appendix A2. Database search results are presented in Figure 9 and Appendix B.

4.3.2 Fauna Habitat

Five broad fauna habitats were identified and mapped within the Survey Area (Figure 10). Habitat condition varied throughout the Survey Area with the most prolific forms of disturbance being previous mining activity, litter, and vehicle tracks. Other disturbances included clearing, erosion, weeds, and introduced fauna.


A description, extent within the Survey Area, and a representative photo is provided for each fauna habitat in Table 10. Small discrepancies in fauna habitat extents (i.e., not adding up to the exact area extent of the Survey Area) are due to rounding. Fauna habitat mapping is presented in Figure 10 and site sheets for each habitat assessment are shown in Appendix F.


Table 10: Fauna Habitat Types within the Survey Area

Fauna Habitat	Total Area, Proportion of the Survey Area	Habitat Description	Representative Photo
<p><i>Acacia</i> Shrublands</p>	<p>75.8 ha</p>	<p><i>Eucalyptus griffithsii</i> low open woodland over <i>Acacia hemiteles</i> and <i>Dodonaea stenozyga</i> (<i>A. jennerae</i>, <i>Alyxia buxifolia</i>) mid shrubland over <i>Senna artemisioides</i> subsp. <i>filifolia</i> and <i>Atriplex vesicaria</i> (<i>Olearia muelleri</i>) low open shrubland</p> <p>Hollow logs, leaf litter, and peeling bark are present throughout this habitat type. These microhabitat features provide shelter and foraging opportunities for small reptiles, birds, and mammals.</p> <p>Conservation significant fauna such as the Malleefowl (<i>Leipoa ocellata</i>) and the Western Quoll, Chuditch (<i>Dasyurus geoffroii fortis</i>) may use this habitat.</p> <p>Habitat condition varied from disturbed to very good. Evidence of disturbance includes previous mining activity, vehicle tracks, litter, and the presence of introduced fauna.</p>	

Fauna Habitat	Total Area, Proportion of the Survey Area	Habitat Description	Representative Photo
Eucalyptus Woodlands	943.9 ha	<p>Mixed <i>Eucalyptus</i> sp. woodlands over <i>Acacia</i> sp., <i>Dodonaea</i> sp., <i>Eremophila</i> sp. or <i>Melaleuca</i> sp., mixed shrublands.</p> <p>Peeling bark, woody debris, leaf litter and hollow logs were observed throughout this habitat type. These microhabitat features provide shelter for small reptiles and mammals. The canopy of trees provides shelter and foraging habitat for birds.</p> <p>Evidence of the conservation significant Western Quoll, Chuditch (<i>Dasyurus geoffroii fortis</i>) was recorded in this habitat type. The Malleefowl (<i>Leipoa ocellata</i>) may also use this habitat.</p> <p>Habitat condition varied from highly degraded to high quality. Evidence of disturbance includes previous mining activity, vehicle tracks, litter, and the presence of introduced fauna.</p>	

Fauna Habitat	Total Area, Proportion of the Survey Area	Habitat Description	Representative Photo
Open Water	2.7 ha	<p>Coolgardie Gorge was located within the Survey Area, with a fringe of introduced flora taxa including <i>*Schinus molle</i> var. <i>areira</i>, <i>*Heliotropium europaeum</i>, and <i>*Sonchus asper</i>. Additional standing water was identified within remnant mine pits, however this may only be temporary.</p> <p>Microhabitats and habitat features unique to this habitat type include exfoliating rock, steep rocky crevices and water sources.</p> <p>Migratory birds such as the Common Sandpiper (<i>Actitis hypoleucos</i>), Sharp-tailed Sandpiper (<i>Calidris acuminata</i>), Curlew Sandpiper (<i>Calidris ferruginea</i>), Wood Sandpiper (<i>Tringa glareola</i>), Common Greenshank (<i>Tringa nebularia</i>) and Glossy Ibis (<i>Plegadis falcinellus</i>) may use these areas.</p> <p>Habitat condition varies from highly degraded to disturbed. Evidence of disturbance includes previous mining activity, vehicle tracks, litter, and the presence of introduced fauna.</p>	

Fauna Habitat	Total Area, Proportion of the Survey Area	Habitat Description	Representative Photo
Rocky Slopes	178.5	<p><i>Acacia collegialis</i> (<i>A. acuminata</i>) tall shrubland over <i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>, <i>E. georgei</i>, <i>Acacia tetragonophylla</i> (<i>Senna artemisioides</i> subsp. <i>filifolia</i>, <i>Exocarpos aphyllus</i>) mid shrubland over <i>Dodonaea lobulata</i> (<i>Atriplex vesicaria</i>, <i>Ptilotus obovatus</i> var. <i>obovatus</i>) low shrubland</p> <p>Leaf litter, peeling bark, rock crevices, and woody debris provides shelter for small reptiles and mammals. Shrublands provide shelter and foraging habitat for birds, reptiles, and mammals.</p> <p>Malleefowl (<i>Leipoa ocellata</i>) may forage within this habitat, however, it is unlikely to nest in this habitat due to the rocky substrate. The Western Quoll, Chuditch (<i>Dasyurus geoffroii fortis</i>) may use this habitat.</p> <p>Habitat condition varies from disturbed to very good. Evidence of disturbance includes previous mining activities, vehicle tracks, litter, and the presence of introduced fauna.</p>	

Fauna Habitat	Total Area, Proportion of the Survey Area	Habitat Description	Representative Photo
Cleared Areas	160.9 ha	<p>Cleared or historically cleared areas including mine pits and borrow pits (often filled with water), bitumen roads, and dirt tracks.</p> <p>Areas of completely cleared land include vehicle access tracks and previous mining activity including mining pits. These areas have limited value as habitat for fauna.</p> <p>The mining pits may provide some habitat for small reptiles and mammals in the form of steep rocky crevices and isolated shrubs and grasses.</p> <p>Evidence of disturbance includes previous mining activity, vehicle tracks, litter, and the presence of introduced fauna.</p>	

4.3.3 Fauna Records

The terrestrial vertebrate fauna survey recorded a total of 61 fauna taxa from 33 families. An inventory of fauna recorded during the field survey is provided in Appendix G.

Table 11: Overview of Vertebrate Fauna Species Recorded

Fauna group	Number of species	Number of families
Birds	42	21
Mammals	10	7
Reptiles	9	5
Amphibians	0	0
Total	61	33

4.3.3.1 Birds

A total of 42 avian taxa from 21 families were recorded throughout the Survey Area. The most recorded taxon was the Budgerigar (*Melopsittacus undulatus*), followed by the Australian Ringneck (*Platycercus zonarius*) and the Singing Honeyeater (*Gavicalis virescens*). The most diverse avifauna families were Meliphagidae (seven taxa) and Acanthizidae (six taxa).

4.3.3.2 Mammals

A total of three native mammals were recorded within the Survey Area. The most recorded native mammal taxon was the Western Grey Kangaroo (*Macropus fuliginosus melanops*). Seven introduced mammal taxa were recorded in the Survey Area, Goat (*Capra hircus*), European Cattle (*Bos primigenius taurus*), Dog/Dingo (*Canis familiaris*), Red fox (*Vulpes vulpes*), Horse (*Equus caballus*), Cat (*Felis catus*) and Rabbit (*Oryctolagus cuniculus*).

4.3.3.3 Reptiles

A total of nine reptilian species from five families were recorded throughout the Survey Area. The most recorded species was the Bobtail (*Tiliqua rugosa*) followed by the Bynoe's Gecko (*Heteronotia binoei*). The most diverse reptilian family was Agamidae (four taxa).

4.3.3.4 Amphibians

No amphibians were recorded during the field survey.

4.3.4 Conservation Significant Fauna

One conservation significant taxon was recorded via observation of a scat during the fauna survey, the Western Quoll, Chuditch (*Dasyurus geoffroii fortis*), which is listed Vulnerable under the BC and EPBC Act (Plate 2).



Plate 2: Scat of Western Quoll, Chuditch (*Dasyurus geoffroii fortis*)

GPS Coordinates: Latitude: -30.920324, Longitude: 121.184610. Image Source 360 Environmental.

Three conservation significant fauna taxa were assessed as having a high likelihood of occurrence within the Survey Area:

- Malleefowl (*Leipoa ocellata*), Vulnerable under the BC and EPBC Act
- Common Sandpiper (*Actitis hypoleucos*), International Agreement under the BC Act and Migratory and Marine under the EPBC Act
- Common Greenshank (*Tringa nebularia*), International Agreement under the BC Act and Migratory and Marine under the EPBC Act.

Four conservation significant taxa were assessed as having a medium likelihood of occurrence within the Survey Area:

- Sharp-tailed Sandpiper (*Calidris acuminata*), International Agreement under the BC Act and Migratory and Marine under the EPBC Act
- Curlew Sandpiper (*Calidris ferruginea*), Critically Endangered, International Agreement under the BC Act and Critically Endangered, Migratory and Marine under the EPBC Act

- Wood Sandpiper (*Tringa glareola*), International Agreement under the BC Act and Migratory and Marine under the EPBC Act
- Glossy Ibis (*Plegadis falcinellus*), International Agreement under the BC Act and Migratory and Marine under the EPBC Act.

Twelve conservation significant taxa were assessed as having a low likelihood of occurrence within the Survey Area. Further details regarding recorded and potential conservation significant fauna are provided below in Table 12.

Table 12: Conservation Significant Fauna Likelihood of Occurrence

Conservation Status: State - Listed under Biodiversity Conservation Act 2016 or Department of Biodiversity, Conservation and Attractions Conservation List, Federal - Listed under Environmental Protection and Biodiversity Conservation Act 1999. CR - Critically Endangered, EN - Endangered, VU - Vulnerable, IA/MI - Migratory, CD - Conservation Dependent fauna, OS - Other Specially Protected fauna, MA - Marine, P - Listed as Priority by DBCA.

Family	Scientific Name	Common Name	Conservation Status		Source					Likelihood of Occurrence	Justification	
			State	Federal	NM	PMST	DBCA	DBCA 15 yrs	Field Survey			
AVIAN												
<i>Apodidae</i>	<i>Apus pacificus</i>	Pacific Swift (Fork-tailed Swift)	IA	MI, MA		x					Low	Three records within 100 km on the Survey Area (Atlas of Living Australia, 2022a). Species may fly over the Survey Area as it covers a wide range of airspace over varied habitat (Morcombe, 2003).
<i>Cacatuidae</i>	<i>Calyptorhynchus latirostris</i>	Carnaby's Cockatoo	EN	EN	x		x	4			Low	This species was recorded 30 km NE of the Survey Area in Kalgoorlie (Department of Biodiversity Conservation and Attractions, 2021c). However, these records occur well outside the known distribution of the species and likely represent a vagrant occurrence of the taxon (Department of Sustainability

Family	Scientific Name	Common Name	Conservation Status		Source					Likelihood of Occurrence	Justification
			State	Federal	NM	PM/ST	DBCA	DBCA 15 Yrs	Field Survey		
											Environment Water Population and Communities, 2012).
Charadriidae	<i>Thinornis cucullatus</i>	Hooded Plover (Hooded Dotterel)	P4	MA			x			Low	Closest record 42 km NE of the Survey Area (Department of Biodiversity Conservation and Attractions, 2021c). No suitable habitat within the Survey Area (Menkhorst <i>et al.</i> , 2017).
Falconidae	<i>Falco hypoleucos</i>	Grey Falcon	VU	VU		x				Low	No recent nearby records. Some records within 100 km on the Survey Area (Atlas of Living Australia, 2022b). Preferred nesting habitat absent. May use Survey Area for hunting (Menkhorst <i>et al.</i> , 2017).
Megapodiidae	<i>Leipoa ocellata</i>	Malleefowl	VU	VU	x	x	x	79		High	Recent records within 1 km of the Survey Area (Department of Biodiversity Conservation and Attractions, 2021c). Recorded 40 km north of the Survey Area in 2019 (Phoenix

Family	Scientific Name	Common Name	Conservation Status		Source					Likelihood of Occurrence	Justification
			State	Federal	NM	PM/ST	DBCA	DBCA 15 Yrs	Field Survey		
											Environmental Sciences, 2019). Suitable habitat present, unburned mallee and woodland with abundant litter and low scrub (Morcombe, 2003)
Motacillidae	<i>Motacilla cinerea</i>	Grey Wagtail	IA	MI, MA		x				Low	Survey Area is well outside of the distribution of this species Area (Atlas of Living Australia, 2022b). Some suitable habitat present in parts i.e. water bodies (Morcombe, 2003).
Psittaculidae	<i>Pezoporus occidentalis</i>	Night Parrot	CR	EN		x				Low	No records within 100 km on the Survey Area (Atlas of Living Australia, 2022b). No suitable habitat within the Survey Area (Morcombe, 2003).
Scolopacidae	<i>Actitis hypoleucos</i>	Common Sandpiper	IA	MI, MA	x	x	x	3		Previously Recorded	Three recent records within the Survey Area (Department of Biodiversity Conservation and Attractions, 2021c). Some suitable habitat present i.e. interior wetlands – narrow muddy edges of billabongs (Morcombe, 2003).

Family	Scientific Name	Common Name	Conservation Status		Source					Likelihood of Occurrence	Justification
			State	Federal	NM	PM/ST	DBCA	DBCA 15 Yrs	Field Survey		
<i>Scolopacidae</i>	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	IA	MI, MA	x	x	x	2		Medium	Nearest record 15 km NW of the Survey Area (Department of Biodiversity Conservation and Attractions, 2021c). Suitable habitat present (water bodies) (Morcombe, 2003).
<i>Scolopacidae</i>	<i>Calidris alba</i>	Sanderling	IA	MI, MA	x		x	1		Low	Nearest record in Kalgoorlie (Department of Biodiversity Conservation and Attractions, 2021c). No suitable habitat within the Survey Area (Menkhorst et al., 2017).
<i>Scolopacidae</i>	<i>Calidris ferruginea</i>	Curlew Sandpiper	CR, IA	CR, MI, MA	x	x	x	1		Medium	Nearest record 15 km NW of Survey Area (Department of Biodiversity Conservation and Attractions, 2021c). Suitable habitat within the Survey Area i.e. around lakes, dams (Morcombe, 2003).
<i>Scolopacidae</i>	<i>Calidris melanotos</i>	Pectoral Sandpiper	IA	MI, MA		x				Low	Survey Area is well outside of the distribution of this species Area (Atlas of Living Australia, 2022b). Some suitable habitat present in parts i.e. inland

Family	Scientific Name	Common Name	Conservation Status		Source					Likelihood of Occurrence	Justification
			State	Federal	NM	PM/ST	DBCA	DBCA 15 Yrs	Field Survey		
											water bodies (Morcombe, 2003).
Scolopacidae	<i>Calidris ruficollis</i>	Red-necked Stint	IA	MI, MA	x		x	1		Low	Nearest record 15 km NW of Survey Area (Department of Biodiversity Conservation and Attractions, 2021c). No suitable habitat within the Survey Area i.e., mudflats (Morcombe, 2003).
Scolopacidae	<i>Tringa brevipes</i>	Grey-tailed Tattler	IA, P4	MI, MA	x		x	1		Low	Nearest record 20 km NE of Survey Area (Department of Biodiversity Conservation and Attractions, 2021c). No suitable habitat within the Survey Area, coastal in Australia (Menkhorst et al., 2017).
Scolopacidae	<i>Tringa glareola</i>	Wood Sandpiper	IA	MI, MA	x		x			Medium	Nearest record 30 km NE of the Survey Area (Department of Biodiversity Conservation and Attractions, 2021c). Suitable habitat within the Survey Area i.e., freshwater

Family	Scientific Name	Common Name	Conservation Status		Source					Likelihood of Occurrence	Justification
			State	Federal	NM	PM/ST	DBCA	DBCA 15 Yrs	Field Survey		
											wetlands (Menkhorst et al., 2017).
Scolopacidae	<i>Tringa nebularia</i>	Common Greenshank	IA	MI, MA	x	x	x	2		Previously Recorded	Recent record within the Survey Area (Department of Biodiversity Conservation and Attractions, 2021c). Suitable habitat within the survey areas i.e. temporary inland wetlands (Morcombe, 2003).
Threskiornithidae	<i>Plegadis falcinellus</i>	Glossy Ibis	IA	MI, MA			x			Medium	Only record 27 km NE of the Survey Area in Kalgoorlie (Department of Biodiversity Conservation and Attractions, 2021c). Some suitable habitat present i.e. temporary wetlands (Morcombe, 2003).
MAMMALIAN											
Dasyuridae	<i>Dasyurus geoffroii fortis</i>	Western Quoll, Chuditch	VU	VU		x	x		x	Recorded	A scat was found within the Survey Area during the current survey, identified to be this species. Some suitable habitat present mallee

Family	Scientific Name	Common Name	Conservation Status		Source					Likelihood of Occurrence	Justification
			State	Federal	NM	PM/ST	DBCA	DBCA 15 Yrs	Field Survey		
											shrubland (Van Dyck and Strahan, 2008).
Myrmecobiidae	<i>Myrmecobius fasciatus</i>	Numbat, Walpurti	EN	EN	x					Low	No nearby records (Atlas of Living Australia, 2022b). Some suitable habitat is present i.e. eucalypts and wandoo woodland (Van Dyck and Strahan, 2008). The only natural populations exist well outside the Survey Area in the far north of WA (Department of Biodiversity Conservation and Attractions, 2017b).
Thylacomyidae	<i>Macrotis lagotis</i>	Bilby, Dalgyte	VU	VU	x					Low	No nearby records (Atlas of Living Australia, 2022b). No suitable habitat is present (Van Dyck and Strahan, 2008).
INSECTS											
Lycaenidae	<i>Jalmenus aridus</i>	Inland Hairstreak	P1 (not WAM)		x		x			Medium	Nearest record 19 km NE of the Survey Area (Department of Biodiversity Conservation and Attractions, 2021c). Suitable habitat present within the Survey Area

Family	Scientific Name	Common Name	Conservation Status		Source					Likelihood of Occurrence	Justification
			State	Federal	NM	PM/ST	DBCA	DBCA 15 yrs	Field Survey		
											(Williams, Williams and Lundstrom, 1998)
Lycaenidae	<i>Ogyris subterrestris petrina</i>	Arid Bronze Azure Butterfly	CR (not WAM)	CR (not WAM)	x	x	x			Medium	No recent records (Department of Biodiversity Conservation and Attractions, 2021c). Suitable habitat present (smooth bark <i>Eucalyptus</i> sp.) (Department of Biodiversity Conservation and Attractions, 2020b).

5 Discussion

5.1 Flora and Vegetation

5.1.1 Flora Composition

The suite of flora taxa recorded during the survey is considered typical for the area (Beard 1976) and aligns with the database search results obtained and with previous surveys conducted around the Survey Area.

5.1.2 Survey Adequacy

The flora and vegetation survey effort was in accordance with the scope of works, and appropriate for a detailed flora and vegetation survey in the Eastern Goldfields region.

The Survey Area was sampled with 74 quadrats, 22 relevés and an additional 91 mapping notes. Of the 10 vegetation types defined, four were not sampled with three flora sites. Vegetation types Ec and EooEiiDs were sampled with two sites only due to limited distribution of the vegetation (<1% each). Vegetation types Sl, and Lake were sampled only once due to the landforms (clay and lake) being very limited in distribution.

The inventory of vascular flora was compiled using site data and opportunistic observations made while traversing between sites and during targeted searching within the Survey Area. The entire Survey Area was not systematically searched, and therefore additional flora taxa, and records of conservation significant flora and weed species may be recorded with additional survey effort.

5.1.3 Flora of Conservation Significance

No Threatened flora species pursuant to the EPBC Act 1999 and/or gazetted as Threatened Flora pursuant to the BC Act 2016 were recorded within the Survey Area.

Ten individuals of *Austrostipa blackii* (P3) were recorded from quadrat C1Q01, within vegetation type AcEoaDI. This vegetation type was sampled heavily, and no other records of the taxon were recorded. With more intensive surveys additional individuals may be recorded, as this vegetation type and landform (rocky hills) cover 13.1% of the Survey Area.

5.1.4 Likelihood of Occurrence

Of the 90 Priority flora identified by the database searches, only one was recorded from the Survey Area (*Austrostipa blackii* (P3)). Of the remaining 89 taxa, two were considered to retain a high likelihood of occurrence following the survey:

- *Acacia websteri* (P1): A tall shrub or tree is known only from the Bencubbin and Coolgardie-Kambalda areas, and grows mostly in red loam, sand, and clay in drainage depressions among shrubland and scrub. The habitat for this taxon is present within the Survey Area, and the closest location is <1 km from the survey boundary.

- *Eremophila veronica* (P3): A record of this erect shrub to 40cm high (80cm wide) was located 500 m from the Survey Area, in vegetation similar in appearance to that within the survey boundary. The record was noted as growing with *E. salubris*, *A. burkittii*, and *Cylindropuntia tunicata*.

A further 18 taxa were considered to have a medium likelihood of occurrence due to presence of habitat and records within 15 km of the Survey Area boundary. The remaining taxa were considered to have a low likelihood of occurrence.

5.1.5 Introduced Flora

Thirteen weed species were recorded in the Survey Area, of which one, **Opuntia stricta* (Common Prickly Pear), is a Declared Pest and listed as a WoNS.

Weed diversity and population abundance are consistent with the region and land use (mining operations, broadacre cropping and sheep farming).

Weed species richness and abundance was greatest in previously cleared areas such as old drill pads/ excavation works and associated tracks. Weed species, particularly **Opuntia stricta* were present in relatively high abundance near Great Eastern Highway. The publicly accessible semi-pool 'Coolgardie Gorge' contained dense weed numbers along the edge and in the immediate surrounds.

5.1.6 Unconfirmed Flora

Eighteen specimens collected during the field survey were sterile and could not be confidently identified beyond genus level. None of these were analogous to Priority flora taxa identified by the database searches.

5.1.7 Vegetation Types

No vegetation representative of any TECs or PECs was recorded in the Survey Area.

Mapping reliability across the survey area was high, and the majority of the Survey Area was traversed on foot. The plains through the majority of the Survey Area showed a mosaic of different *Eucalyptus* spp. that could not be easily separated via quadrating or aerial imagery. However, *E. salmonophloia* was scattered across the majority of the plains, with *E. celastroides*, *E. clelandiorum*, and *E. torquate* at varying densities across the plains. This is common across the region, as underlying geology affects the vegetation on a fine scale. The Survey Area was dominated by these plains, along with rocky hills dominated by *Acacia collegialis* tall shrubs. While this vegetation type AcEoaDI rocky hills did support *Austropstipa blackii* (P3), only one population was recorded through 21 quadrats in the vegetation. As such it was not considered to be a distinctive habitat of the taxon, and not considered to be vegetation of local significance.

Coolgardie Gorge is a natural semi-pool landform present within the Survey Area, which is also a public recreation area, as such it contains many introduced (weed) taxa. The landform is limited in size, with the vegetation unique and restricted to a small radius around the semi-pool.

Numerous patches within the Survey Area were considered either recently or historically cleared. Some of these historically cleared areas contained some regrowing native and weed taxa, however, were still considered to be cleared as they were predominantly bare, and any native taxa did not represent the surrounding vegetation. One small area of claypan vegetation was recorded and sampled with a single quadrat. After recent rains, this claypan landform may contain an increased load of annual and cryptic taxa.

5.2 Vertebrate Fauna

5.2.1 Fauna Habitat

The five broad fauna habitats identified within the Survey Area are typical of the Coolgardie bioregion and consistent with habitats identified by previous studies in the region (Terrestrial Ecosystems, 2018; Phoenix Environmental Sciences, 2019; Strategen Environmental, 2019; Biostat Pty Ltd, 2020). Of the habitats within the Survey Area, the *Eucalyptus* Woodlands, *Acacia* Shrublands and Open Water habitats, particularly the semi-permanent pool at Coolgardie Gorge, represent the most value to the overall fauna assemblage within the Survey Area. The *Eucalyptus* Woodlands and the *Acacia* Shrubland habitats are valuable due to the variety of micro habitats present. Peeling bark, woody debris, leaf litter and hollow logs were observed throughout these habitat types. The dense understorey observed in these habitat types may provide refuge and shelter for a variety of mammals, reptiles, and birds. Specifically, these habitat types may provide suitable breeding and nesting habitat for the Malleefowl (*Leipoa ocellata*) and foraging habitat for the Western Quoll, Chuditch (*Dasyurus geoffroii fortis*).

The Open Water habitat provides an important water source for fauna within the Survey Area and is particularly important for water birds, including several significant species. The Open Water habitat at Coolgardie Gorge is surrounded by vegetation that provides potential foraging, roosting, and nesting habitat for a wide variety of fauna taxa. Old mine pits throughout the Survey Area may have water present, however it will be of less value to most fauna species due to a lack of surrounding vegetation.

The Rocky Slopes habitat contains crevices that may provide refuge and shelter for small fauna taxa. This habitat type generally lacks the dense understory found in the *Eucalyptus* Woodlands and the *Acacia* Shrubland habitats, making it less suitable for the Malleefowl and its slope reduces its value as Malleefowl nesting habitat.

Cleared Areas provide limited habitat value for fauna; however, some small mammals and reptiles may use the rocky crevices within the steep walls of mining pits and the low isolated shrubs occasionally found in other Cleared Areas for shelter and foraging.

The habitat condition varied widely throughout the Survey Area from highly degraded to high quality. The most common forms of disturbance included previous mining activity, litter, and vehicle tracks. Species with a limited dispersal capability may be restricted by these impacts, whilst movements of birds, larger reptiles, and mammals between surrounding habitats are unlikely to be severely impeded by these disturbances.

5.2.2 Conservation Significant Fauna

5.2.2.1 Recorded

Western Quoll, Chuditch (*Dasyurus geoffroii fortis*), Vulnerable under the BC Act and EPBC Act

The Chuditch inhabits areas dominated by sclerophyll forest or drier woodland, heath and mallee shrubland (Van Dyck and Strahan, 2008). The species is generally highly mobile and uses bush remnants as corridors (Woinarski, Burbidge and Harrison, 2014). The Chuditch is a largely nocturnal animal, feeding on a carnivorous diet of mammals, birds, lizards, and frogs. Although they have been recorded foraging during the day at particular times such as during the breeding season or when cold and wet weather restricts their nocturnal movements (Van Dyck and Strahan, 2008). Most diurnal nesting sites in sclerophyll forest consist of hollow logs or earth burrows, although bandicoot nests and hollow tree bases may be used (Van Dyck and Strahan, 2008). The Chuditch was abundant prior to European settlement, and it is now largely restricted to the south-west of Western Australia, with small numbers in the Midwest, Wheatbelt and South Coast regions (Department of Biodiversity Conservation and Attractions, 2017a).

Chuditch scat was recorded within the Survey Area. Of the habitat types present with the Survey Area the *Eucalyptus* Woodland and *Acacia* Shrubland present the most value to this species. These habitats contain mallee woodland and shrubland, which the Chuditch often inhabits as well hollow logs and tree bases which are used for denning (Van Dyck and Strahan, 2008). The suitability of these habits likely varies with the degree of disturbance which may alter prevalence of both denning sites and availability of prey.

5.2.2.2 High Likelihood

Malleefowl (*Leipoa ocellata*), Vulnerable under the BC Act and EPBC Act

The Malleefowl is found in semi-arid to arid shrublands and low woodlands, especially those dominated by mallee and/or *Acacia*. The species nests in large mounds of dirt and leaf litter up to five metres wide and one metre tall (Menkhorst et al., 2017). Sandy substrates and abundance of leaf litter are required for breeding (Department of the Environment and Energy, 2018). Densities of the birds are generally greatest in areas of higher rainfall and on more fertile soils where there is an abundance of food plants.

The Malleefowl has recently been recorded within 1 km of the Survey Area and is therefore highly likely to use suitable habitat within the Survey Area (Department of Biodiversity Conservation and Attractions, 2022). The *Eucalyptus* Woodland and *Acacia* Shrubland habitats constitute suitable habitat for the taxon. No mounds, tracks, or other signs of the taxon observed during the field survey. When present, these signs are obvious and detectable (National Malleefowl Recovery Team, 2016). While breeding may occur in the Survey Area, it is unlikely that high densities of breeding individuals are present.

Common Sandpiper (*Actitis hypoleucos*), International Agreement under the BC Act and Migratory and Marine under the EPBC Act.

The Common Sandpiper typically feeds on mollusks and crustaceans as well as a variety of insects. It is a migratory species that uses varied coastal and interior wetlands including narrow muddy edges of billabongs, river pools, mangroves, among rocks and snags, reefs or rocky beaches (Morcombe, 2003). It migrates from mid-northern latitudes of Asia (Menkhorst *et al.*, 2017) and likely breeds in the Russian far east (Pizzey and Knight, 2001).

The Common Sandpiper was not recorded during the current field survey, however it has been recorded within the Survey Area previously (Department of Biodiversity Conservation and Attractions, 2022). The taxon may use the Open Water habitat within the Survey Area, particularly the Coolgardie Gorge for foraging and roosting.

Common Greenshank (*Tringa nebularia*), International Agreement under the BC Act and Migratory and Marine under the EPBC Act.

The Common Greenshank is a migratory species to Australia that typically breeds in Norway (BirdLife International, 2016). The species is found in a wide variety of wetlands from coastal to freshwater, where it wades in shallow water foraging for prey, often lunging or probing for fish and invertebrates (Pizzey and Knight, 2001; BirdLife International, 2016; Menkhorst *et al.*, 2017).

The Common Greenshank was not recorded during the current field survey, however, it has been recorded within the Survey Area previously (Department of Biodiversity Conservation and Attractions, 2022). The taxon may use the Open Water habitat within the Survey Area, particularly the Coolgardie Gorge for foraging and roosting.

5.2.2.3 Medium Likelihood

Sharp-tailed Sandpiper (*Calidris acuminata*), International Agreement under the BC Act and Migratory and Marine under the EPBC Act.

The Sharp-tailed Sandpiper is a small-medium migratory wader, nesting in the northern Siberian Tundra and is one of the most common shorebirds to inhabit in fresh and saline wetlands occurring inland in Australia (Menkhorst *et al.*, 2017). In Western Australia there are scattered records of the species occurring along the Nullarbor Plain and the southern areas of the Great Victoria Desert. They are widespread from Cape Arid to Carnarvon, around coastal and subcoastal plains of the Pilbara Region to south-west and east Kimberley (Pizzey and Knight,

2001). It also forages in grasslands and tidal areas. The species typically prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation (Pizzey and Knight, 2001).

The Sharp-tailed Sandpiper was not recorded during the field survey. The nearest record was 15 km northwest of the Survey Area (Department of Biodiversity Conservation and Attractions, 2022). The taxon may use the Open Water habitat within the Survey Area, particularly the Coolgardie Gorge for foraging and roosting.

Curlew Sandpiper (*Calidris ferruginea*), Critically Endangered, International Agreement under the BC Act and Critically Endangered, Migratory and Marine under the EPBC Act.

The Curlew Sandpiper is a small, slim sandpiper that is most commonly found on large tidal flats, occasionally using brackish and freshwater wetland systems (Menkhorst *et al.*, 2017). They typically forage on invertebrates throughout mudflats and nearby shallow water. The species is migratory and nests in Arctic Siberia, and in Western Australia are widespread around coastal and subcoastal plains from Cape Arid to the south-west Kimberley (Pizzey and Knight, 2001).

The Curlew Sandpiper was not recorded during the field survey. The nearest record was 15 km northwest of the Survey Area (Department of Biodiversity Conservation and Attractions, 2022). The taxon may use the Open Water habitat within the Survey Area, particularly the Coolgardie Gorge for foraging and roosting.

Wood Sandpiper (*Tringa glareola*), International Agreement under the BC Act and Migratory and Marine under the EPBC Act.

The Wood Sandpiper is a small, thin wader that uses well-vegetated, shallow, freshwater wetlands such as swamps, billabongs, lakes, pools and waterholes (Menkhorst *et al.*, 2017). The species is generally associated with emergent aquatic plants or grass, and they forage on moist or dry mud at the edges of wetlands. The Wood Sandpiper is a migratory species, breeding in the subarctic Siberia with some individuals migrating to Australia (Menkhorst *et al.*, 2017). In Western Australia the species is widespread but scattered in most regions (Pizzey and Knight, 2001).

The Wood Sandpiper was not recorded during the field survey. The nearest record was 30 km northeast of the Survey Area (Department of Biodiversity Conservation and Attractions, 2022). The taxon may use the Open Water habitat within the Survey Area, particularly the Coolgardie Gorge for foraging and roosting.

Glossy Ibis (*Plegadis falcinellus*), International Agreement under the BC Act and Migratory and Marine under the EPBC Act.

The preferred foraging and breeding habitat of the Glossy Ibis includes fresh water marshes at the edges of lakes and rivers, lagoons, flood-plains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation (Marchant and Higgins, 1990; del Hoyo, Elliot and Sargatal, 1992). The Glossy Ibis builds a platform nest of sticks in trees or shrubs above

water and typically nests in colonies (Pizzey and Knight, 2013). The distribution of the Glossy Ibis is generally east of the Kimberley in Western Australia and Eyre Peninsula in South Australia. The species is also known to be patchily distributed in the rest of Western Australia (Department of the Environment and Energy, 2020).

The Glossy Ibis was not recorded during the field survey, however, it has been recorded 27 km northeast of the Survey Area in Kalgoorlie (Department of Biodiversity Conservation and Attractions, 2022). The taxon may use the Open Water habitat within the Survey Area, particularly the Coolgardie Gorge for foraging and roosting.

5.3 Invertebrates

Although outside the scope of this report, two conservation significant invertebrates were identified as potentially occurring within the Survey Area.

Arid Bronze Azure Butterfly (*Ogyris subterrestris petrina*), Critically Endangered under the BC Act and EPBC Act.

Following the extirpation of the only known population in the early 1990s, the Arid Bronze Azure Butterfly (ABAB) was rediscovered at Barbalin Nature Reserve in 2006. The ABAB can only reproduce where nests of the sugar ant, *Camponotus* sp. nr. *terebrans* are present. The ants protect the larvae from predators and in return, the ants feed on secretions produced by the ABAB larvae. Unlike other species in this genus, the ABAB larva do not eat vegetation and are entirely dependent upon the host ant. The ABAB larvae require large ant colonies that are typically found at the base of many species of smooth-barked eucalypts including *Eucalyptus salubris* and *E. salmonophloia* (Department of Biodiversity Conservation and Attractions, 2020b).

The presence of multiple smooth-barked eucalypt species within the known distribution of the host ant *Camponotus* sp. nr. *terebrans* suggests that suitable habitat for the ABAB may occur within the survey area. The presence of potentially suitable ABAB habitat within the range of the host ant requires surveys to determine the presence and density of *Camponotus* sp. nr. *terebrans* colonies (Department of Biodiversity Conservation and Attractions, 2020a, 2020b). Consequently, a targeted survey for host ant colonies was conducted in Dec 2021. The results of this survey are presented in a separate report in preparation (360 Environmental 2022, in prep).

Inland Hairstreak (*Jalmenus aridus*), Priority 1 under the BC Act.

Jalmenus aridus is one of ten currently recognised species in the genus *Jalmenus*, which is found only in Australia. *Jalmenus* species feed openly on the foliage of their respective host plants, and all are attended by specific ant species. *Jalmenus aridus* is attended by the ant species *Froggattella kirbii* (Sands and New, 2002). *Jalmenus aridus* is protected by the ants from predators and parasitoids and the butterfly caterpillars reward the ants with sweet liquid produced in special organs.

The butterfly is only present in its adult form for short periods of time (perhaps only two to three weeks at a given site). Timing of adult emergence is linked to rainfall patterns, plant growth stages and other ecological conditions with most likely flight times from mid-October to mid-November.

The ant, *Froggattella kirbii* is found from near Perth to the East coast of Australia and is associated with two known host plants. One host plant, *Senna nemophila (artemisioides)*, is found over most of central and eastern WA while the other known host plant, *Acacia tetragonophylla*, is found almost everywhere in WA except the very far north and far south.

During the surveys, it was observed that suitable habitat was present within the Survey Area. Additional targeted surveys will be required to confirm the presence of *Jalmenus aridus* within the Survey Area.

6 Conclusion

Flora and Vegetation

- No Threatened Listed flora species pursuant to the EPBC Act 1999 and/or gazetted as Threatened/Declared Rare Flora pursuant to the BC Act 2016 were recorded
- Ten individuals of *Austrostipa blackii* (P3), were recorded in one quadrat (C1Q01)
- Thirteen introduced species were recorded during the survey, of which one, **Opuntia stricta*, is a Declared Pest and listed as a WoNS
- Ten vegetation types were mapped within the Survey Area, none of which were analogous to conservation significant ecological communities.

Vertebrate Fauna

- Five fauna habitats were mapped, of which the *Eucalyptus* Woodland, *Acacia* Shrubland, and Open Water habitat types represent the most value to conservation significant fauna and overall fauna assemblages. A naturally occurring pool at Coolgardie Gorge was of particularly value to water birds and to the overall fauna assemblage.
- One conservation significant species, the Western Quoll, Chuditch (*Dasyurus geoffroii fortis*), which is listed as Vulnerable under the BC Act and EPBC Act, was recorded within the Survey Area. Chuditch scat was observed during the field survey.
- Seven introduced species were recorded during the survey, Goat (*Capra hircus*), European Cattle (*Bos primigenius taurus*), Dog/Dingo (*Canis familiaris*), Red fox (*Vulpes vulpes*), Horse (*Equus caballus*), Cat (*Felis catus*) and Rabbit (*Oryctolagus cuniculus*).
- One significant fauna species, the Western Quoll, Chuditch (*Dasyurus geoffroii fortis*) which is listed as Vulnerable under the BC Act and EPBC Act, was recorded within the Survey Area based on a scat observed during the field survey.
- Although outside the scope of this report, potential habitat for Arid Bronze Azure Butterfly (*Ogyris subterrestris petrina*), which is listed as Critically Endangered under the BC Act and EPBC Act, and the Inland Hairstreak butterfly (*Jalmenus aridus*), which is listed as Priority 1 by the DBCA, was observed within the Survey Area.

7 Report Disclaimer

This report is produced strictly in accordance with the scope of services set out in the contract or otherwise agreed in accordance with the contract. 360 Environmental makes no representations or warranties in relation to the nature and quality of soil and water other than the visual observation and analytical data in this report.

In the preparation of this report, 360 Environmental has relied upon documents, information, data, and analyses ('client's information') provided by the client and other individuals and entities. In most cases where client's information has been relied upon, such reliance has been indicated in this report. Unless expressly set out in this report, 360 Environmental has not verified that the client's information is accurate, exhaustive, or current and the validity and accuracy of any aspect of the report including, or based upon, any part of the client's information is contingent upon the accuracy, exhaustiveness, and currency of the client's information. 360 Environmental shall not be liable to the client or any other person in connection with any invalid or inaccurate aspect of this report where that invalidity or inaccuracy arose because the client's information was not accurate, exhaustive, and current or arose because of any information or condition that was concealed, withheld, misrepresented, or otherwise not fully disclosed or available to 360 Environmental.

Aspects of this report, including the opinions, conclusions, and recommendations it contains, are based on the results of the investigation, sampling and testing set out in the contract and otherwise in accordance with normal practices and standards. The investigation, sampling and testing are designed to produce results that represent a reasonable interpretation of the general conditions of the site that is the subject of this report. However, due to the characteristics of the site, including natural variations in site conditions, the results of the investigation, sampling and testing may not accurately represent the actual state of the whole site at all points.

It is important to recognise that site conditions, including the extent and concentration of contaminants, can change with time. This is particularly relevant if this report, including the data, opinions, conclusions, and recommendations it contains, are to be used a considerable time after it was prepared. In these circumstances, further investigation of the site may be necessary.

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8 References

- Atlas of Living Australia (2022a) *No Title*. Available at: <https://www.ala.org.au/>.
- Atlas of Living Australia (2022b) *No Title*.
- Beard, J. S. (1976) *Vegetation survey of Western Australia. Western Australia 1: 1 000 000 vegetation series. Design and cartography by Dept. of Geography, University of W.A.*
- Biostat Pty Ltd (2020) *Vegetation Clearing - Fauna Assessment (Davyhurst, Callion, Waihi, Siberia, Riverina Clearance Areas)*.
- BirdLife International (2016) *Tringa nebularia. The IUCN Red List of Threatened Species 2016*. Available at: <https://www.iucnredlist.org/species/22693220/86684205>.
- Botanica Consulting (2020) *Flora and Vegetation Impact Assessment - Medcalf Project*.
- Bureau of Meteorology (2021) *Monthly climate data statistics*. Available at: www.bom.gov.au/climate/data.
- Bureau of Meteorology (2022) *Groundwater Dependent Ecosystems Atlas*.
- Clarke, K. R. and Gorley, R. N. (2006) 'Primer-E v6'. Plymouth, United Kingdom, United Kingdom.
- Cowan, M. (2001) *Coolgardie 3 (COO3 – Eastern Goldfields subregion)*. Available at: https://www.dpaw.wa.gov.au/images/documents/about/science/projects/waaudit/coolgardie_03_p156-169.pdf.
- Data WA (2021) *Mining Tenements (DMIRS-003), Mining Tenements (DMIRS-003)*. Available at: <https://catalogue.data.wa.gov.au/dataset/mining-tenements-dmirs-003>.
- Department of Agriculture and Food WA (2012) *Soil-landscape systems of Western Australia - GIS dataset*. Perth, Australia.
- Department of Agriculture Water and the Environment (2020) *Protected Matters Search Tool*. Canberra, Australia. Available at: <http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf>.
- Department of Agriculture Water and the Environment (2021a) *Protected Matters Search Tool*. Canberra, Australia. Available at: <http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf>.
- Department of Agriculture Water and the Environment (2021b) *Weeds of National Significance*. Available at: <https://weeds.org.au/>.
- Department of Biodiversity Conservation and Attractions (2017a) *Fauna Profile - Chuditch *Dasyurus geoffroii**. Available at: https://www.dpaw.wa.gov.au/images/documents/plants-animals/animals/animal_profiles/chuditch_fauna_profile.pdf.
- Department of Biodiversity Conservation and Attractions (2017b) *Fauna Profile - Numbat *Myrmecobius fasciatus*, 2017*. Available at: https://www.dpaw.wa.gov.au/images/documents/plants-animals/animals/animal_profiles/numbat_fauna_profile.pdf.
- Department of Biodiversity Conservation and Attractions (2020a) *Arid bronze azure butterfly (ABAB) survey in Western Australia additional information*.

Department of Biodiversity Conservation and Attractions (2020b) *Guideline for the survey of arid bronze azure butterfly (ABAB) in Western Australia*.

Department of Biodiversity Conservation and Attractions (2021a) *DBCA - Legislated Lands and Waters (DBCA-011) GIS Dataset*. Perth, Australia. Available at: <https://catalogue.data.wa.gov.au/dataset/dbca-legislated-lands-and-waters>.

Department of Biodiversity Conservation and Attractions (2021b) *NatureMap*. Perth, Western Australia. Available at: <https://naturemap.dpaw.wa.gov.au/>.

Department of Biodiversity Conservation and Attractions (2021c) *Threatened and Priority Fauna database request (custom search)*. Perth, Australia.

Department of Biodiversity Conservation and Attractions (2021d) *Threatened and Priority Flora List (TPFL) database request (custom search)*. Perth, Australia.

Department of Biodiversity Conservation and Attractions (2021e) *Western Australia Herbarium Flora Database (custom search)*. Perth, Australia.

Department of Biodiversity Conservation and Attractions (2022) *Threatened and Priority Ecological Communities database request (custom search)*.

Department of Primary Industries and Regional Development (2018) *Soil Landscape Mapping - Systems (DPIRD-064) - GIS Dataset*. Perth, Australia. Available at: <https://catalogue.data.wa.gov.au/dataset/soil-landscape-mapping-systems>.

Department of Primary Industries and Regional Development (2021) *Declared plants*. Available at: <https://www.agric.wa.gov.au/organisms>.

Department of Sustainability Environment Population and Communities (1999) *Survey Guidelines for Australia's Threatened Mammals*. Canberra, Australia. Available at: <http://www.environment.gov.au/system/files/resources/b1c6b237-12d9-4071-a26e-ee816caa2b39/files/survey-guidelines-mammals.pdf>.

Department of Sustainability Environment Water Population and Communities (2011) *Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the EPBC Act*. Canberra, Australia. Available at: <http://www.environment.gov.au/resource/survey-guidelines-australias-threatened-reptiles-guidelines-detecting-reptiles-listed>.

Department of Sustainability Environment Water Population and Communities (2012) *EPBC Act Referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo, Baudin's cockatoo and Forest red-tailed black cockatoo*. Canberra, Australia.

Department of the Environment (2013) *Matters of National Environmental Significance: Significant impact guidelines 1.1*. Canberra, Australia. Available at: http://www.environment.gov.au/system/files/resources/42f84df4-720b-4dcf-b262-48679a3aba58/files/nes-guidelines_1.pdf (Accessed: 24 July 2018).

Department of the Environment and Energy (2018) *Leipoa ocellata - Malleefowl*. Available at: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=934.

Department of the Environment and Energy (2020) *Plegadis falcinellus in Species Profile and Threats (SPRAT) database*. Available at: https://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=991.

Department of the Environment Water Heritage and the Arts (2010) *Survey guidelines for*

Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act. Canberra, Australia. Available at:

<http://www.environment.gov.au/system/files/resources/107052eb-2041-45b9-9296-b5f514493ae0/files/survey-guidelines-birds-april-2017.pdf> (Accessed: 24 July 2018).

Department of Water and Environmental Regulation (2018) *Hydrography, Linear (Hierarchy) (DWER-031) - GIS Dataset*. Perth, Australia: Landgate. Available at:

<https://catalogue.data.wa.gov.au/dataset/hydrography-linear-hierarchy>.

Department of Water and Environmental Regulation (2020) *Clearing Regulations - Environmentally Sensitive Areas (DWER-046)*. Available at:

<https://catalogue.data.wa.gov.au/dataset/clearing-regulations-environmentally-sensitive-areas-dwer-046>.

Van Dyck, S. and Strahan, R. (2008) *The mammals of Australia*. 3rd edn. Sydney, Australia: New Holland Publishers.

Environmental Protection Authority (2016) *Technical Guidance - Flora and Vegetation surveys for Environmental Impact Assessment*. Perth, Australia. Available at:

http://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/EPA_Technical_Guidance_-_Flora_and_Vegetation_survey_Dec13.pdf.

Environmental Protection Authority (2020) *Technical Guidance - Terrestrial vertebrate fauna surveys for environmental impact assessment*. Perth, Australia. Available at:

<https://www.epa.wa.gov.au/policies-guidance/technical-guidance-terrestrial-vertebrate-fauna-surveys-environmental-impact>.

Government of Western Australia (2019) *2018 Statewide Vegetation Statistics - Full Report*.

Available at: <https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics/resource/b7bd60c2-bff6-4637-b213-ae4706412c7>.

del Hoyo, J., Elliot, A. and Sargatal, J. (). (1992) *Handbook of the Birds of the World. 1. Ostrich to Ducks*. Spain: Lynx Edicions.

Keighery, B. (1994) *Bushland Plant Survey: A Guide to Plant Community Survey for the Community*. Floreat, Western Australia.

Marchant, S. and Higgins, P. J. (1990) *Handbook of Australian, New Zealand and Antarctic Birds. Volume 1 - Ratites to Ducks*. Melbourne: Oxford University Press.

Menkhorst, P. *et al.* (2017) *The Australian bird guide*. Australia: CSIRO Publishing.

Morcombe, M. (2003) *Field Guide to Australian Birds*. Archerfield: Steve Parish Publishing Pty Ltd.

National Malleefowl Recovery Team (2016) *NATIONAL MALLEEFOWL Monitoring Manual*.

Native Vegetation Solutions (2018) *Reconnaissance Flora and Vegetation Survey of Lot 500 Great Eastern Highway Kalgoorlie*.

Native Vegetation Solutions (2019) *Reconnaissance Flora and Vegetation Survey for the Mt Marion Project Area*.

Native Vegetation Solutions (2020) *Reconnaissance Flora and Vegetation Survey of the Spargos Project - October 2020*.

Phoenix Environmental Sciences (2019) *Fauna survey for Mungari Gold Operations Cutters*

Ridge Project.

Pizzey, G. and Knight, F. (2001) *Field Guide to Birds of Australia*. Pymble, Australia: Harpercollins Australia.

Pizzey and Knight (2013) *Birds of Australia, Digital Edition*. Melbourne, Australia: Gibbon Multimedia.

Sands, D. P. A. and New, T. R. (2002) *The Action Plan for Butterflies*. Canberra: Environment Australia.

Shepherd, D. P., Beeston, G. R. and Hopkins, A. J. M. (2002) *Native Vegetation in Western Australia Technical Report 249*. Perth, Australia.

Strategen Environmental (2019) *Coolgardie Landfill - Flora, vegetation and fauna habitat assessment*.

Terrestrial Ecosystems (2018) *Level 1 Vertebrate Fauna Risk Assessment for Lot 500 Kalgoorlie West*.

Western Australian Herbarium (2021) *FloraBase - The Western Australian Flora*. Perth, Australia. Available at: <https://florabase.dpaw.wa.gov.au>.

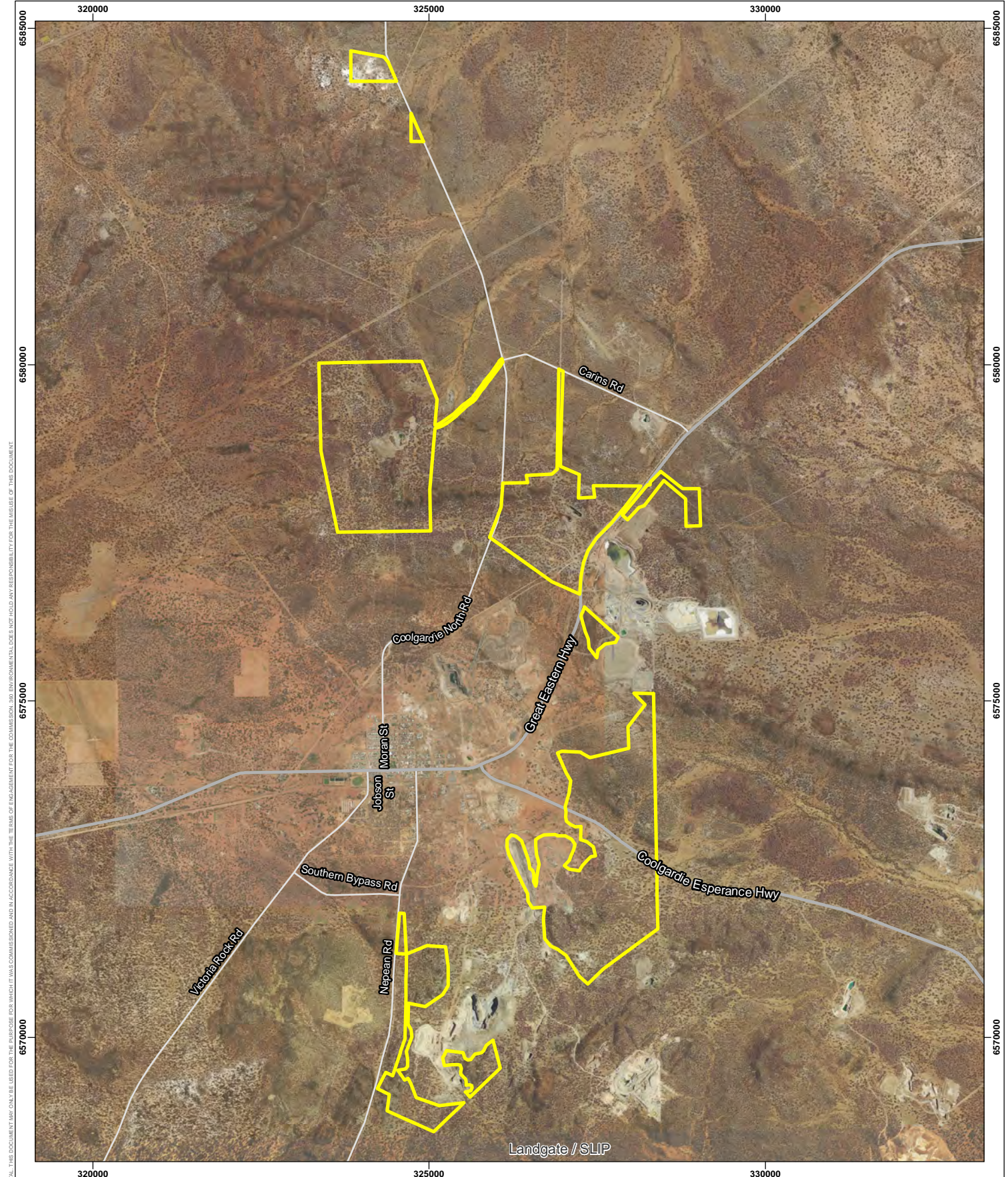
Western Australian Herbarium (2022) *FloraBase - The Western Australian Flora*. Available at: <https://florabase.dpaw.wa.gov.au/>.

Western Australian Museum (2019) *Checklist of the Terrestrial Vertebrate Fauna of Western Australia | Western Australian Museum*. Perth, Australia. Available at: <http://museum.wa.gov.au/research/departments/terrestrial-zoology/checklist-terrestrial-vertebrate-fauna-western-australia> (Accessed: 3 August 2018).

Williams, M., Williams, A. and Lundstrom, T. (1998) 'Jewels of the West', *Landscape*, pp. 49–53.

Woinarski, J., Burbidge, A. and Harrison, P. (2014) *The action plan for Australian mammals 2012*. CSIRO Publishing.

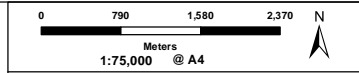
Figures



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Legend

- Survey Area
- State Road

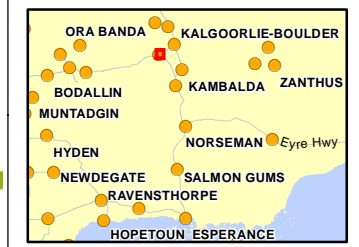


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LOCALITY MAP



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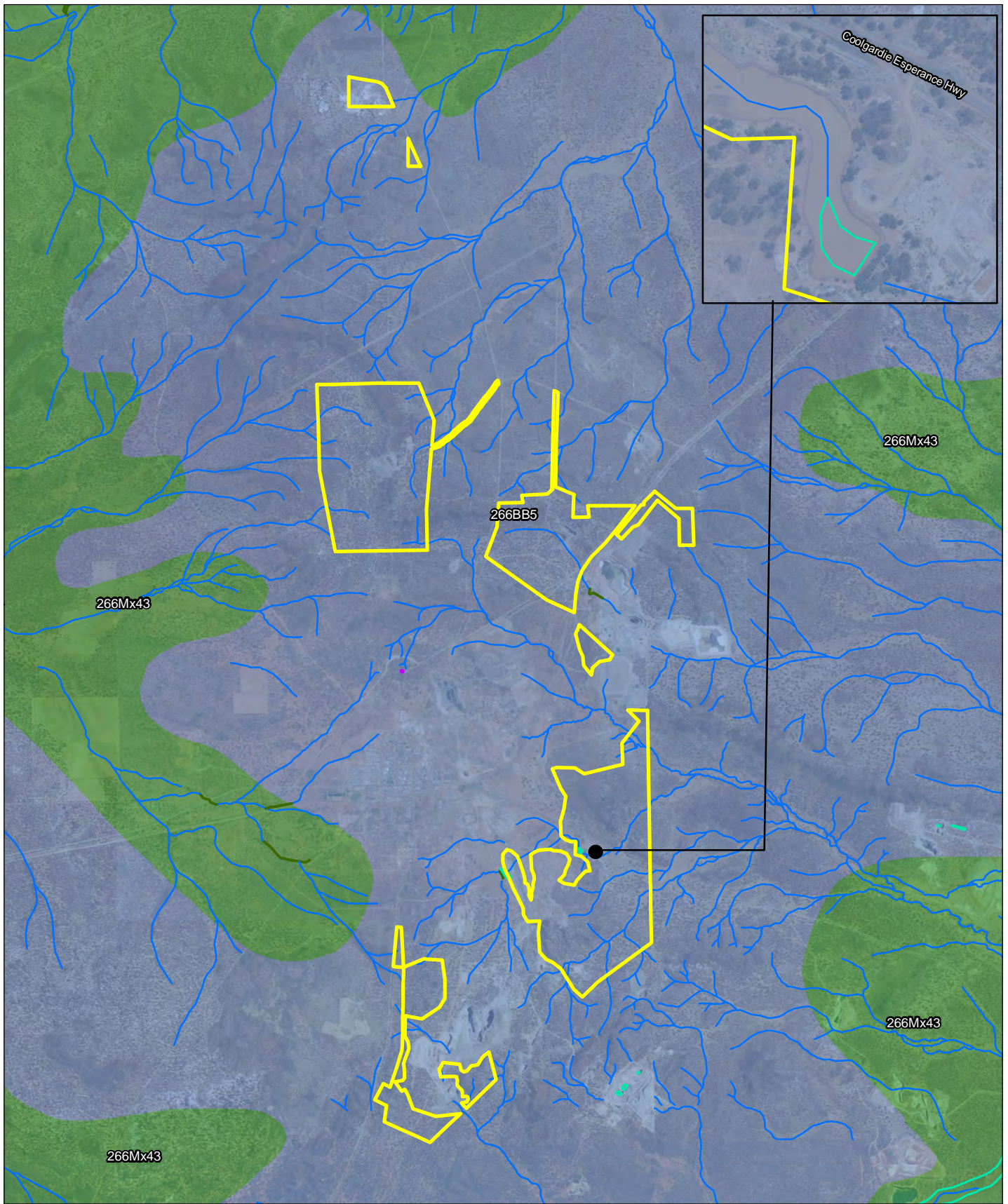
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Figure 1
Survey Area

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Legend

Soil Land System

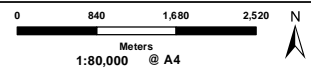
- 266BB5
- 266Mx43

Hydrography

- Watercourse - minor
- Drain - major
- Lake
- Water Reservoir
- Survey Area

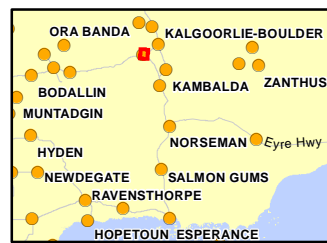


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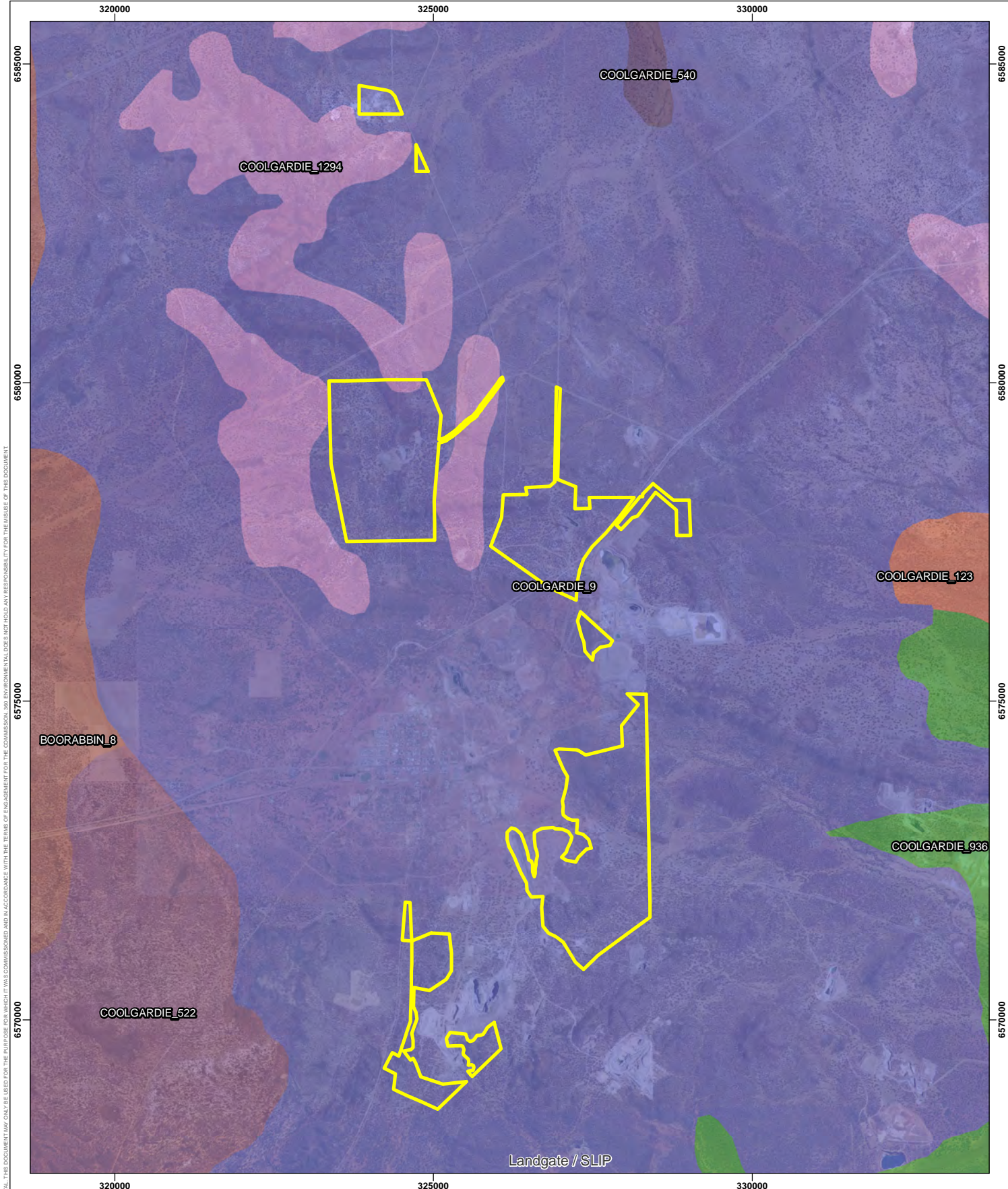
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Figure 2
Soil Landscapes and Land Systems and Hydrography

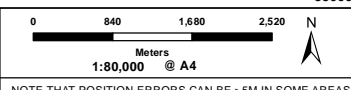


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Legend

- Survey Area
- Broad Vegetation Types**
- BOORABBIN_8
- COOLGARDIE_123
- COOLGARDIE_1294
- COOLGARDIE_522
- COOLGARDIE_540
- COOLGARDIE_9
- COOLGARDIE_936


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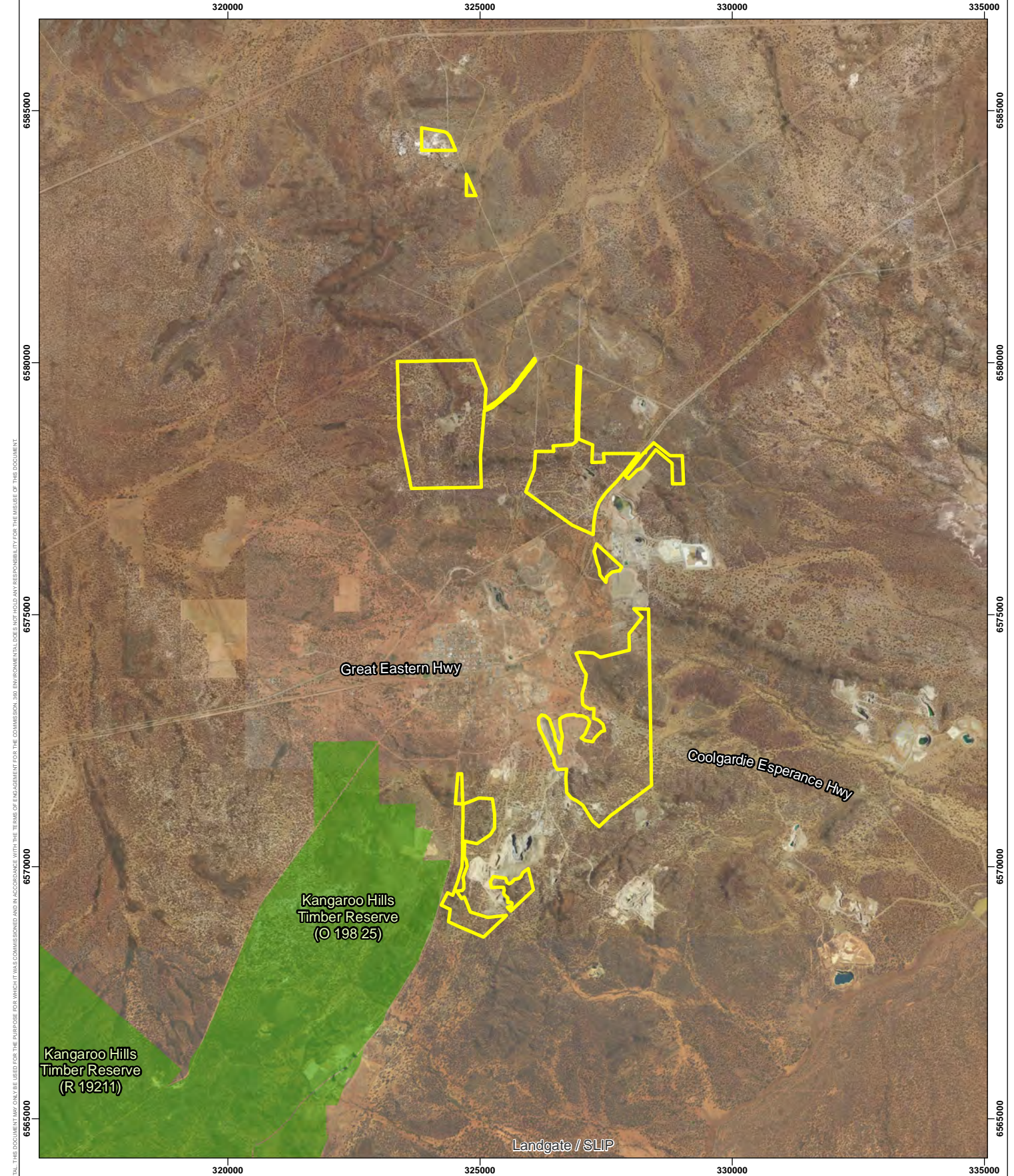
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Figure 3
Broad Vegetation Types

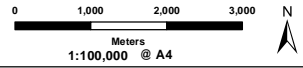


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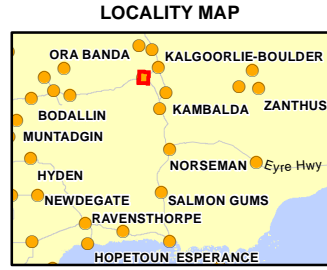
Legend

- Survey Area
- DBCA Managed Lands and Waters**
- DBCA Managed Land


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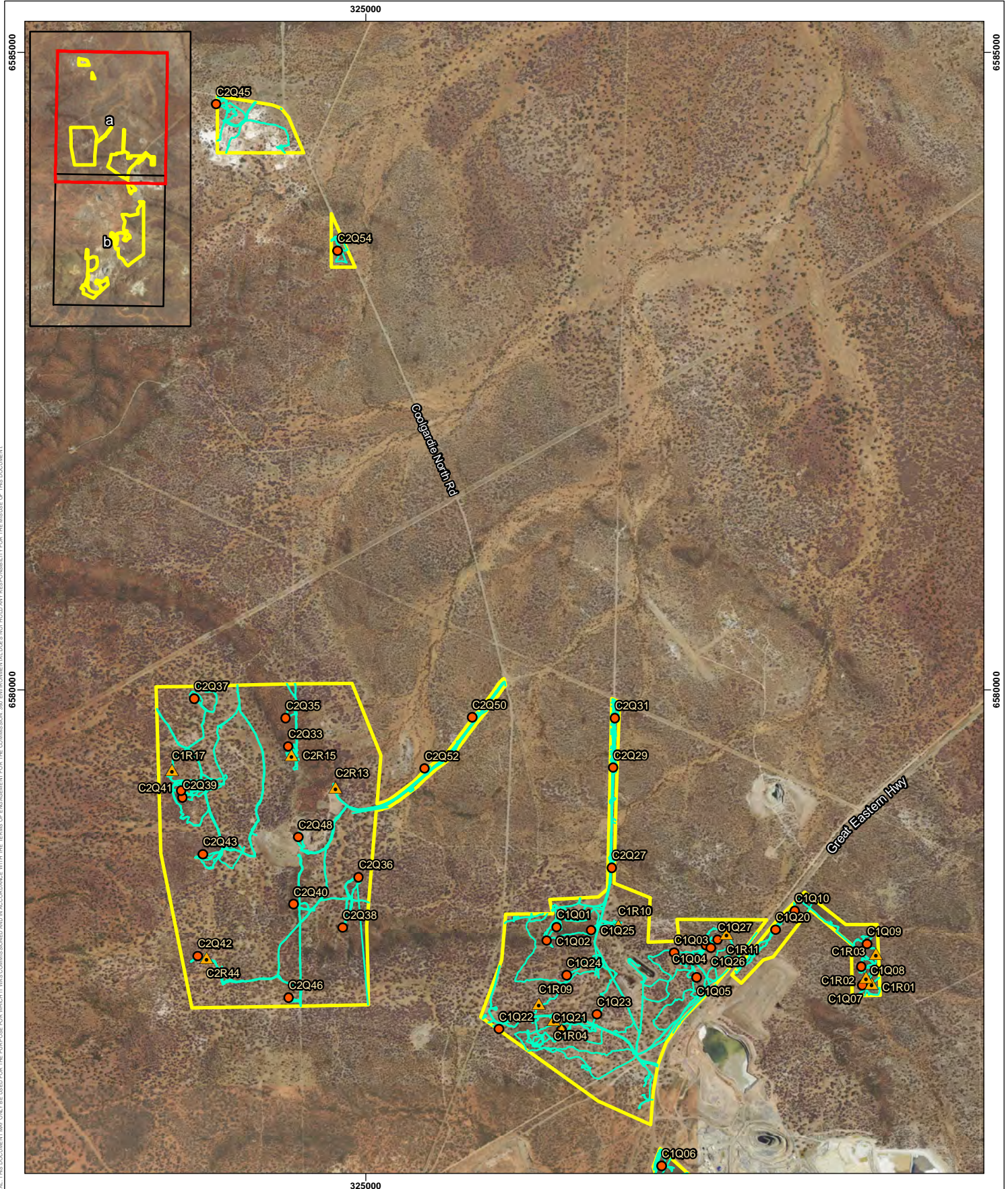
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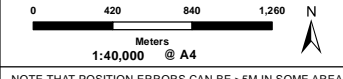
Figure 4
Conservation Areas



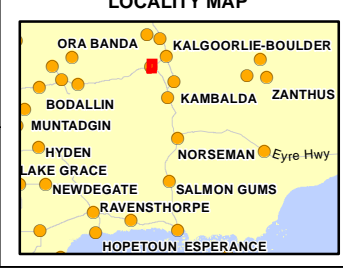
- Legend**
- Survey Area
 - GPS Tracks
- Sample Sites**
- Quadrat
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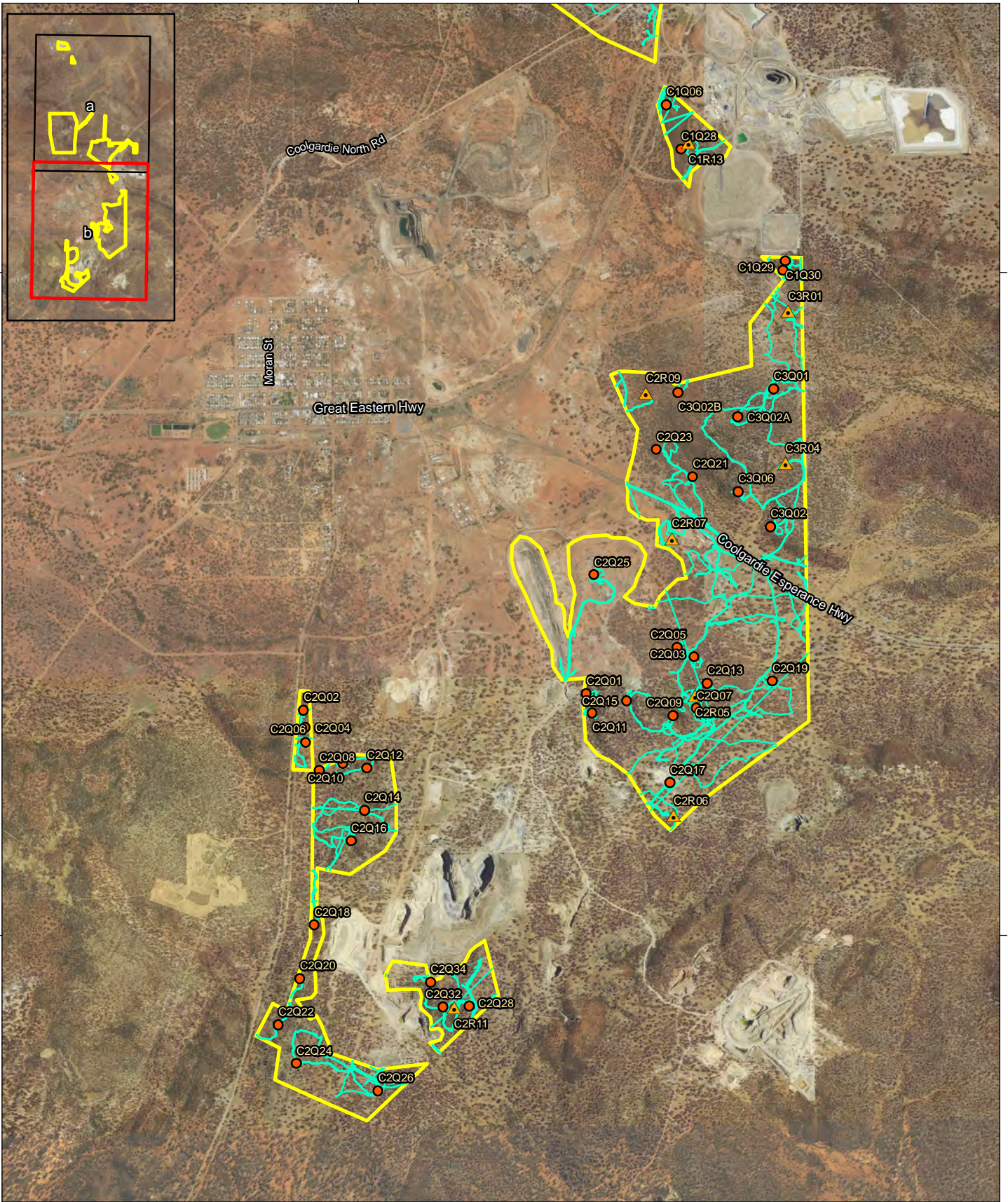
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Figure 5a
Survey Effort

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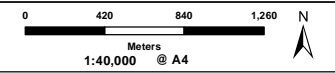
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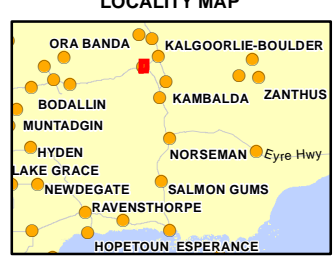
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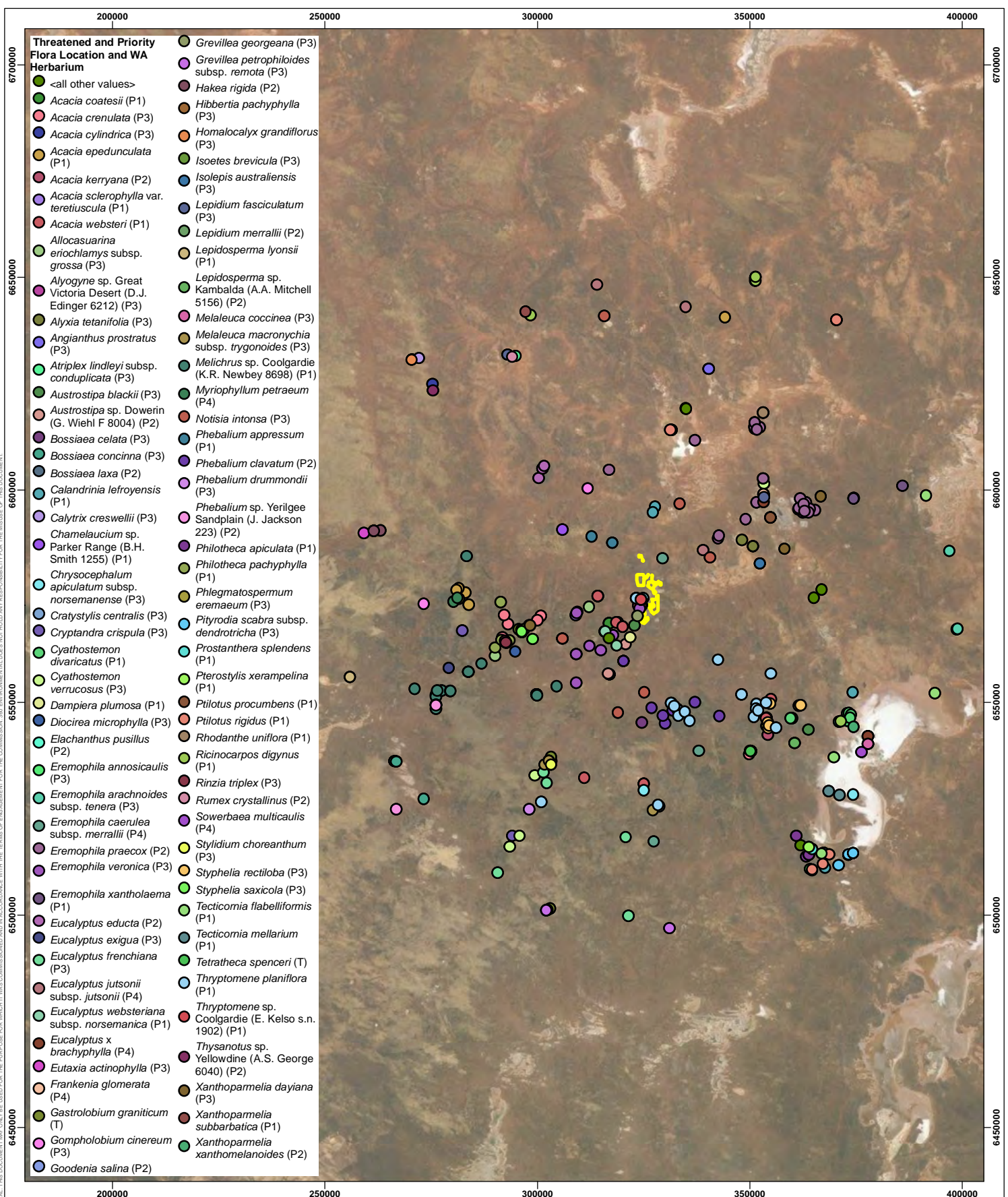
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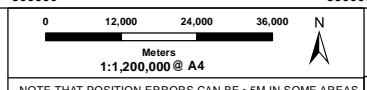
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Figure 5b
Survey Effort

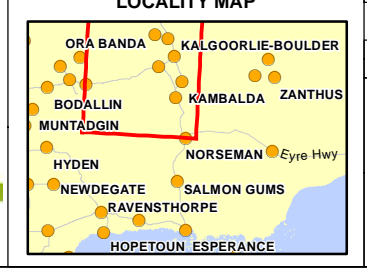


- Threatened and Priority Flora Location and WA Herbarium**
- <all other values>
 - *Acacia coatesii* (P1)
 - *Acacia crenulata* (P3)
 - *Acacia cylindrica* (P3)
 - *Acacia epedunculata* (P1)
 - *Acacia kerryana* (P2)
 - *Acacia sclerophylla* var. *teretiusscula* (P1)
 - *Acacia websteri* (P1)
 - *Allocasuarina eriochlamys* subsp. *grossa* (P3)
 - *Alyogyne* sp. Great Victoria Desert (D.J. Edinger 6212) (P3)
 - *Alyxia tetanifolia* (P3)
 - *Angianthus prostratus* (P3)
 - *Atriplex lindleyi* subsp. *conduplicata* (P3)
 - *Austrostipa blackii* (P3)
 - *Austrostipa* sp. Dowerin (G. Wiehl F 8004) (P2)
 - *Bossiaea celata* (P3)
 - *Bossiaea concinna* (P3)
 - *Bossiaea laxa* (P2)
 - *Calandrinia lefroyensis* (P1)
 - *Calytrix creswellii* (P3)
 - *Chamelaucium* sp.
 - Parker Range (B.H. Smith 1255) (P1)
 - *Chrysocephalum apiculatum* subsp. *norsemanense* (P3)
 - *Cratystylis centralis* (P3)
 - *Cryptandra crispula* (P3)
 - *Cyathostemon divaricatus* (P1)
 - *Cyathostemon verrucosus* (P3)
 - *Dampiera plumosa* (P1)
 - *Diocirea microphylla* (P3)
 - *Elachanthus pusillus* (P2)
 - *Eremophila annosicaulis* (P3)
 - *Eremophila arachnoides* subsp. *tenera* (P3)
 - *Eremophila caerulea* subsp. *merrallii* (P4)
 - *Eremophila praecox* (P2)
 - *Eremophila veronica* (P3)
 - *Eremophila xantholaema* (P1)
 - *Eucalyptus educta* (P2)
 - *Eucalyptus exigua* (P3)
 - *Eucalyptus frenchiana* (P3)
 - *Eucalyptus jutsonii* subsp. *jutsonii* (P4)
 - *Eucalyptus websteriana* subsp. *norsemanica* (P1)
 - *Eucalyptus* x *brachyphylla* (P4)
 - *Eutaxia actinophylla* (P3)
 - *Frankenia glomerata* (P4)
 - *Gastrolobium graniticum* (T)
 - *Gompholobium cinereum* (P3)
 - *Goodenia salina* (P2)
 - *Grevillea georgeana* (P3)
 - *Grevillea petrophiloides* subsp. *remota* (P3)
 - *Hakea rigida* (P2)
 - *Hibbertia pachyphylla* (P3)
 - *Homalocalyx grandiflorus* (P3)
 - *Isoetes brevicula* (P3)
 - *Isolepis australiensis* (P3)
 - *Lepidium fasciculatum* (P3)
 - *Lepidium merrallii* (P2)
 - *Lepidosperma lyonsii* (P1)
 - *Lepidosperma* sp.
 - Kambalda (A.A. Mitchell 5156) (P2)
 - *Melaleuca coccinea* (P3)
 - *Melaleuca macronychia* subsp. *trygonoides* (P3)
 - *Melichrus* sp. Coolgardie (K.R. Newbey 8698) (P1)
 - *Mirophyllum petraeum* (P4)
 - *Notisia intonsa* (P3)
 - *Phebalium appressum* (P1)
 - *Phebalium clavatum* (P2)
 - *Phebalium drummondii* (P3)
 - *Phebalium* sp. Yerilgee Sandplain (J. Jackson 223) (P2)
 - *Philotheca apiculata* (P1)
 - *Philotheca pachyphylla* (P1)
 - *Phlegmatospermum eremaeum* (P3)
 - *Pityrodia scabra* subsp. *dendrotricha* (P3)
 - *Prostanthera splendens* (P1)
 - *Pterostylis xerampelina* (P1)
 - *Ptilotus procumbens* (P1)
 - *Ptilotus rigidus* (P1)
 - *Rhodanthe uniflora* (P1)
 - *Ricinocarpos digynus* (P1)
 - *Rinzia triplex* (P3)
 - *Rumex crystallinus* (P2)
 - *Sowerbaea multicaulis* (P4)
 - *Stylidium choreanthum* (P3)
 - *Styphelia rectiloba* (P3)
 - *Styphelia saxicola* (P3)
 - *Tecticornia flabelliformis* (P1)
 - *Tecticornia mellarium* (P1)
 - *Tetradthea spenceri* (T)
 - *Thryptomene planiflora* (P1)
 - *Thryptomene* sp. Coolgardie (E. Kelso s.n. 1902) (P1)
 - *Thysanotus* sp. Yellowdine (A.S. George 6040) (P2)
 - *Xanthoparmelia dayiana* (P3)
 - *Xanthoparmelia subbarbatica* (P1)
 - *Xanthoparmelia xanthomelanoides* (P2)

Legend
 Survey Area



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PROJECT ID	4794	DATE	29/04/2022

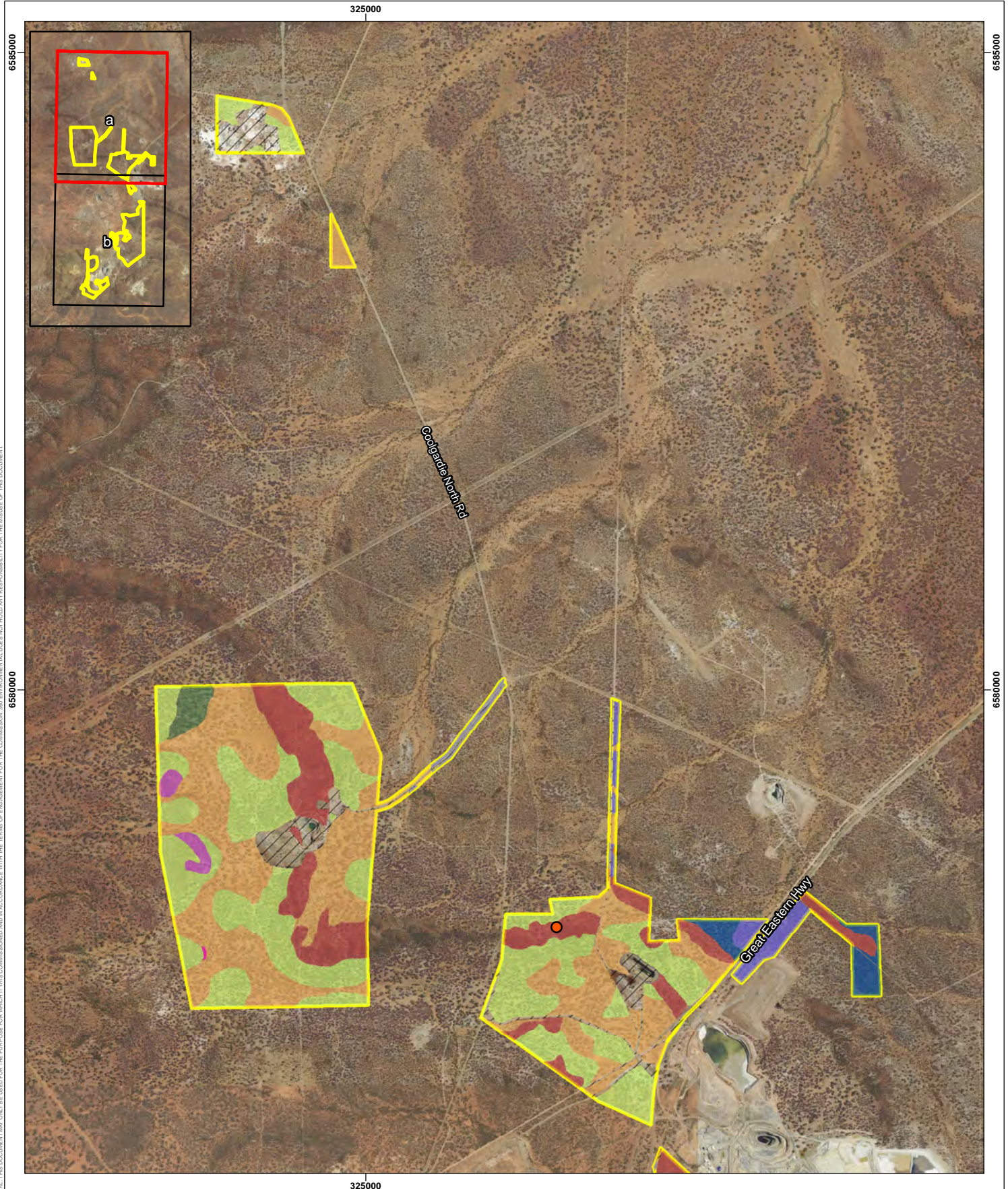
HORIZONTAL DATUM AND PROJECTION			
GDA 1994 MGA Zone 51			
CREATED	CHECKED	APPROVED	REVISION
CL	NW	NW	0

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Figure 6
 DBCA Threatened and Priority Flora Locations

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Legend

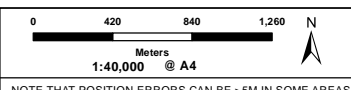
Survey Area ● *Austrostipa blackii* (P3)

Vegetation Types

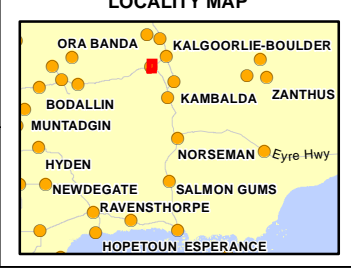
- AcEoaDI
- Ec
- EgAhSaf
- EooEiiDs
- EsEiiAv
- EspEiiSaa
- EtEaEpa
- SI
- Cleared

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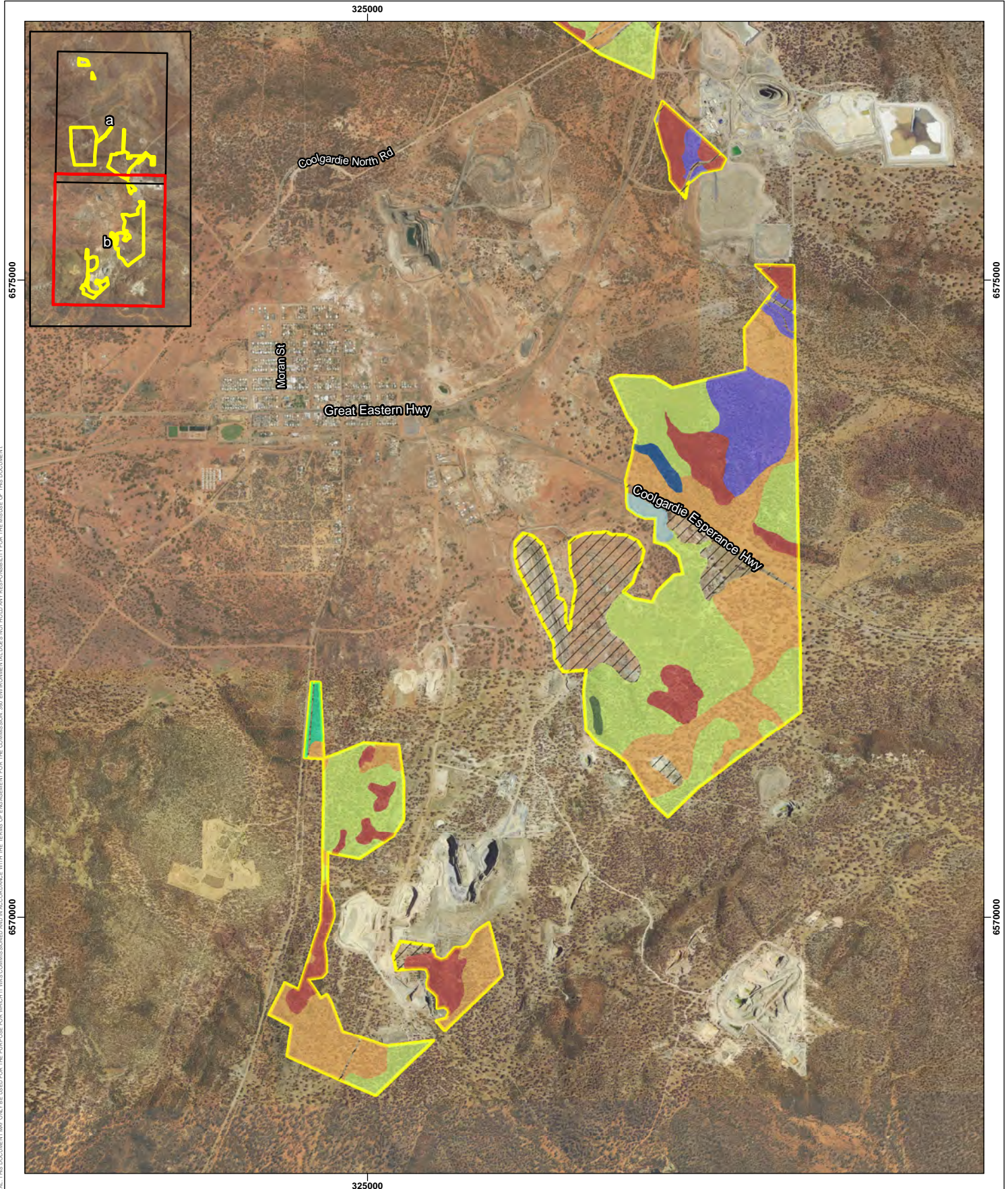
CREATED	CHECKED	APPROVED	REVISION
CL	NW	NW	0

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Figure 7a
Vegetation Types

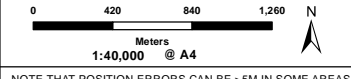
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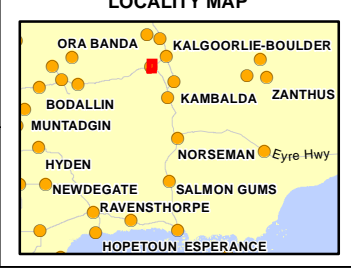
- Legend**
- Survey Area
 - Vegetation Types**
 - AcEoaDI
 - EgAhSaf
 - EooEiiDs
 - ErMhOm
 - EsEiiAv
 - EsppeiiSaa
 - EtEaEpa
 - Lake
 - Cleared

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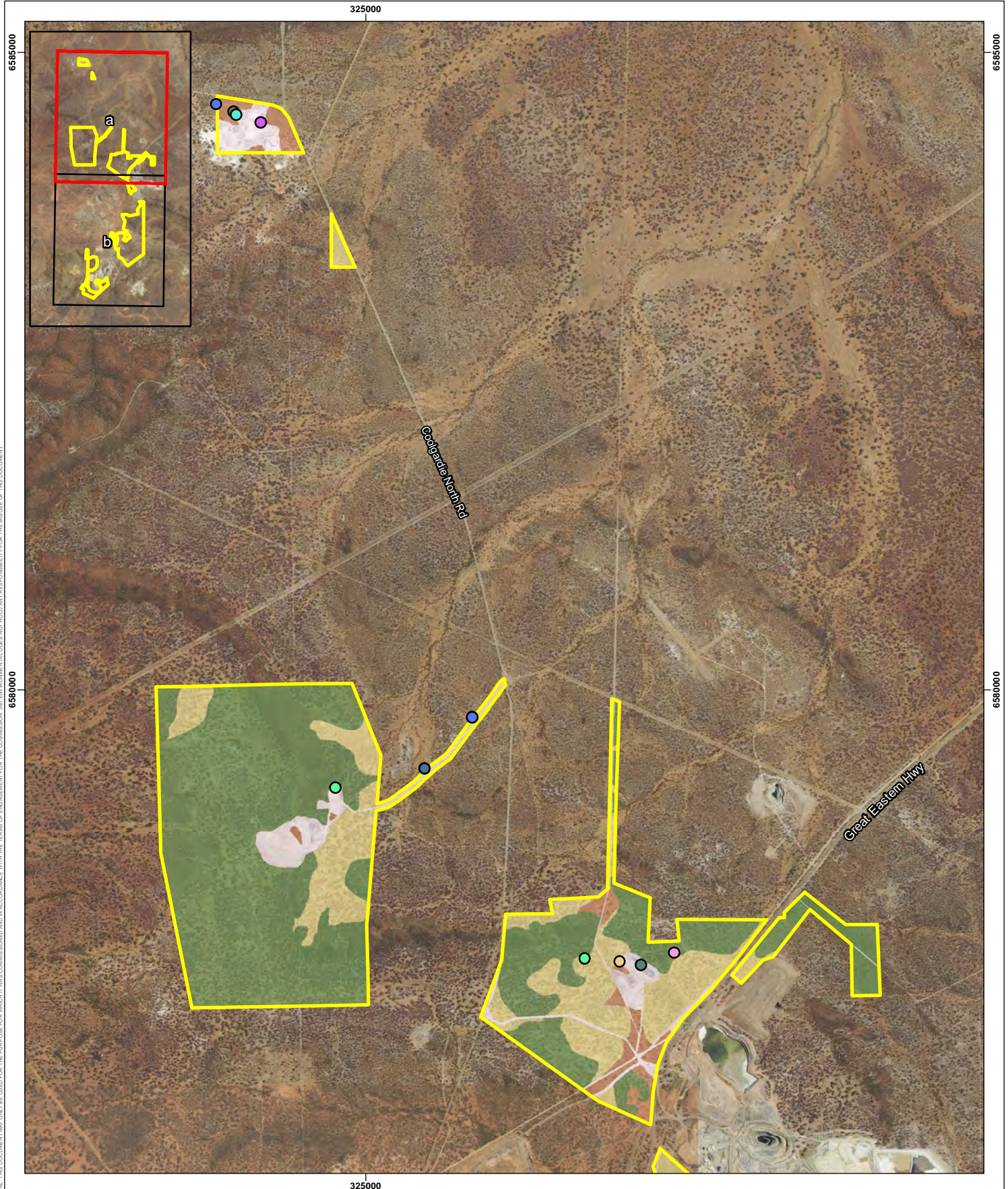
PROJECT ID 4794	DATE 13/05/2022
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HORIZONTAL DATUM AND PROJECTION GDA 1994 MGA Zone 51			
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Figure 7b
Vegetation Types



Legend

Weed Species

- *Agave americana*
- *Carrichtera annua*
- *Centaurea melitensis*
- *Crassula ovata*
- *Nicotiana glauca*
- *Oligocarpus calendulaceus*
- *Rumex vesicarius*
- *Salvia verbenaca*
- *Schinus molle var. areira*

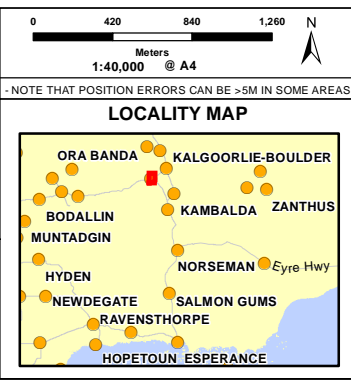
Vegetation Condition

- Excellent
- Very Good
- Good
- Completely Degraded

Survey Area

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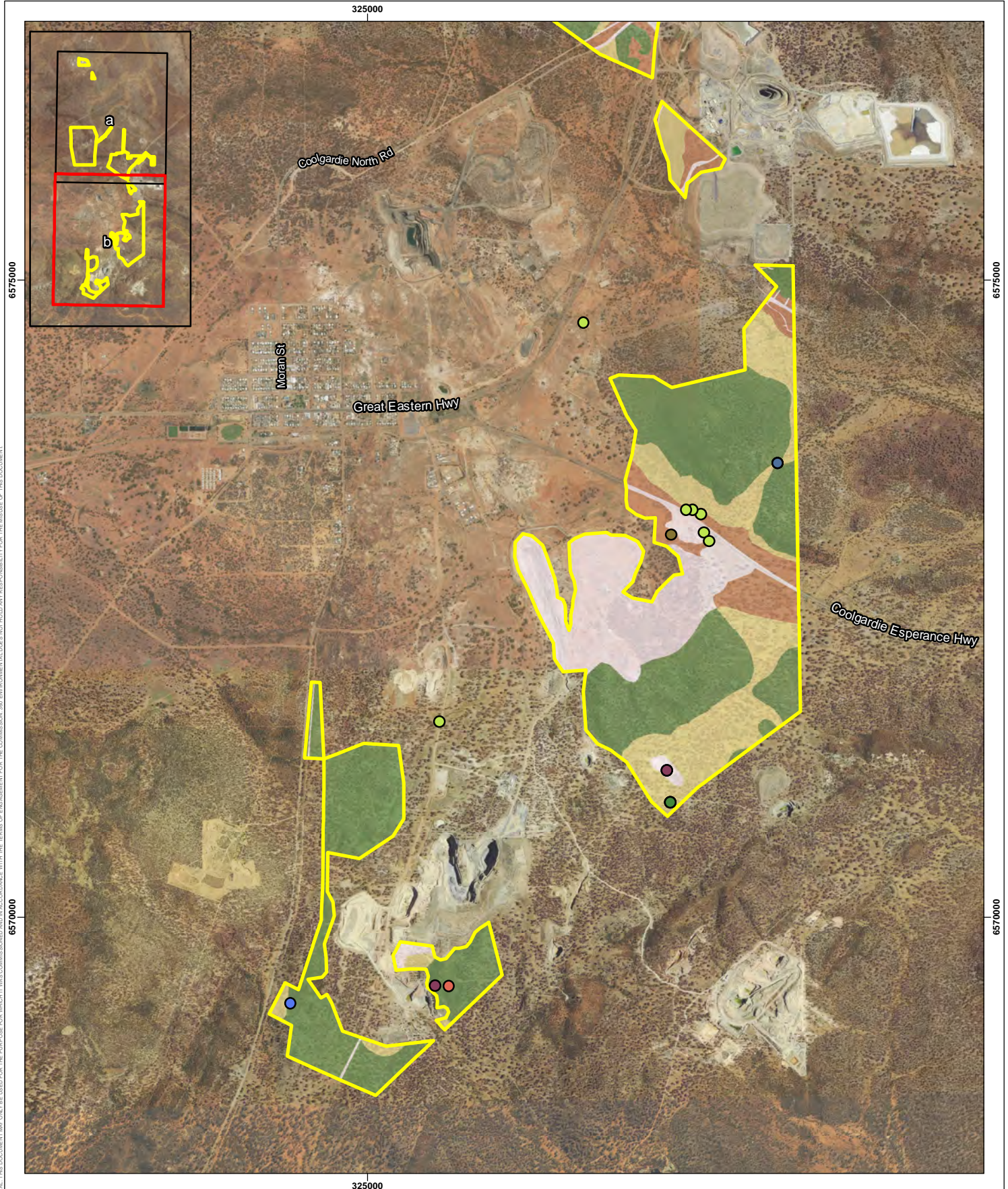
PROJECT ID 4794		DATE 29/04/2022	
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Figure 8a Vegetation Condition

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Legend

Weed Species

- *Asphodelus fistulosus*
- *Carrichtera annua*
- *Centaurea melitensis*
- *Euphorbia drummondii*
- *Heliotropium europaeum*
- *Oligocarpus calendulaceus*
- *Opuntia stricta*
- *Salvia verbenaca*
- *Schinus molle var. areira*
- *Sonchus asper*

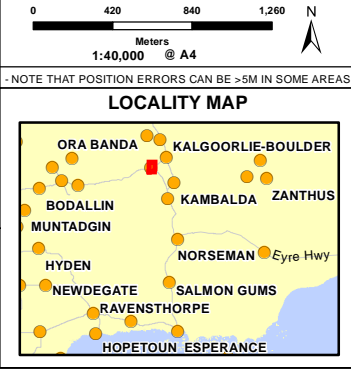
Vegetation Condition

- Excellent
- Very Good
- Good
- Completely Degraded

Survey Area

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Figure 8b Vegetation Condition

300000

350000

6600000

6600000

6650000

6650000

Landgate / SLIP

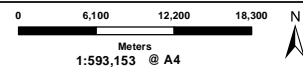
300000

350000

Legend

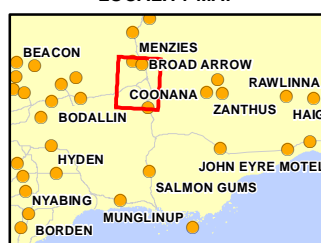
- Survey Area
- Threatened and Priority Fauna Records**
- A Fairy Shrimp (Carnavon to Kalgoorlie) (P3)
- Arid Bronze Azure Butterfly (CR)
- Carnaby's Cockatoo (EN)
- Chuditch, Western Quoll (VU)
- Common Greenshank, Greenshank (MI)
- Common Sandpiper (MI)
- Curlew Sandpiper (CR)
- Glossy Ibis (MI)
- Grey-tailed Tattler (P4)
- Hooded plover, hooded dotterel (P4)
- Inland Hairstreak, Desert Blue Butterfly (P1)
- Malleefowl (VU)
- Red-necked Stint (MI)
- Sanderling (MI)
- Sharp-tailed Sandpiper (MI)
- Wood Sandpiper (MI)

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LOCALITY MAP



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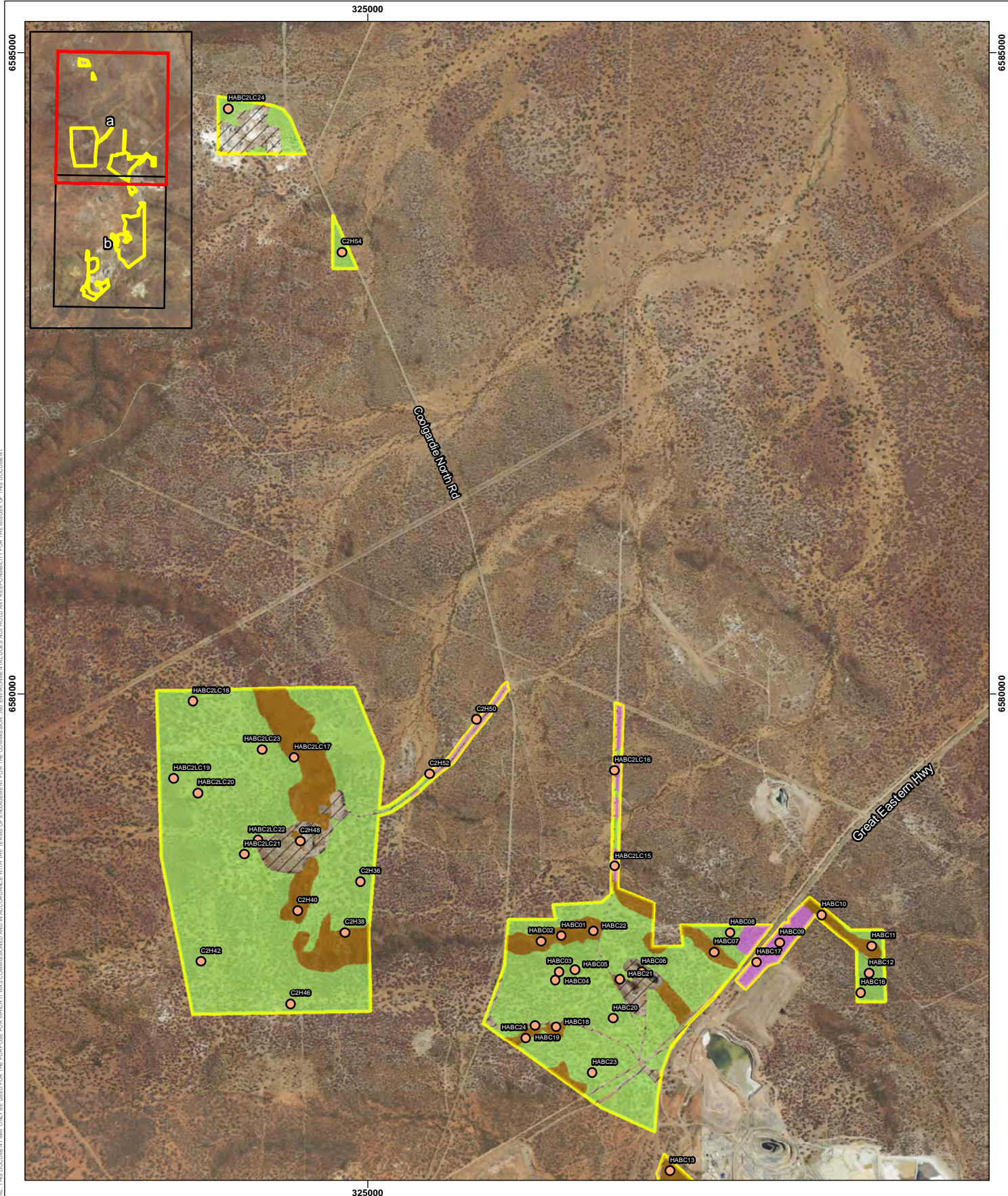
HORIZONTAL DATUM AND PROJECTION
 GDA 1994 MGA Zone 51

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Figure 9
 DBCA Threatened and Priority Fauna Records

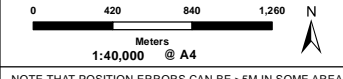
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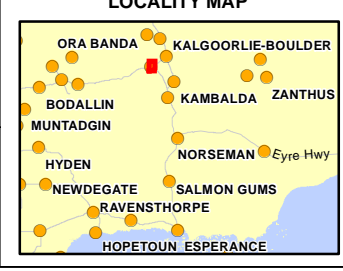
- Legend**
- Survey Area
 - Habitat Assessment Location
- Fauna Habitat**
- Acacia Shrubland
 - Eucalyptus Woodland
 - Rocky Slopes
 - Cleared

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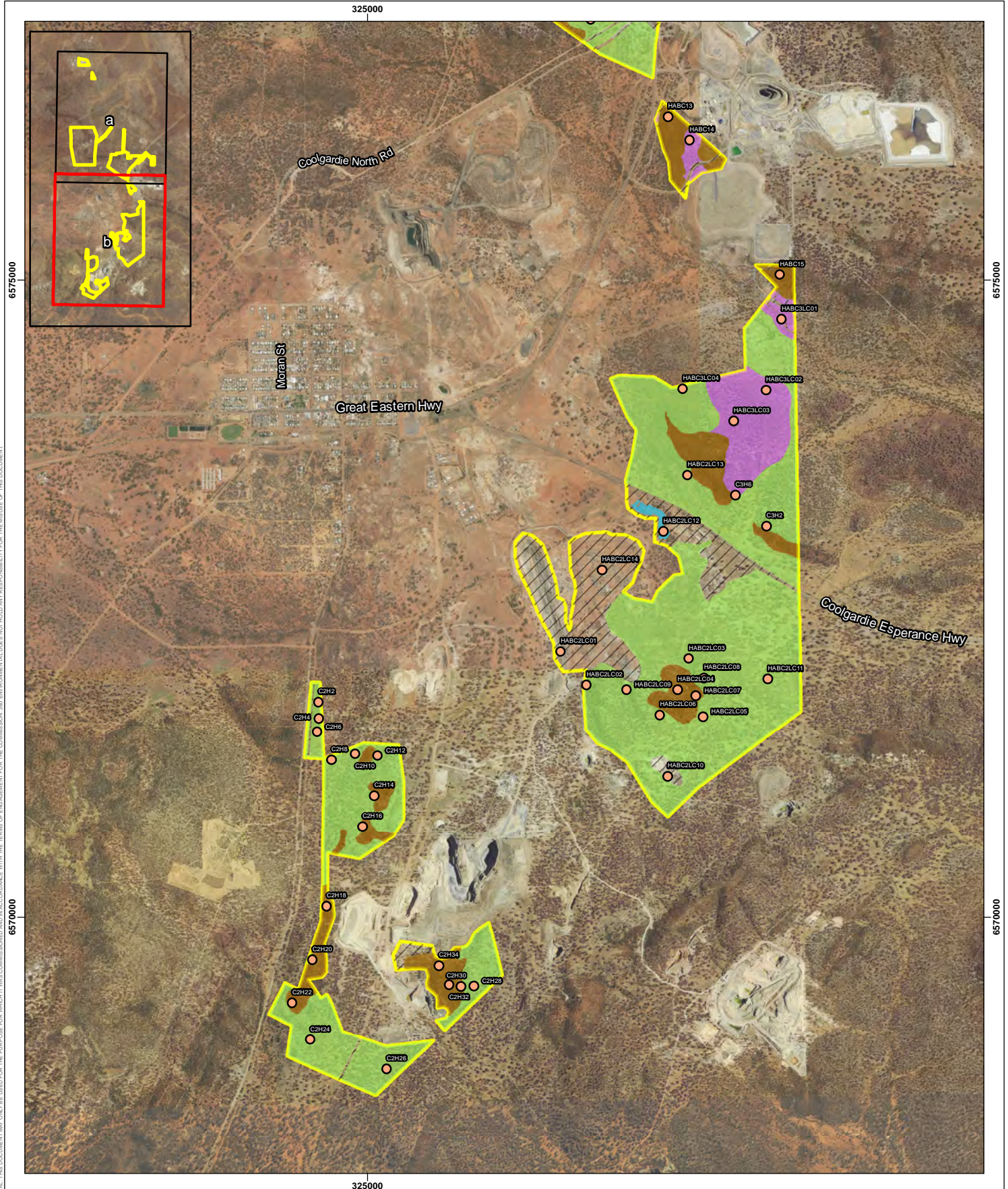
HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 51

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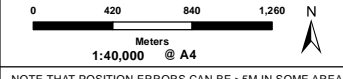
Figure 10a
Fauna Habitat



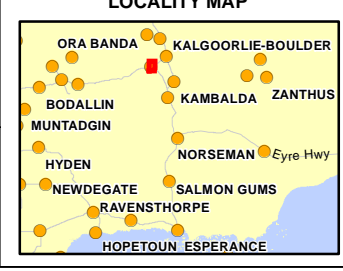
- Legend**
- Survey Area
 - Habitat Assessment Location
- Fauna Habitat**
- Acacia Shrubland
 - Eucalyptus Woodland
 - Open Water
 - Rocky Slopes
 - Cleared

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Figure 10b
Fauna Habitat

Appendices

Appendix A

Flora and Fauna Literature Review

Appendix A: Fauna Literature Review

Report	Distance to current Survey Area	Survey timing	Survey effort	Recorded conservation significant fauna	Fauna habitats
Coolgardie landfill Flora, Vegetation and Fauna Habitat Assessment (Stategen Environmental 2019)	6.4 kms ESE of Survey Area	18 December 2018	Describe fauna habitat within the Survey Area	None	Open mallee woodland to mallee woodland.
Fauna survey for Mungari Gold Operations Cutters Ridge Project (Phoenix Environmental Sciences, 2019)	40 km North of Survey Area	September 2018	Level 1 Fauna Targeted Malleefowl	Malleefowl (<i>Leipoa ocellata</i>)	Open Eucalypt woodland, shrubland, and salt lake, in addition to a small portion of existing cleared areas.
Level 1 Vertebrate Fauna Risk Assessment for Lot 500 Kalgoorlie West (Terrestrial Ecosystems, 2018)	24 km NE of Survey Area	2018	Level 1 Vertebrate Fauna	None	Open eucalypt woodland with a mixed understory of scattered shrubs and chenopods
Vegetation Clearing - Fauna Assessment (Biostat Pty Ltd, 2020)	40 km N of the Survey Area	December 2019	Level 1 Reconnaissance	None	Open woodland: Acacia, Casuarina, and Eucalypt. Chenopod shrubland, Acacia shrubland. Eucalyptus sp. mallee over spinifex Stoney/rocky hills Drainage lines Mulga woodland

Appendix B

Flora and Fauna Database Searches

Appendix B: DBCA Threatened and Priority Fauna

CLASS	SCI_NAME	COM_NAME	WA_status	EPBCstatus	YEAR	SOURCE	CERTAINTY	OBS_METHOD	OBS_TYPE	COUNT	LOCALITY	SITE
Actitis hypoleucos	Common Sandpiper	BIRD	MI	MI	2014	BIRDATA				0	coolgardie gorge	coolgardie gorge
Actitis hypoleucos	Common Sandpiper	BIRD	MI	MI	2011	BIRDATA				0	The Gorge (Coolgardie0	The Gorge (Coolgardie0
Actitis hypoleucos	Common Sandpiper	BIRD	MI	MI	2013	BIRDATA				0	Coolgardie Gorge wetland	Coolgardie Gorge wetland
Tringa nebularia	Common greenshank, greenshank	BIRD	MI	MI	2013	BIRDATA				0	Coolgardie Gorge wetland	Coolgardie Gorge wetland
Calidris acuminata	Sharp-tailed sandpiper	BIRD	MI	MI	2012	BIRDATA				0	Silver Lake	Silver Lake
Calidris alba	Sanderling	BIRD	MI	MI	2016	BIRDATA				0	Hannan Lake	Hannan Lake
Calyptrorhynchus lat	Carnaby's cockatoo	BIRD	EN	EN	2016	BIRDATA				0	367 Collins	367 Collins
Calyptrorhynchus lat	Carnaby's cockatoo	BIRD	EN	EN	2016	BIRDATA				0	Cape Lilac on alley	Cape Lilac on alley
Calyptrorhynchus lat	Carnaby's cockatoo	BIRD	EN	EN	2017	BIRDATA				0	Piccadilly St West	Piccadilly St West
Tringa brevipes	Grey-tailed tattler	BIRD	P4	MI	2017	BIRDATA				0	Lake Douglas	Lake Douglas
Tringa nebularia	Common greenshank, greenshank	BIRD	MI	MI	1980	BIRDATLAS1				0	KANOWNA	KANOWNA
Tringa glareola	Wood sandpiper	BIRD	MI	MI	1980	BIRDATLAS1				0	KARLKURLA	KARLKURLA
Calidris acuminata	Sharp-tailed sandpiper	BIRD	MI	MI	1980	BIRDATLAS1				0	KARLKURLA	KARLKURLA
Thinornis rubricollis	Hooded plover, hooded dotterel	BIRD	P4		1980	BIRDATLAS1				0		
Tringa nebularia	Common greenshank, greenshank	BIRD	MI	MI	1980	BIRDATLAS1				0	KANOWNA	KANOWNA
Calidris acuminata	Sharp-tailed sandpiper	BIRD	MI	MI	1980	BIRDATLAS1				0	FEYSVILLE	FEYSVILLE
Calidris acuminata	Sharp-tailed sandpiper	BIRD	MI	MI	1981	BIRDATLAS1				0	KARLKURLA	KARLKURLA
Plegadis falcinellus	Glossy ibis	BIRD	MI	MI	1981	BIRDATLAS1				0	KARLKURLA	KARLKURLA
Calidris acuminata	Sharp-tailed sandpiper	BIRD	MI	MI	1981	BIRDATLAS1				0	KANOWNA	KANOWNA
Tringa nebularia	Common greenshank, greenshank	BIRD	MI	MI	2001	BIRDATLAS2				0	Kopal Lake	Kopal Lake
Calidris acuminata	Sharp-tailed sandpiper	BIRD	MI	MI	2001	BIRDATLAS2				0	Kopal Lake	Kopal Lake
Calidris acuminata	Sharp-tailed sandpiper	BIRD	MI	MI	2001	BIRDATLAS2				0	Kopal Lake	Kopal Lake
Tringa glareola	Wood sandpiper	BIRD	MI	MI	2005	BIRDATLAS2				0	Kalgoorlie Sewerage overflow ponds	Kalgoorlie Sewerage overflow ponds
Tringa glareola	Wood sandpiper	BIRD	MI	MI	2005	BIRDATLAS2				0	Kalgoorlie Sewerage outlet	Kalgoorlie Sewerage outlet
Tringa nebularia	Common greenshank, greenshank	BIRD	MI	MI	2006	BIRDATLAS2				0	Young River Station Lake	Young River Station Lake
Calidris ferruginea	curlew sandpiper	BIRD	CR	CR	2006	BIRDATLAS2				0	Young River Station Lake	Young River Station Lake
Calidris ruficollis	Red-necked stint	BIRD	MI	MI	2006	BIRDATLAS2				0	Young River Station Lake	Young River Station Lake
Calidris acuminata	Sharp-tailed sandpiper	BIRD	MI	MI	2006	BIRDATLAS2				0	Young River Station Lake	Young River Station Lake
Tringa nebularia	Common greenshank, greenshank	BIRD	MI	MI	1999	BIRDATLAS2				0	Kurnalpi Road	Kurnalpi Road
Calidris ferruginea	curlew sandpiper	BIRD	CR	CR	1999	BIRDATLAS2				0	Kurnalpi Road	Kurnalpi Road
Calidris acuminata	Sharp-tailed sandpiper	BIRD	MI	MI	1999	BIRDATLAS2				0	Kurnalpi Road	Kurnalpi Road
Leipoa ocellata	Malleefowl	BIRD	VU	VU	2012	FAUNASURVEY	Certain	Survey	Unknown	1	FEYSVILLE	Kalgoorlie, Goldfields, Mt Martin
Leipoa ocellata	Malleefowl	BIRD	VU	VU	2012	FAUNASURVEY	Certain	Survey	Unknown	1	FEYSVILLE	Kalgoorlie Region, Goldfields, Jubilee mine
Leipoa ocellata	Malleefowl	BIRD	VU	VU	2012	FAUNASURVEY	Certain	Survey	Unknown	1	FEYSVILLE	Kalgoorlie Region, Goldfields, Jubilee mine
Leipoa ocellata	Malleefowl	BIRD	VU	VU	2012	FAUNASURVEY	Certain	Survey	Unknown	1	FEYSVILLE	Kalgoorlie Region, Goldfields, Jubilee mine
Leipoa ocellata	Malleefowl	BIRD	VU	VU	2012	FAUNASURVEY	Certain	Survey	Unknown	1	FEYSVILLE	Kalgoorlie Region, Goldfields, Jubilee mine
Leipoa ocellata	Malleefowl	BIRD	VU	VU	2012	FAUNASURVEY	Certain	Survey	Unknown	1	BULONG	Hampton Hill, Bulong Mining Lease M25/333
Dasyurus geoffroi	chuditch, western quoll	MAMMAL	VU	VU	1974	TFAUNA	Certain	Opportunistic sighting	Caught or trapped	1	Kambalda East	1 mile N of Kambalda East townsite, at edge of Lake Lefroy in sandy mulga country
Leipoa ocellata	malleefowl	BIRD	VU	VU	1994	TFAUNA	Certain	Opportunistic sighting	Secondary sign	0	Bullabulling	one active nest at Bullabulling No. 8 Pumping station.
Leipoa ocellata	malleefowl	BIRD	VU	VU	1995	TFAUNA	Moderately certain	Opportunistic sighting	Day sighting	1	Londonderry	Yerilla Sandalwood Reserve
Leipoa ocellata	malleefowl	BIRD	VU	VU	2000	TFAUNA	Certain	Opportunistic sighting	Day sighting	1	Mount Burges	access road to Kundana Mining Lease - "30km NW (10km W & 22km N) of Kalgoorlie"
Branchinella denticu	a fairy shrimp (Carnavon to Kalgoorlie)	INVERTEBRATE	P3		1937	TFAUNA	Certain	Historical (written)	Caught or trapped	0	Gidji Lake	Gidji Lake, N of Kalgoorlie
Thinornis rubricollis	hooded plover, hooded dotterel	BIRD	P4		1992	TFAUNA	Certain	Survey	Sighting	0	Arrow Lake	Arrow Lake
Ogyris subterrestris	arid bronze azure butterfly	INVERTEBRATE	CR	CR	1989	TFAUNA	Certain	Survey	Caught or trapped	1	Lake Douglas	Lake Douglas, 12 km SW of Kalgoorlie
Ogyris subterrestris	arid bronze azure butterfly	INVERTEBRATE	CR	CR	1991	TFAUNA	Certain	Survey	Caught or trapped	1	Lake Douglas	Lake Douglas, 12 km SW of Kalgoorlie
Ogyris subterrestris	arid bronze azure butterfly	INVERTEBRATE	CR	CR	1982	TFAUNA	Certain	Survey	Caught or trapped	2	Lake Douglas	Lake Douglas, 12 km SW of Kalgoorlie

CLASS	SCL_NAME	COM_NAME	WA_status	EPBCstatus	YEAR	SOURCE	CERTAINTY	OBS_METHOD	OBS_TYPE	COUNT	LOCALITY	SITE
Ogyris subterrestris	arid bronze azure butterfly	INVERTEBRATE	CR	CR	1986	TFAUNA	Certain	Survey	Caught or trapped	15	Lake Douglas	Lake Douglas, 12 km SW of Kalgoorlie
Ogyris subterrestris	arid bronze azure butterfly	INVERTEBRATE	CR	CR	1986	TFAUNA	Certain	Survey	Caught or trapped	4	Lake Douglas	Lake Douglas, 12 km SW of Kalgoorlie
Ogyris subterrestris	arid bronze azure butterfly	INVERTEBRATE	CR	CR	1991	TFAUNA	Certain	Survey	Caught or trapped	1	Lake Douglas	Lake Douglas, Kalgoorlie
Ogyris subterrestris	arid bronze azure butterfly	INVERTEBRATE	CR	CR	1987	TFAUNA	Certain	Survey	Caught or trapped	1	Lake Douglas	Lake Douglas, 12km SW of Kalgoorlie
Ogyris subterrestris	arid bronze azure butterfly	INVERTEBRATE	CR	CR	1987	TFAUNA	Certain	Survey	Caught or trapped	8	Lake Douglas	Lake Douglas, 12km SW of Kalgoorlie
Ogyris subterrestris	arid bronze azure butterfly	INVERTEBRATE	CR	CR	1987	TFAUNA	Certain	Survey	Caught or trapped	2	Lake Douglas	Lake Douglas, 12km SW of Kalgoorlie
Ogyris subterrestris	arid bronze azure butterfly	INVERTEBRATE	CR	CR	1989	TFAUNA	Certain	Survey	Caught or trapped	2	Lake Douglas	Lake Douglas, 12km SW of Kalgoorlie
Ogyris subterrestris	arid bronze azure butterfly	INVERTEBRATE	CR	CR	1989	TFAUNA	Certain	Survey	Caught or trapped	2	Lake Douglas	Lake Douglas, 12km SW of Kalgoorlie
Ogyris subterrestris	arid bronze azure butterfly	INVERTEBRATE	CR	CR	1989	TFAUNA	Certain	Survey	Caught or trapped	3	Lake Douglas	Lake Douglas, 12km SW of Kalgoorlie
Ogyris subterrestris	arid bronze azure butterfly	INVERTEBRATE	CR	CR	1989	TFAUNA	Certain	Survey	Caught or trapped	6	Lake Douglas	Lake Douglas, 12km SW of Kalgoorlie
Ogyris subterrestris	arid bronze azure butterfly	INVERTEBRATE	CR	CR	1991	TFAUNA	Certain	Survey	Caught or trapped	1	Lake Douglas	Lake Douglas, 12km SW of Kalgoorlie
Ogyris subterrestris	arid bronze azure butterfly	INVERTEBRATE	CR	CR	1991	TFAUNA	Certain	Survey	Caught or trapped	4	Lake Douglas	Lake Douglas, 12km SW of Kalgoorlie
Leipoa ocellata	malleefowl	BIRD	VU	VU	1985	TFAUNA	Certain	Opportunistic sighting	Sighting	2	Jaurdie Hills	Jaurdie Hills
Ogyris subterrestris	arid bronze azure butterfly	INVERTEBRATE	CR	CR	1911	TFAUNA	Certain	Historical (written)	Caught or trapped	1	Kalgoorlie	SW Australia, Kalgoorlie District
Jalmenus aridus	inland hairstreak, desert blue butterfly	INVERTEBRATE	P1		1985	TFAUNA	Certain	Survey	Caught or trapped	1	Lake Douglas	Lake Douglas 12 km SW of Kalgoorlie
Jalmenus aridus	inland hairstreak, desert blue butterfly	INVERTEBRATE	P1		1989	TFAUNA	Certain	Survey	Caught or trapped	1	Lake Douglas	Lake Douglas 12 km SW of Kalgoorlie
Jalmenus aridus	inland hairstreak, desert blue butterfly	INVERTEBRATE	P1		1986	TFAUNA	Certain	Survey	Caught or trapped	1	Lake Douglas	Lake Douglas 12 km SW of Kalgoorlie
Jalmenus aridus	inland hairstreak, desert blue butterfly	INVERTEBRATE	P1		1986	TFAUNA	Certain	Survey	Caught or trapped	1	Lake Douglas	Lake Douglas 12 km SW of Kalgoorlie
Ogyris subterrestris	arid bronze azure butterfly	INVERTEBRATE	CR	CR	1985	TFAUNA	Certain	Survey	Caught or trapped	1	Lake Douglas	Lake Douglas 12 km SW of Kalgoorlie
Leipoa ocellata	malleefowl	BIRD	VU	VU	2006	TFAUNA	Certain	Opportunistic sighting	Day sighting	1	Bullabulling	Bullabulling
Leipoa ocellata	malleefowl	BIRD	VU	VU	2007	TFAUNA	Certain	Opportunistic sighting	Day sighting	2	Bullabulling	Bullabulling
Leipoa ocellata	malleefowl	BIRD	VU	VU	2008	TFAUNA	Certain	Opportunistic sighting	Day sighting	2	Bullabulling	Bullabulling pastoral lease, 10km west of the Bullabulling Pub and 2 kms south of the highway
Jalmenus aridus	inland hairstreak, desert blue butterfly	INVERTEBRATE	P1		1997	TFAUNA	Certain	Survey	Caught or trapped	1	Karramindie	Lake Douglas (Douglas Lake)
Leipoa ocellata	malleefowl	BIRD	VU	VU	2009	TFAUNA	Certain	Opportunistic sighting	Day sighting	1	Mount Burges	North of Mount Burges
Leipoa ocellata	malleefowl	BIRD	VU	VU	2009	TFAUNA	Certain	Opportunistic sighting	Day sighting	1	Bullabulling	Bullabulling, road from Bullabulling to Stewart
Leipoa ocellata	malleefowl	BIRD	VU	VU	2010	TFAUNA	Certain	Opportunistic sighting	Sighting	1		Vic Rock Road
Leipoa ocellata	malleefowl	BIRD	VU	VU	2011	TFAUNA	Certain	Opportunistic sighting	Day sighting	1		Yallari Timber Reserve
Leipoa ocellata	malleefowl	BIRD	VU	VU	2011	TFAUNA	Certain	Opportunistic sighting	Secondary sign	0		Yallari Timber Reserve
Leipoa ocellata	malleefowl	BIRD	VU	VU	2011	TFAUNA	Certain	Opportunistic sighting	Day sighting	1		
Leipoa ocellata	malleefowl	BIRD	VU	VU	2009	TFAUNA	Certain	Opportunistic sighting	Day sighting	1		on road from Bullabulling to Stuart sighting, off Great Eastern Highway
Leipoa ocellata	malleefowl	BIRD	VU	VU	2009	TFAUNA	Certain	Opportunistic sighting	Day sighting	1		north of Mt Burgess
Leipoa ocellata	malleefowl	BIRD	VU	VU	2011	TFAUNA	Certain	Survey	Caught or trapped	1		gravel area just of side of the road at Yarri and Barlick Kanowna Belle access road intersection.
Leipoa ocellata	malleefowl	BIRD	VU	VU	2012	TFAUNA	Certain	Opportunistic sighting	Day sighting	2	Coolgardie	Just off cave hill road in Widgiemoalthe close to one of Focus Minerals small operations.
Leipoa ocellata	malleefowl	BIRD	VU	VU	2013	TFAUNA	Certain	Opportunistic sighting	Dead	1	Bullabulling	48km West of Coolgardie, No 8 pump Denardi Station, Great Eastern Highway
Leipoa ocellata	malleefowl	BIRD	VU	VU	2013	TFAUNA	Moderately certain	Opportunistic sighting	Day sighting	1	Bullabulling	~10km east of Bullabulling (40km east of Coolgardie) on Great Eastern Highway
Leipoa ocellata	malleefowl	BIRD	VU	VU	2013	TFAUNA	Moderately certain	Opportunistic sighting	Night sighting	1	Feysville	Out the front of Pevnatty Crib room on active haul road. A highly disturbed area.
Leipoa ocellata	malleefowl	BIRD	VU	VU	2013	TFAUNA	Certain	Opportunistic sighting	Secondary sign	0	Schahil Timber reserve	Schahil Timber reserve

CLASS	SCL_NAME	COM_NAME	WA_status	EPBCstatus	YEAR	SOURCE	CERTAINTY	OBS_METHOD	OBS_TYPE	COUNT	LOCALITY	SITE
Leipoa ocellata	malleefowl	BIRD	VU	VU	2013	TFAUNA	Certain	Opportunistic sighting	Day sighting	1	Burra Rock Conservation Reserve	Carpark at Burra Rock. Mound found within adjacent bush habitat.
Leipoa ocellata	malleefowl	BIRD	VU	VU	2013	TFAUNA	Certain	Opportunistic sighting	Day sighting	1	Ora Banda	500m before Cawse Nickel turn off on Broad Arrow-Ora Banda road, heading towards Ora Banda
Leipoa ocellata	malleefowl	BIRD	VU	VU	2013	TFAUNA	Certain	Opportunistic sighting	Day sighting	1	Kanowna	~5km before the Mt Pleasant Office turn off on Mt Pleasant Rd, off Menzies Highway
Leipoa ocellata	malleefowl	BIRD	VU	VU	2013	TFAUNA	Certain	Opportunistic sighting	Dead	1	Kanowna	3.1km north of Paddington Mill (35km north of Kalgoorlie) on Menzies Highway
Leipoa ocellata	malleefowl	BIRD	VU	VU	2013	TFAUNA	Certain	Opportunistic sighting	Day sighting	1		3.2km east of cawse nickel turn off on the Ora Banda - Broad Arrow Rd
Leipoa ocellata	malleefowl	BIRD	VU	VU	2013	TFAUNA	Moderately certain	Opportunistic sighting	Day sighting	1	Feysville	Woolibar Station, just south of where Woolibar creek crosses the Goldfields Highway.
Leipoa ocellata	malleefowl	BIRD	VU	VU	2013	TFAUNA	Certain	Opportunistic sighting	Dead	1	Kanowna	~4.45km east of Cawse Nickel turn off on the Broad Arrow- Ora Banda Rd
Leipoa ocellata	malleefowl	BIRD	VU	VU	2013	TFAUNA	Certain	Opportunistic sighting	Dead	1	Kanowna	~100-200m W of drilling track access road, on the Braod Arrow to Ora Banda road, Near Cawse Nickel turn off.
Leipoa ocellata	malleefowl	BIRD	VU	VU	2013	TFAUNA	Certain	Opportunistic sighting	Day sighting	1	Kanowna	~10km W of Menzies Hwy on Ora Banda - Broad Arrow road
Leipoa ocellata	malleefowl	BIRD	VU	VU	2013	TFAUNA	Certain	Opportunistic sighting	Day sighting	1		3.26km E of Cawse Nickel turn off on Broad Arrow - Ora banda Rd
Leipoa ocellata	malleefowl	BIRD	VU	VU	2014	TFAUNA	Certain	Opportunistic sighting	Day sighting	2	Burra Rock	Burra Rock, Directly west of campsite, south of old east-west track
Leipoa ocellata	malleefowl	BIRD	VU	VU	2015	TFAUNA	Certain	Opportunistic sighting	Day sighting	1	Parkeston	100m along a small track - off a major dirt road; approximately 9km NE of Kalgoorlie
Leipoa ocellata	malleefowl	BIRD	VU	VU	2015	TFAUNA	Certain	Opportunistic sighting	Day sighting	2	Bulong	10.6km SSE of Hampton Hill Station homestead
Leipoa ocellata	malleefowl	BIRD	VU	VU	2015	TFAUNA	Certain	Opportunistic sighting	Day sighting	2	Feysville	Brown Hill on Woolubar Station. Kambolda Rd, Boulder WA
Leipoa ocellata	malleefowl	BIRD	VU	VU	2016	TFAUNA	Moderately certain	Opportunistic sighting	Sighting	1	Coolgardie	Coolgardie North Rd, approx. 5km N of Coolgardie
Leipoa ocellata	malleefowl	BIRD	VU	VU	2016	TFAUNA	Moderately certain	Opportunistic sighting	Sighting	1	Coolgardie	Coolgardie North Rd, approx. 7km N of Coolgardie, near Bonnievale
Leipoa ocellata	malleefowl	BIRD	VU	VU	2015	TFAUNA	Moderately certain	Opportunistic sighting	Sighting	1	Coolgardie	Between Burra Rocks Rd and Coolgardie-Esperance Rd, approx. 5km S of Coolgardie
Leipoa ocellata	malleefowl	BIRD	VU	VU	2016	TFAUNA	Certain	Opportunistic sighting	Dusk sighting	1	Yallari Timber Reserve	Yallari Timber Reserve, central N-S track
Leipoa ocellata	malleefowl	BIRD	VU	VU	2016	TFAUNA	Moderately certain	Opportunistic sighting	Sighting	1	Mount Burges	Traveling route back from Lake Carnage (Coolgardie Nth Rd??), 10km S of Ora Banda
Leipoa ocellata	malleefowl	BIRD	VU	VU	1996	TFAUNA	Moderately certain	Opportunistic sighting	Secondary sign	0	Coolgardie	4WD Holland Track, 200km NE of Mt Holland (cannot find Holland Track)
Leipoa ocellata	malleefowl	BIRD	VU	VU	1965	TFAUNA	Moderately certain	Historical (written)	Secondary sign	0	MOUNT BURGES	12 miles North of Coolgardie
Leipoa ocellata	malleefowl	BIRD	VU	VU	1994	TFAUNA	Moderately certain	Opportunistic sighting	Sighting	2	BULLABULLING	22 kms west of Coolgardie
Leipoa ocellata	malleefowl	BIRD	VU	VU	2004	TFAUNA	Moderately certain	Opportunistic sighting	Sighting	1	KANOWNA	50 km nth of kalgoorlie on main hwy nth of Mt Vettlers homestead
Leipoa ocellata	malleefowl	BIRD	VU	VU	1902	TFAUNA	Moderately certain	Opportunistic sighting	Secondary sign	0	BOORARA	Boorara
Leipoa ocellata	malleefowl	BIRD	VU	VU	2001	TFAUNA	Moderately certain	Opportunistic sighting	Sighting	1	BULONG	Corsair Mine 10km E of Kalgoorlie; 1km S of Bulong Rd on graded track heading E
Leipoa ocellata	malleefowl	BIRD	VU	VU	1988	TFAUNA	Moderately certain	Opportunistic sighting	Sighting	1	MOUNT BURGES	Eight Mile Rock dam
Leipoa ocellata	malleefowl	BIRD	VU	VU	2002	TFAUNA	Moderately certain	Opportunistic sighting	Sighting	2	KARRAMINDIE	grt eastern hwy 21 km kal side of mungarrie industrial area
Leipoa ocellata	malleefowl	BIRD	VU	VU	2002	TFAUNA	Moderately certain	Opportunistic sighting	Sighting	2	BULONG	Hampton Hill Station, 16km ESE of Boulder b/w Boorara Mine Site & Golden Ridge
Leipoa ocellata	malleefowl	BIRD	VU	VU	1910	TFAUNA	Moderately certain	Opportunistic sighting	Sighting	1	LAMINGTON	Kalgoorlie
Leipoa ocellata	malleefowl	BIRD	VU	VU	1991	TFAUNA	Moderately certain	Opportunistic sighting	Sighting	1	BULLABULLING	Kangaroo Hills Timber Reserve
Leipoa ocellata	malleefowl	BIRD	VU	VU	1947	TFAUNA	Moderately certain	Opportunistic sighting	Secondary sign	0	LAMINGTON	PO Kalgoorlie
Leipoa ocellata	malleefowl	BIRD	VU	VU	1988	TFAUNA	Moderately certain	Opportunistic sighting	Sighting	1	MOUNT BURGES	WMC sand pit Jaurdi Hills Rd
Leipoa ocellata	malleefowl	BIRD	VU	VU	1995	TFAUNA	Moderately certain	Opportunistic sighting	Sighting	1	LONDONDERRY	Yallari Timber Reserve
Leipoa ocellata	malleefowl	BIRD	VU	VU	1995	TFAUNA	Moderately certain	Opportunistic sighting	Day sighting	1	LONDONDERRY	Yerilla Sandalwood Reserve
Leipoa ocellata	malleefowl	BIRD	VU	VU	2017	TFAUNA	Very Certain (photo, spec)	Opportunistic sighting	Day sighting	1	Goldfields Woodlands Conservation P	5km N of Victoria Rock, on Coolgardie Vic Rock Rd, in Goldfields Woodlands CP

CLASS	SCL_NAME	COM_NAME	WA_status	EPBCstatus	YEAR	SOURCE	CERTAINTY	OBS_METHOD	OBS_TYPE	COUNT	LOCALITY	SITE
Leipoa ocellata	malleefowl	BIRD	VU	VU	2017	TFAUNA	Very Certain (photo, spec)	Monitoring	Remote camera	1	Londonderry	Scahill Rimber Reserve, on track south of reserve
Leipoa ocellata	malleefowl	BIRD	VU	VU	2017	TFAUNA	Very Certain (photo, spec)	Monitoring	Remote camera	1	Londonderry	Scahill Rimber Reserve, on track south of reserve
Leipoa ocellata	malleefowl	BIRD	VU	VU	2018	TFAUNA	Very Certain (photo, spec)	Opportunistic sighting	Dawn sighting	2	Kanowna	Borad Arrow-Ora Banda Rd, 3km E of Cawse Nickel turnoff
Leipoa ocellata	malleefowl	BIRD	VU	VU	2018	TFAUNA	Not sure	Opportunistic sighting	Sighting	1	Ora Banda	Norton Gold field mining lease road
Leipoa ocellata	malleefowl	BIRD	VU	VU	2017	TFAUNA	Moderately certain	Opportunistic sighting	Day sighting	1	Karramindie	Karramindie State Forest No. 8
Leipoa ocellata	malleefowl	BIRD	VU	VU	2017	TFAUNA	Very Certain (photo, spec)	Opportunistic sighting	Dusk sighting	1	Karramindie	50m E of the S/W corner gate of Karramindie State Forest, where the gully crosses the track
Leipoa ocellata	malleefowl	BIRD	VU	VU	2018	TFAUNA	Very Certain (photo, spec)	Opportunistic sighting	Secondary sign	0	Karramindie	1.7km S of Karramindie State Forest on Hampton Location 53
Leipoa ocellata	malleefowl	BIRD	VU	VU	2018	TFAUNA	Certain	Opportunistic sighting	Day sighting	1	Londonberry	Old woodland track running SW away from Scahill Timber Reserve
Leipoa ocellata	malleefowl	BIRD	VU	VU	2018	TFAUNA	Very Certain (photo, spec)	Monitoring	Remote camera	2	Londonderry	3.5km S of Scahill Timber Reserve, Londonderry
Leipoa ocellata	malleefowl	BIRD	VU	VU	2018	TFAUNA	Certain	Opportunistic sighting	Day sighting	1	Kanowna	Golden cities Mine Site haul road, Kanowna
Calyptorhynchus latirostris	Carnaby's cockatoo	BIRD	EN	EN	2018	TFAUNA	Very Certain (photo, spec)	Opportunistic sighting	Day sighting	1	Sommerville	Southern corner of Hay St and Hutton St
Leipoa ocellata	malleefowl	BIRD	VU	VU	2018	TFAUNA	Very Certain (photo, spec)	Opportunistic sighting	Day sighting	0	Kalgoorlie	West north-west of Kalgoorlie about 20km
Leipoa ocellata	malleefowl	BIRD	VU	VU	2018	TFAUNA	Certain	Opportunistic sighting	Day sighting	2	Golden Cities	Goldfields mining tenure
Leipoa ocellata	malleefowl	BIRD	VU	VU	2007	TFAUNA	Certain	Opportunistic sighting		1	Coolgardie	Victoria Rock Rd, about 15km south of Coolgardie
Leipoa ocellata	malleefowl	BIRD	VU	VU	2007	TFAUNA	Certain	Opportunistic sighting		1	Kalgoorlie	Broad Arrow-Ora Banda Rd, few km east of Cawse Mine turnoff
Leipoa ocellata	malleefowl	BIRD	VU	VU	2007	TFAUNA	Certain	Opportunistic sighting		1	Coolgardie	Burra Rock Road, 11.2km north of DEC Burra Rock Reserve boundary sign
Leipoa ocellata	malleefowl	BIRD	VU	VU	2012	TFAUNA	Certain	Opportunistic sighting		4	Coolgardie	Borefields on Focus owned mine lease, near bore 8
Leipoa ocellata	malleefowl	BIRD	VU	VU	2008	TFAUNA	Certain	Opportunistic sighting		1	Kambalda	
Leipoa ocellata	malleefowl	BIRD	VU	VU	2006	TFAUNA	Certain	Opportunistic sighting		1	Coolgardie	23.2km south of T intersection of Coolgardie Norseman Rd
Leipoa ocellata	malleefowl	BIRD	VU	VU	2008	TFAUNA	Certain	Opportunistic sighting	Dusk sighting	1	Coolgardie	Great Eastern Hwy, 40.5km west of Coolgardie
Leipoa ocellata	malleefowl	BIRD	VU	VU	2009	TFAUNA	Certain	Opportunistic sighting		2	Coolgardie	Juardi Hills Rd, 100m north of crest
Leipoa ocellata	malleefowl	BIRD	VU	VU	2009	TFAUNA	Certain	Opportunistic sighting		1	Londonderry	about 3km south of Burra Rock Reserve along Burra Rock Road
Leipoa ocellata	malleefowl	BIRD	VU	VU	2010	TFAUNA	Certain	Opportunistic sighting		1	Londonberry	Burra Rock Nature Reserve, next to camping area
Leipoa ocellata	malleefowl	BIRD	VU	VU	2010	TFAUNA	Certain	Opportunistic sighting		1	Kambalda	5km along pipeline access road off Cave Rocks mine haul rd
Leipoa ocellata	malleefowl	BIRD	VU	VU	2010	TFAUNA	Certain	Opportunistic sighting	Dead	1	Kambalda	9km N of Kambalda T intersection along Goldfields Hwy
Leipoa ocellata	malleefowl	BIRD	VU	VU	2010	TFAUNA	Certain	Opportunistic sighting		1	Bullabulling	Great Eastern Hwy, 130km E of Southern Cross, near unnamed gravel road
Leipoa ocellata	malleefowl	BIRD	VU	VU	2011	TFAUNA	Certain	Opportunistic sighting		1	Ora Banda	Broad Arrow-Ora Banda Rd, approx. 5.5km from Norlisk Nickel access road toward east
Leipoa ocellata	malleefowl	BIRD	VU	VU	2011	TFAUNA	Certain	Opportunistic sighting		2	Londonderry	Burra Rock camping ground
Leipoa ocellata	malleefowl	BIRD	VU	VU	2011	TFAUNA	Certain	Survey		0	Ora Banda	
Leipoa ocellata	malleefowl	BIRD	VU	VU	2011	TFAUNA	Certain	Survey		0	Ora Banda	
Leipoa ocellata	malleefowl	BIRD	VU	VU	2013	TFAUNA	Certain	Opportunistic sighting	Sighting	1	Coolgardie	7km south of Coolgardie on the Victoria Rock Road
Leipoa ocellata	malleefowl	BIRD	VU	VU	0	TFAUNA	Certain	Opportunistic sighting	Secondary sign	0	Burra Rock Conservation Reserve	
Leipoa ocellata	malleefowl	BIRD	VU	VU	2012	TFAUNA	Certain	Opportunistic sighting	Sighting	1	Kalgoorlie	Goldfield HWY
Leipoa ocellata	malleefowl	BIRD	VU	VU	2013	TFAUNA	Certain	Opportunistic sighting	Sighting	1	Ora Banda	Between Broad Arrow and Ora Banda
Leipoa ocellata	malleefowl	BIRD	VU	VU	2013	TFAUNA	Certain	Opportunistic sighting	Sighting	1	Goldfields- Kalgoorlie/Coolgardie	Great Eastern Highway
Leipoa ocellata	malleefowl	BIRD	VU	VU	2019	TFAUNA	Certain	Opportunistic sighting	Dusk sighting	1	Arrow Lake	
Leipoa ocellata	malleefowl	BIRD	VU	VU	2019	TFAUNA	Certain	Opportunistic sighting	Sighting	1	Mungari	Mungari turnoff from Great Eastern HWY heading South
Leipoa ocellata	Malleefowl	BIRD	VU	VU	0	WAM_BIRDS	WAM Vouchered	Collection	Specimen	1	KALGOORLIE	Kalgoorlie
Leipoa ocellata	Malleefowl	BIRD	VU	VU	0	WAM_BIRDS	WAM Vouchered	Collection	Specimen	1	KALGOORLIE	Kalgoorlie

NatureMap Species Report

Created By Guest user on 02/11/2021

Kingdom Animalia
 Current Names Only Yes
 Core Datasets Only Yes
 Species Group All Animals
 Method 'By Circle'
 Centre 121° 11' 12" E, 30° 55' 14" S
 Buffer 40km
 Group By Conservation Status

Conservation Status	Species	Records
Non-conservation taxon	297	4751
Priority 1	1	5
Priority 4	1	1
Protected under international agreement	6	13
Rare or likely to become extinct	6	67
TOTAL	311	4837

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Rare or likely to become extinct				
1.	24784 <i>Calidris ferruginea</i> (Curlew Sandpiper)		T	
2.	24734 <i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)		T	
3.	24557 <i>Leipoa ocellata</i> (Malleefowl)		T	
4.	24168 <i>Macrotis lagotis</i> (Bilby, Dalgyte, Ninu)		T	
5.	24146 <i>Myrmecobius fasciatus</i> (Numbat, Walpurti)		T	
6.	33987 <i>Ogyris subterrestris</i> subsp. <i>petrina</i> (Arid Bronze Azure Butterfly)		T	
Protected under international agreement				
7.	41323 <i>Actitis hypoleucos</i> (Common Sandpiper)		IA	
8.	24779 <i>Calidris acuminata</i> (Sharp-tailed Sandpiper)		IA	
9.	24780 <i>Calidris alba</i> (Sanderling)		IA	
10.	24788 <i>Calidris ruficollis</i> (Red-necked Stint)		IA	
11.	24806 <i>Tringa glareola</i> (Wood Sandpiper)		IA	
12.	24808 <i>Tringa nebularia</i> (Common Greenshank, greenshank)		IA	
Priority 1				
13.	33979 <i>Jalmenus aridus</i> (inland hairstreak, desert blue butterfly)		P1	Y
Priority 4				
14.	24803 <i>Tringa brevipes</i> (Grey-tailed Tattler)		P4	
Non-conservation taxon				
15.	24559 <i>Acanthagenys rufogularis</i> (Spiny-cheeked Honeyeater)			
16.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
17.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
18.	24265 <i>Acanthiza uropygialis</i> (Chestnut-rumped Thornbill)			
19.	25243 <i>Acanthopis pyrrhus</i> (Desert Death Adder)			
20.	25535 <i>Accipiter cirrocephalus</i> (Collared Sparrowhawk)			
21.	25536 <i>Accipiter fasciatus</i> (Brown Goshawk)			
22.	25544 <i>Aegotheles cristatus</i> (Australian Owllet-nightjar)			
23.	<i>Afraflacilla stridulator</i>			
24.	<i>Afrosterphorus hirsti</i>			Y
25.	<i>Allodessus bistrigatus</i>			
26.	<i>Aname armigera</i>			
27.	<i>Aname mainae</i>			
28.	24312 <i>Anas gracilis</i> (Grey Teal)			
29.	24313 <i>Anas platyrhynchos</i> (Mallard)			
30.	24315 <i>Anas rhynchotis</i> (Australasian Shoveler)			
31.	24316 <i>Anas superciliosa</i> (Pacific Black Duck)			
32.	47414 <i>Anhinga novaehollandiae</i> (Australasian Darter)			
33.	<i>Anidiops villosus</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
34.	24561 <i>Anthochaera carunculata</i> (Red Wattlebird)			
35.	25670 <i>Anthus australis</i> (Australian Pipit)			
36.	24599 <i>Anthus australis</i> subsp. <i>australis</i> (Australian Pipit)			
37.	25528 <i>Aphelocephala leucopsis</i> (Southern Whiteface)			
38.	24266 <i>Aphelocephala leucopsis</i> subsp. <i>castaneiventris</i> (Southern Whiteface)			
39.	24285 <i>Aquila audax</i> (Wedge-tailed Eagle)			
40.	41324 <i>Ardea modesta</i> (great egret, white egret)			
41.	24341 <i>Ardea pacifica</i> (White-necked Heron)			
42.	24610 <i>Ardeotis australis</i> (Australian Bustard)			
43.	<i>Argiope protensa</i>			
44.	<i>Argiope trifasciata</i>			
45.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
46.	24353 <i>Artamus cyanopterus</i> (Dusky Woodswallow)			
47.	24356 <i>Artamus personatus</i> (Masked Woodswallow)			
48.	<i>Austracantha minax</i>			
49.	24318 <i>Aythya australis</i> (Hardhead)			
50.	<i>Backobourkia heroine</i>			
51.	<i>Baiami tegenarioides</i>			
52.	<i>Barnardius zonarius</i>			
53.	<i>Berosus nutans</i>			
54.	24319 <i>Biziura lobata</i> (Musk Duck)			
55.	42380 <i>Brachyurophis fasciolatus</i> subsp. <i>fasciolatus</i> (Narrow-banded Shovel-nosed Snake)			
56.	42381 <i>Brachyurophis semifasciatus</i> (Southern Shovel-nosed Snake)			
57.	25715 <i>Cacatua roseicapilla</i> (Galah)			
58.	25716 <i>Cacatua sanguinea</i> (Little Corella)			
59.	42307 <i>Cacomantis pallidus</i> (Pallid Cuckoo)			
60.	24253 <i>Capra hircus</i> (Goat)	Y		
61.	<i>Carassius auratus</i>			
62.	<i>Celaenia excavata</i>			
63.	24086 <i>Cercartetus concinnus</i> (Western Pygmy-possum, Mundarda)			
64.	<i>Cercophonius michaelseni</i>			
65.	24186 <i>Chalinolobus gouldii</i> (Gould's Wattled Bat)			
66.	24187 <i>Chalinolobus morio</i> (Chocolate Wattled Bat)			
67.	24377 <i>Charadrius ruficapillus</i> (Red-capped Plover)			
68.	43380 <i>Chelodina colliei</i> (South-western Snake-necked Turtle)			
69.	24321 <i>Chenonetta jubata</i> (Australian Wood Duck, Wood Duck)			
70.	47909 <i>Cheramoeca leucosterna</i> (White-backed Swallow)			
71.	<i>Chroicocephalus novaehollandiae</i>			
72.	24431 <i>Chrysococcyx basalis</i> (Horsfield's Bronze Cuckoo)			
73.	24434 <i>Chrysococcyx osculans</i> (Black-eared Cuckoo)			
74.	24289 <i>Circus assimilis</i> (Spotted Harrier)			
75.	24774 <i>Cladorhynchus leucocephalus</i> (Banded Stilt)			
76.	25675 <i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
77.	24399 <i>Columba livia</i> (Domestic Pigeon)	Y		
78.	24361 <i>Coracina maxima</i> (Ground Cuckoo-shrike)			
79.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
80.	<i>Corasoides australis</i>			
81.	<i>Corimaethes campestris</i>			
82.	<i>Cormocephalus bungalbinensis</i>			
83.	24416 <i>Corvus bennetti</i> (Little Crow)			
84.	25592 <i>Corvus coronoides</i> (Australian Raven)			
85.	25593 <i>Corvus orru</i> (Torresian Crow)			
86.	24671 <i>Coturnix pectoralis</i> (Stubble Quail)			
87.	24420 <i>Cracticus nigrogularis</i> (Pied Butcherbird)			
88.	25595 <i>Cracticus tibicen</i> (Australian Magpie)			
89.	25596 <i>Cracticus torquatus</i> (Grey Butcherbird)			
90.	30893 <i>Cryptoblepharus buchananii</i>			
91.	25020 <i>Cryptoblepharus plagioccephalus</i>			
92.	25458 <i>Ctenophorus caudicinctus</i> (Ring-tailed Dragon)			
93.	24871 <i>Ctenophorus cristatus</i> (Bicycle Dragon)			
94.	24873 <i>Ctenophorus fordi</i> (Mallee Sand Dragon)			
95.	24874 <i>Ctenophorus isolepis</i> subsp. <i>citrinus</i> (Yellowy Military Dragon)			
96.	24882 <i>Ctenophorus nuchalis</i> (Central Netted Dragon)			
97.	24886 <i>Ctenophorus reticulatus</i> (Western Netted Dragon)			
98.	24888 <i>Ctenophorus salinarum</i> (Salt Pan Dragon)			
99.	24889 <i>Ctenophorus scutulatus</i> (Lozenge-marked Dragon)			
100.	25026 <i>Ctenotus atlas</i>			
101.	25052 <i>Ctenotus leonhardii</i>			
102.	25074 <i>Ctenotus schomburgkii</i>			
103.	25465 <i>Ctenotus uber</i> (Spotted Ctenotus)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
104.	25080 <i>Ctenotus uber</i> subsp. <i>uber</i> (Spotted Ctenotus)			
105.	25089 <i>Cyclodomorphus melanops</i> subsp. <i>elongatus</i> (Slender Blue-tongue)			
106.	24322 <i>Cygnus atratus</i> (Black Swan)			
107.	<i>Cyrtophora parnasia</i>			
108.	<i>Daphnia carinata</i>			
109.	25673 <i>Daphnoenissita chrysoptera</i> (Varied Sittella)			
110.	24606 <i>Daphnoenissita chrysoptera</i> subsp. <i>pileata</i> (Varied Sittella, Black-capped Sittella)			
111.	24995 <i>Delma australis</i>			
112.	25247 <i>Demansia psammophis</i> subsp. <i>psammophis</i> (Yellow-faced Whipsnake)			
113.	25607 <i>Dicaeum hirundinaceum</i> (Mistletoebird)			
114.	25469 <i>Diplodactylus granariensis</i>			
115.	24929 <i>Diplodactylus granariensis</i> subsp. <i>granariensis</i>			
116.	24940 <i>Diplodactylus pulcher</i>			
117.	24470 <i>Dromaius novaehollandiae</i> (Emu)			
118.	24650 <i>Drymodes brunneopygia</i> (Southern Scrub-robin)			
119.	25092 <i>Egernia depressa</i> (Southern Pygmy Spiny-tailed Skink)			
120.	25094 <i>Egernia formosa</i>			
121.	25104 <i>Egernia richardi</i>			
122.	<i>Egretta novaehollandiae</i>			
123.	<i>Elanus axillaris</i>			
124.	24290 <i>Elanus caeruleus</i> subsp. <i>axillaris</i> (Australian Black-shouldered Kite)			
125.	47937 <i>Elseymornis melanops</i> (Black-fronted Dotterel)			
126.	<i>Enochrus elongatulus</i>			
127.	<i>Eolophus roseicapillus</i>			
128.	24651 <i>Eopsaltria australis</i> subsp. <i>griseogularis</i> (Western Yellow Robin)			
129.	24567 <i>Epthianura albifrons</i> (White-fronted Chat)			
130.	24570 <i>Epthianura tricolor</i> (Crimson Chat)			
131.	25109 <i>Eremiascincus richardsonii</i> (Broad-banded Sand Swimmer)			
132.	<i>Eriophora biapicata</i>			
133.	24379 <i>Erythronyctes cinctus</i> (Red-kneed Dotterel)			
134.	24368 <i>Eurostopodus argus</i> (Spotted Nightjar)			
135.	25621 <i>Falco berigora</i> (Brown Falcon)			
136.	24471 <i>Falco berigora</i> subsp. <i>berigora</i> (Brown Falcon)			
137.	25622 <i>Falco cenchroides</i> (Australian Kestrel, Nankeen Kestrel)			
138.	25623 <i>Falco longipennis</i> (Australian Hobby)			
139.	24041 <i>Felis catus</i> (Cat)	Y		
140.	<i>Fissarena castanea</i>			
141.	25727 <i>Fulica atra</i> (Eurasian Coot)			
142.	25301 <i>Furina ornata</i> (Moon Snake)			
143.	24957 <i>Gehyra purpurascens</i>			
144.	24959 <i>Gehyra variegata</i>			
145.	25530 <i>Gerygone fusca</i> (Western Gerygone)			
146.	24443 <i>Gallinula cyanoleuca</i> (Magpie-lark)			
147.	24295 <i>Haliastur sphenurus</i> (Whistling Kite)			
148.	<i>Hemicloea sublimbata</i>			
149.	25232 <i>Hemidactylus frenatus</i> (Asian House Gecko)	Y		
150.	25115 <i>Hemiergis initialis</i> subsp. <i>initialis</i>			
151.	42408 <i>Hesperoedura reticulata</i>			
152.	24961 <i>Heteronotia binoei</i> (Bynoe's Gecko)			
153.	47965 <i>Hieraaetus morphnoides</i> (Little Eagle)			
154.	25734 <i>Himantopus himantopus</i> (Black-winged Stilt)			
155.	24775 <i>Himantopus himantopus</i> subsp. <i>leucocephalus</i> (Black-winged Stilt)			
156.	24491 <i>Hirundo neoxena</i> (Welcome Swallow)			
157.	<i>Hoggicosa castanea</i>			
158.	<i>Hoggicosa forresti</i>			
159.	<i>Holoplatys kalgoorlie</i>			Y
160.	<i>Holoplatys planissima</i>			
161.	34001 <i>Hylacola cauta</i> subsp. <i>whitlocki</i> (Shy Groundwren)			
162.	<i>Idiommata blackwalli</i>			
163.	<i>Isometroides vescus</i>			
164.	<i>Isopeda magna</i>			
165.	<i>Isopedella saundersi</i>			
166.	<i>Jalmenus icilius</i>			Y
167.	24367 <i>Lalage tricolor</i> (White-winged Triller)			
168.	<i>Lampona cylindrata</i>			
169.	<i>Lamponina scutata</i>			
170.	<i>Latrodectus hasseltii</i>			
171.	<i>Lerista kingi</i>			
172.	25155 <i>Lerista muelleri</i>			
173.	25162 <i>Lerista picturata</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
174.	25172 <i>Lerista stictopleura</i>			
175.	42411 <i>Lerista timida</i>			
176.	25005 <i>Lialis burtonis</i>			
177.	25659 <i>Lichenostomus leucotis</i> (White-eared Honeyeater)			
178.	24576 <i>Lichenostomus leucotis</i> subsp. <i>novaenorciae</i> (White-eared Honeyeater)			
179.	25661 <i>Lichmera indistincta</i> (Brown Honeyeater)			
180.	41411 <i>Liopholis inornata</i> (Desert Skink)			
181.	25388 <i>Litoria moorei</i> (Motorbike Frog)			
182.	30935 <i>Lucasium maini</i>			
183.	<i>Lycosa ariadnae</i>			
184.	24132 <i>Macropus fuliginosus</i> (Western Grey Kangaroo)			
185.	24136 <i>Macropus rufus</i> (Red Kangaroo, Marlu)			
186.	24326 <i>Malacorhynchus membranaceus</i> (Pink-eared Duck)			
187.	25652 <i>Malurus leucopterus</i> (White-winged Fairy-wren)			
188.	24551 <i>Malurus pulcherrimus</i> (Blue-breasted Fairy-wren)			
189.	25654 <i>Malurus splendens</i> (Splendid Fairy-wren)			
190.	24583 <i>Manorina flavigula</i> (Yellow-throated Miner)			
191.	25663 <i>Melithreptus brevirostris</i> (Brown-headed Honeyeater)			
192.	24736 <i>Melopsittacus undulatus</i> (Budgerigar)			
193.	25184 <i>Menetia greyii</i>			
194.	24598 <i>Merops ornatus</i> (Rainbow Bee-eater)			
195.	<i>Microcarbo melanoleucos</i>			
196.	25693 <i>Microeca fascinans</i> (Jacky Winter)			
197.	24654 <i>Microeca fascinans</i> subsp. <i>assimilis</i> (Jacky Winter)			
198.	<i>Missulena occatoria</i>			
199.	24904 <i>Moloch horridus</i> (Thorny Devil)			
200.	25240 <i>Morelia spilota</i> subsp. <i>imbricata</i> (Carpet Python)			
201.	25188 <i>Morethia adelaidensis</i>			
202.	25190 <i>Morethia butleri</i>			
203.	24223 <i>Mus musculus</i> (House Mouse)	Y		
204.	25248 <i>Neelaps bimaculatus</i> (Black-naped Snake)			
205.	25425 <i>Neobatrachus kunapalari</i> (Kunapalari Frog)			
206.	25426 <i>Neobatrachus pelobatoides</i> (Humming Frog)			
207.	25427 <i>Neobatrachus sutor</i> (Shoemaker Frog)			
208.	25428 <i>Neobatrachus wilsmorei</i> (Plonking Frog)			
209.	<i>Nephila edulis</i>			
210.	24971 <i>Nephurus vertebralis</i>			
211.	<i>Nicodamus mainae</i>			
212.	24096 <i>Ningau yvonneae</i> (Southern Ningau)			
213.	24229 <i>Notomys mitchellii</i> (Mitchell's Hopping-mouse)			
214.	24194 <i>Nyctophilus geoffroyi</i> (Lesser Long-eared Bat)			
215.	24742 <i>Nymphicus hollandicus</i> (Cockatiel)			
216.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
217.	24618 <i>Oreoica gutturalis</i> (Crested Bellbird)			
218.	34011 <i>Oreoica gutturalis</i> subsp. <i>gutturalis</i> (Crested Bellbird (southern))			
219.	24085 <i>Oryctolagus cuniculus</i> (Rabbit)	Y		
220.	<i>Ostracoda (unident.)</i>			
221.	<i>Oxyopes amoenus</i>			
222.	<i>Oxyopes dingo</i>			
223.	<i>Oxyopes variabilis</i>			
224.	<i>Ozestheria packardii</i>			
225.	24619 <i>Pachycephala inornata</i> (Gilbert's Whistler)			
226.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
227.	<i>Parartemia</i> sp.			
228.	25253 <i>Parasuta gouldii</i>			
229.	25254 <i>Parasuta monachus</i>			
230.	25681 <i>Pardalotus punctatus</i> (Spotted Pardalote)			
231.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
232.	24630 <i>Pardalotus striatus</i> subsp. <i>westraliensis</i> (Striated Pardalote)			
233.	48060 <i>Petrochelidon ariel</i> (Fairy Martin)			
234.	48061 <i>Petrochelidon nigricans</i> (Tree Martin)			
235.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
236.	24667 <i>Phalacrocorax sulcirostris</i> (Little Black Cormorant)			
237.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			
238.	24841 <i>Platalea flavipes</i> (Yellow-billed Spoonbill)			
239.	25720 <i>Platycercus icterotis</i> (Western Rosella)			
240.	24748 <i>Platycercus varius</i> (Mulga Parrot)			
241.	25721 <i>Platycercus zonarius</i> (Australian Ringneck, Ring-necked Parrot)			
242.	24751 <i>Platycercus zonarius</i> subsp. <i>zonarius</i> (Port Lincoln Parrot)			
243.	25703 <i>Podargus strigoides</i> (Tawny Frogmouth)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
244.	24907 <i>Pogona minor subsp. minor</i> (Dwarf Bearded Dragon)			
245.	24681 <i>Poliocephalus poliocephalus</i> (Hoary-headed Grebe)			
246.	30854 <i>Polytelis anthopeplus subsp. westralis</i> (Regent Parrot)			
247.	24683 <i>Pomatostomus superciliosus</i> (White-browed Babbler)			
248.	34013 <i>Pomatostomus superciliosus subsp. ashbyi</i> (White-browed Babbler (western wheatbelt))			
249.	24769 <i>Porzana fluminea</i> (Australian Spotted Crane)			
250.	25261 <i>Pseudechis australis</i> (Mulga Snake)			
251.	24232 <i>Pseudomys bolami</i> (Bolam's Mouse)			
252.	24237 <i>Pseudomys hermannsburgensis</i> (Sandy Inland Mouse)			
253.	42416 <i>Pseudonaja mengdeni</i> (Western Brown Snake)			
254.	25263 <i>Pseudonaja modesta</i> (Ringed Brown Snake)			
255.	25434 <i>Pseudophryne occidentalis</i> (Western Toadlet)			
256.	42344 <i>Pumella albifrons</i> (White-fronted Honeyeater)			
257.	25008 <i>Pygopus lepidopodus</i> (Common Scaly Foot)			
258.	25009 <i>Pygopus nigriceps</i>			
259.	24278 <i>Pyrrholaemus brunneus</i> (Redthroat)			
260.	24776 <i>Recurvirostra novaehollandiae</i> (Red-necked Avocet)			
261.	48096 <i>Rhipidura albiscapa</i> (Grey Fantail)			
262.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
263.	24982 <i>Rhynchoedura ornata</i> (Western Beaked Gecko)			
264.	<i>Sandalodes scopifer</i>			
265.	<i>Scolopendra laeta</i>			
266.	<i>Scolopendra morsitans</i>			
267.	24199 <i>Scotorepens balstoni</i> (Inland Broad-nosed Bat)			
268.	<i>Selenotholus foelschei</i>			
269.	25266 <i>Simoselaps bertholdi</i> (Jan's Banded Snake)			
270.	30948 <i>Smicromnis brevirostris</i> (Weebill)			
271.	24108 <i>Sminthopsis crassicaudata</i> (Fat-tailed Dunnart)			
272.	24109 <i>Sminthopsis dolichura</i> (Little long-tailed Dunnart)			
273.	24111 <i>Sminthopsis gilberti</i> (Gilbert's Dunnart)			
274.	24329 <i>Stictonetta naevosa</i> (Freckled Duck)			
275.	<i>Storena sinuosa</i>			
276.	25597 <i>Strepera versicolor</i> (Grey Currawong)			
277.	25590 <i>Streptopelia senegalensis</i> (Laughing Turtle-Dove)	Y		
278.	24923 <i>Strophurus assimilis</i> (Goldfields Spiny-tailed Gecko)			
279.	24927 <i>Strophurus elderi</i>			
280.	25269 <i>Suta fasciata</i> (Rosen's Snake)			
281.	25705 <i>Tachybaptus novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
282.	24207 <i>Tachyglossus aculeatus</i> (Short-beaked Echidna)			
283.	24331 <i>Tadorna tadornoides</i> (Australian Shelduck, Mountain Duck)			
284.	30870 <i>Taeniopygia guttata</i> (Zebra Finch)			
285.	<i>Tamopsis circumvidens</i>			
286.	24176 <i>Taphozous hilli</i> (Hill's Sheathtail-bat)			
287.	<i>Tasmanicosa leuckartii</i>			
288.	24845 <i>Threskiornis spinicollis</i> (Straw-necked Ibis)			
289.	25203 <i>Tiliqua occipitalis</i> (Western Bluetongue)			
290.	25519 <i>Tiliqua rugosa</i>			
291.	25207 <i>Tiliqua rugosa subsp. rugosa</i>			
292.	42351 <i>Todiramphus pyrrhopygius</i> (Red-backed Kingfisher)			
293.	25549 <i>Todiramphus sanctus</i> (Sacred Kingfisher)			
294.	48141 <i>Tribonyx ventralis</i> (Black-tailed Native-hen)			
295.	<i>Trichocycclus balladong</i>			
296.	39407 <i>Triops australiensis</i> (Shield Shrimp)			
297.	24851 <i>Turnix velox</i> (Little Button-quail)			
298.	30814 <i>Tympanocryptis cephalus</i> (Pebble Dragon)			
299.	39408 <i>Tympanocryptis lineata</i> (Lined Earless Dragon)			
300.	24852 <i>Tyto alba subsp. delicatula</i> (Barn Owl)			
301.	24983 <i>Underwoodisaurus milii</i> (Barking Gecko)			
302.	<i>Urodacus armatus</i>			
303.	<i>Urodacus hoplurus</i>			
304.	<i>Urodacus yaschenkoi</i>			
305.	24386 <i>Vanellus tricolor</i> (Banded Lapwing)			
306.	25211 <i>Varanus caudolineatus</i>			
307.	25218 <i>Varanus gouldii</i> (Bungarra or Sand Monitor)			
308.	25526 <i>Varanus tristis</i> (Racehorse Monitor)			
309.	24202 <i>Vespadelus baverstocki</i> (Inland Forest Bat)			
310.	24206 <i>Vespadelus regulus</i> (Southern Forest Bat)			
311.	25765 <i>Zosterops lateralis</i> (Grey-breasted White-eye, Silvereye)			

Name ID Species Name

Naturalised

Conservation Code

¹Endemic To Query Area

Conservation Codes

- T - Rare or likely to become extinct
- X - Presumed extinct
- IA - Protected under international agreement
- S - Other specially protected fauna
- 1 - Priority 1
- 2 - Priority 2
- 3 - Priority 3
- 4 - Priority 4
- 5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 25/10/21 19:14:20

[Summary](#)

[Details](#)

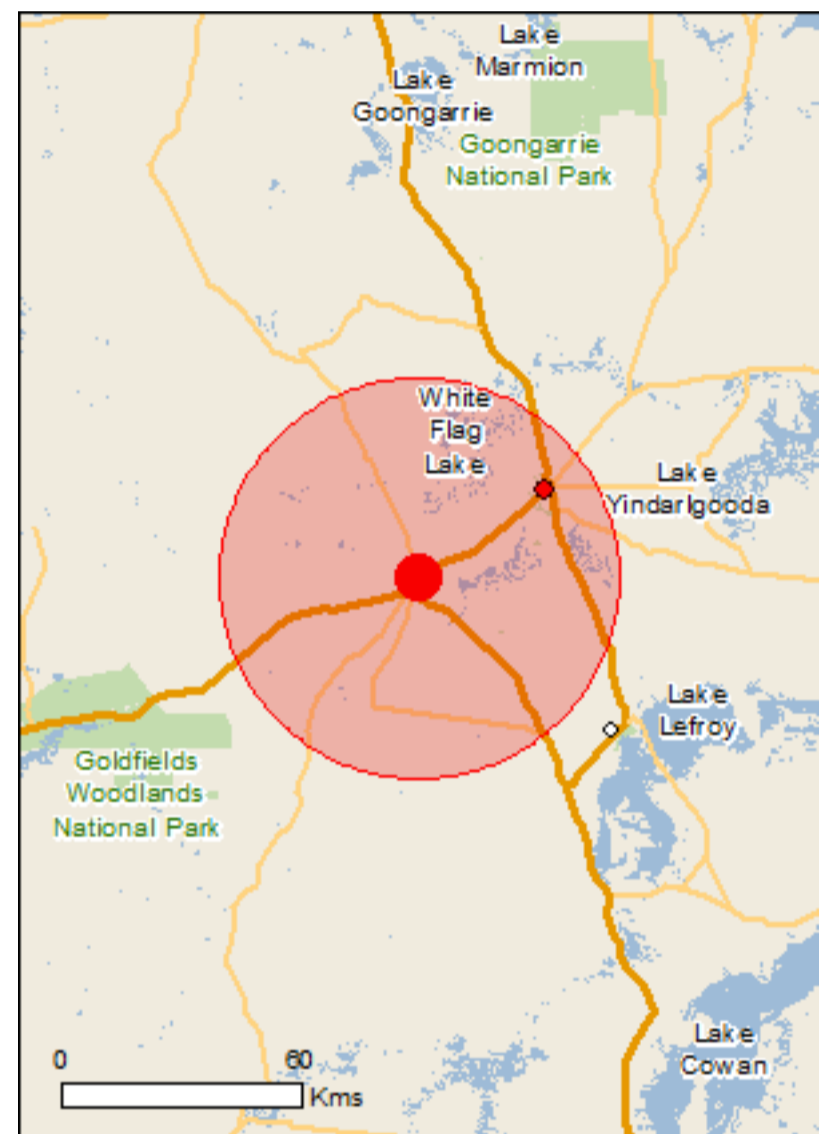
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

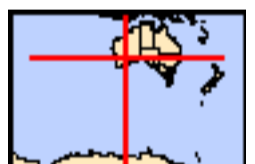
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[Coordinates](#)

Buffer: 50.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance:	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 <http://www.environment.gov.au/heritage>

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

Commonwealth Land:	4
Commonwealth Heritage Places:	None
Listed Marine Species:	11
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	9
Regional Forest Agreements:	None
Invasive Species:	16
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

National Heritage Properties		[Resource Information]
Name	State	Status
Historic		
Goldfields Water Supply Scheme, Western Australia	WA	Listed place

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
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

Insects		
Ogyris subterrestris petrina Arid Bronze Azure [77743]	Critically Endangered	Species or species habitat may occur within area

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

Plants		
Gastrolobium graniticum Granite Poison [14872]	Endangered	Species or species habitat known to occur within area
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat may occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Migratory Terrestrial Species		
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Name	Threatened	Type of Presence
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 known 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 Land [\[Resource Information \]](#)

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.

Name
Commonwealth Land - Defence - AIRTC KALGOORLIE Defence - KALGOORLIE RIFLE RANGE Defence - KALGOORLIE TRAINING DEPOT

Listed Marine Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known 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
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species

Name	Threatened	Type of Presence
Merops ornatus Rainbow Bee-eater [670]		habitat known to occur within area Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Goldfields Woodlands	WA
Kalgoorlie Arboretum	WA
Kambalda	WA
Kangaroo Hills Timber Reserve	WA
Kurrawang	WA
Lakeside Timber Reserve	WA
Scahill Timber Reserve	WA
Victoria Rock	WA
Yallari Timber Reserve	WA

Invasive Species	[Resource Information]
Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.	

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Carrichtera annua Ward's Weed [9511]		Species or species habitat likely to occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Cylindropuntia spp. Prickly Pears [85131]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

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

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

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

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

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

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

Coordinates

-30.92058 121.18644

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 C

Coolgardie Flora Likelihood Table

Appendix: Assessment of the Likelihood of Occurrence of Threatened and Priority Flora as per Desktop Assessment Database Searches surrounding the Survey Area

Distance to Nearest Record from the Survey Area is based on a distance analysis undertaken against 2021 DBCA database. High = Suitable habitat present and records less than 15 km from the Survey Area, Medium = Suitable habitat present and records between 15 km and 30 km from the Survey Area, and Low = No suitable habitat present and/or records greater than 30 km from the Survey Area, Unknown = Insufficient information available to classify. CR= Listed as Critically Endangered under the EPBC Act, EN = Listed as Endangered under the EPBC Act, VU = listed as Vulnerable under the EPBC Act. T = Threatened under the BC Act, P = Priority Listed, Ranked and Listed by the DBCA. Likelihoods are assessed both pre and post survey based on knowledge of the Survey Area, nearest known records, known flowering period of flora taxa and knowledge gained from the survey effort during ground truthing. 1: Department of the Environment (2021). SPRAT EPBC Threatened Flora in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: <http://www.environment.gov.au/sprat>. 2: Department of Biodiversity, Conservation and Attractions (2021). FloraBase - TheWestern Australian Flora. <https://florabase.dpaw.wa.gov.au/>

Species	Conservation Status		Source			Distance to Nearest Record (km)	Flowering Period	Preferred Habitat	Habitat occurs within the Survey Area	Pre-Survey Likelihood of Occurrence	Post-Survey Likelihood of Occurrence
	DBCA	EPBC	NatureMap	PMST	DBCA						
<i>Gastrolobium graniticum</i>	T	EN	X	X	X	25.8	Aug to Sep.	Sand, sandy loam, granite. Margins of rock outcrops, along drainage lines. ²	No	Medium	Low
<i>Tetrateca spenceri</i>	T				X	39.1	Mar	Gentle slope on duricrust breakaway. ²	No	Low	Low
<i>Thelymitra stellata</i>	T	EN		X		12.8	Oct - Nov	Grows on ridges and slopes, flats, also on riverbanks and breakaways. Soil types are red, brown, yellow, or grey sandy loams clay or gravel over laterite or gravel. Dry, moist or saline conditions are tolerated. ¹	Yes	High	Medium
<i>Acacia coatesii</i>	P1		X			7.4	Sep	Flat to gentle slope, red sandy loam soils. ²	Yes	High	Medium
<i>Acacia epedunculata</i>	P1				X	18.6	Aug - Oct	Yellow sand. Sandplains. ²	Yes	Medium	Low
<i>Acacia sclerophylla var. teretiuscula</i>	P1		X			16.1	Sep - Oct	Clay and loamy soils. ²	Yes	Medium	Low
<i>Acacia websteri</i>	P1		X		X	0.7	Jun	Red sand, clay or loam. Low-lying areas, flats. ²	Yes	High	High
<i>Calandrinia lefroyensis</i>	P1				X	10.8	Feb or Apr or Oct - Nov	Light brown, orange or red sand, sandy loam, sandy clay loam over sediments. Fine quartz. Gentle slopes, near salt lakes or salt flats, sand dunes. ²	Yes	High	Medium
<i>Chamelaucium sp. Parker Range (B.H. Smith 1255)</i>	P1				X	19	Nov or Dec	Sandplains, Mid slope. Dry, yellow sand over laterite. ²	Yes	Medium	Low
<i>Eremophila xantholaema</i>	P1				X	17.7	Sep - Oct	Hilltop and slopes. Brown/orange/red very rocky loam/granite. ²	Yes	Medium	Low
<i>Cyathostemon divaricatus</i>	P1				X	40.5	Jan or Jun or Aug	Hills, hillslope. ²	Yes	Low	Low
<i>Dampiera plumosa</i>	P1		X			4.5	Oct	Red sandy soils. ²	Yes	High	Medium
<i>Eucalyptus websteriana subsp. norsemanica</i>	P1		X			8.7	Sep to Nov	Rocky rises. ²	Yes	High	Medium
<i>Lepidosperma lyonsii</i>	P1				X	70.6	Jun	Orange skeletal sandy loam with banded ironstone gravel and rock, well-drained shallow stony loam with quartz. Gentle hill slopes, upper slopes of large hill. ²	Yes	Low	Low
<i>Lepidosperma sp. Parker Range (N. Gibson & M. Lyons 2094)</i>	P1		X			8.3	NA	Brown sandy loam, or clay. Gravel, laterite. Banded ironstone formations, ridges, mid-slopes. ²	Yes	High	Medium

¹ Department of Agriculture, Water and Environment (2020) ²Western Australian Herbarium (2020)

Species	Conservation Status		Source			Distance to Nearest Record (km)	Flowering Period	Preferred Habitat	Habitat occurs within the Survey Area	Pre-Survey Likelihood of Occurrence	Post-Survey Likelihood of Occurrence
	DBCA	EPBC	NatureMap	PMST	DBCA						
<i>Melichrus</i> sp. <i>Coolgardie</i> (K.R. Newbey 8698)	P1				X	24.8	April or Jun or Aug - Dec	Yellow loamy sand. Sandplains. ²	Yes	Medium	Low
<i>Phebalium appressum</i>	P1		X			7.8	Jul	Yellow sandplain. ²	Yes	High	Low
<i>Philotheca apiculata</i>	P1				X	45.8	Aug - Nov	Stony clay loam. Rocky outcrops, hillsides. ²	Yes	Low	Low
<i>Philotheca pachyphylla</i>	P1				X	31.9	May or Sep	Sand, red loam, clay loam. Sandplains, hill tops. ²	Yes	Low	Low
<i>Prostanthera splendens</i>	P1				X	66.8	Aug - Oct	Stony loam, shallow soils with ironstone pebbles. Breakaways. ²	No	Low	Low
<i>Pterostylis xerampelina</i>	P1				X	66.1	Sept - Oct	Granite. ²	Yes	Low	Low
<i>Ptilotus procumbens</i>	P1				X	30.2	Nov	Red clay. ²	Yes	Low	Low
<i>Ptilotus rigidus</i>	P1				X	30.4	Mar or May or Oct - Jan	Clay, clay loam on quartz hills and edges of salt lakes. ²	Yes	Low	Low
<i>Ptilotus</i> sp. <i>Kalgoorlie</i> (J. Jackson & B. Moyle 260)	P1				X	36.1	NA	Quartz hills. ²	Yes	Low	Low
<i>Rhodanthe uniflora</i>	P1				X	44.8	Aug - Oct	Brown earth. Open <i>Eucalyptus</i> woodland. ²	Yes	Low	Low
<i>Ricinocarpos digynus</i>	P1				X	50.4	Aug	Red-brown sand-loam. Rocky hillslopes and plains. ²	Yes	Low	Low
<i>Tecticornia flabelliformis</i>	P1	VU		X	X	54.8	Dec	Clay. Saline flats. ²	Yes	Low	Low
<i>Tecticornia mellarium</i>	P1				X	58.4	NA	Close proximity to salt lakes and dunes. ²	Yes	Low	Low
<i>Thryptomene planiflora</i>	P1		X			19.1	Jul or Aug - Sep	Brown, yellow or orange sandy loam. Lateritic gravel. Gentle hillslopes, sandplains, slight depressions. ²	Yes	Medium	Medium
<i>Thryptomene</i> sp. <i>Coolgardie</i> (E. Kelso s.n. 1902)	P1		X			2.2	NA	NA	Unknown	Unknown	Medium
<i>Acacia kerryana</i>	P2				X	39.2	Oct - Dec or Jan - Feb	Granitic loamy sand, stony clayey loam or clayey sand. Low stony ridges, undulating plains. ²	Yes	Low	Low
<i>Austrostipa frankliniae</i>	P2		X			8.5	Oct - Nov	Flat plain, Basalt slope. Dry brown / red loam. ²	Yes	High	Medium
<i>Bossiaea laxa</i>	P2				X	43.3	May	Brown loam over deep granite. Sheltered positions around outcrops. ²	No	Low	Low

Species	Conservation Status		Source			Distance to Nearest Record (km)	Flowering Period	Preferred Habitat	Habitat occurs within the Survey Area	Pre-Survey Likelihood of Occurrence	Post-Survey Likelihood of Occurrence
	DBCA	EPBC	NatureMap	PMST	DBCA						
<i>Elachanthus pusillus</i>	P2				X	32.1	Aug - Oct	Dry brown or red-orange loam clay. Quartz, limestone, granite. Low plains, drainage flats, gentle upper slopes. ²	Yes	Low	Low
<i>Eremophila praecox</i>	P2		X		X	17.2	Oct or Dec.	Red/brown sandy loam. Undulating plains. ²	Yes	Medium	Low
<i>Eucalyptus educta</i>	P2				X	29.7	Apr	Shallow soils. Granite rocks. ²	Yes	Medium	Medium
<i>Goodenia salina</i>	P2				X	23.9	May or Aug - Nov	Well-drained, saline, grey or brown loamy clay. Low gypseous dunes near salt pans. ²	Yes	Medium	Low
<i>Hakea rigida</i>	P2		X		X	61.3	Sep to Oct.	Sandy soils, yellow sand. ²	Yes	Low	Low
<i>Lepidium merrallii</i>	P2		X			2.5	NA	Clay loam. ²	Yes	High	Medium
<i>Lepidosperma</i> sp. <i>Kambalda</i> (A.A. Mitchell 5156)	P2				X	45.2	Dec	Lower footslope of basalt hill. ²	No	Low	Low
<i>Phebalium clavatum</i>	P2		X		X	10.1	Aug - Sep	Sandy soils. Sandplains. ²	Yes	Medium	Low
<i>Phebalium</i> sp. <i>Yerilgee Sandplain</i> (J. Jackson 223)	P2				X	52.1	Aug	Yellow, orange/red sad, loam. Sandplains. ²	Yes	Low	Low
<i>Rumex crystallinus</i>	P2				X	55.3	Annual	Arid & semi-arid areas.	Yes	Low	Low
<i>Thysanotus</i> sp. <i>Yellowdine</i> (A.S. George 6040)	P2				X	61.5	Mar or Dec	Yellow sand, sandy clay. Sandplains, undulating ridges. ²	Yes	Low	Low
<i>Acacia crenulata</i>	P3				X	23.9	April - May or Nov	Clay, sandy clay, yellow sand. ²	Yes	Medium	Low
<i>Acacia cylindrica</i>	P3				X	63.2	Aug to Oct.	Yellow/brown sand, gravelly soils. Undulating plains, flats. ²	Yes	Low	Low
<i>Allocasuarina eriochlamys</i> subsp. <i>grossa</i>	P3		X			12.7	Jul	Stony loam, laterite clay. Granite outcrops. ²	No	High	Low
<i>Alyogyne</i> sp. <i>Great Victoria Desert</i> (D.J. Edinger 6212)	P3				X	2.5	Aug or Dec	Orange, yellow or red sand, sandy loams. Flat plains. ²	Yes	High	Low
<i>Alyxia tetanifolia</i>	P3				X	21.6	May - Jun or Nov	Sandy clay, loam, concretionary gravel. Drainage lines, near lakes. ²	Yes	Medium	Low
<i>Angianthus prostratus</i>	P3				X	46.7	Jul - Sep	Red clay or loamy soils. Saline depressions. ²	Yes	Low	Low
<i>Atriplex lindleyi</i> subsp. <i>conduplicata</i>	P3				X	55.1	NA	Crabhole plains, dry, yellow bare sandy clay, by lakes. ²	Yes	Low	Low

¹ Department of Agriculture, Water and Environment (2020) ²Western Australian Herbarium (2020)

Species	Conservation Status		Source			Distance to Nearest Record (km)	Flowering Period	Preferred Habitat	Habitat occurs within the Survey Area	Pre-Survey Likelihood of Occurrence	Post-Survey Likelihood of Occurrence
	DBCA	EPBC	NatureMap	PMST	DBCA						
<i>Austrostipa blackii</i>	P3		X			1.7	Sep - Nov	Orange, red or brown clay loam, silty sand, sandy clay loam. Gravel, basalt. Winter wet depressions, rocky outcrops, hills sides. ²	Yes	High	Recorded
<i>Austrostipa turbinata</i>	P3		X			8	Sep - Oct	Hill. Brown sandy clay. ²	Yes	High	Medium
<i>Bossiaea celata</i>	P3				X	23.3	Sep - Oct	Deep sand. Open mallee. ²	No	Medium	Low
<i>Bossiaea concinna</i>	P3				X	68.3	Jun - Sep	White or red sand, gravel. ²	Yes	Low	Low
<i>Calytrix creswellii</i>	P3				X	69.3	Sep to Dec.	Yellow sand, sometimes with lateritic gravel. Sandplains. ²	Yes	Low	Low
<i>Chrysocephalum apiculatum subsp. norsemanense</i>	P3		X			2.1	Aug - Oct	Well-drained loamy sand. Moderately exposed, gentle undulating plains, hills. ²	Yes	High	Medium
<i>Cratystylis centralis</i>	P3				X	39.2	Oct	Red sandy loam with ironstone gravel. Flat plains, breakaway country. ²	Yes	Low	Low
<i>Cryptandra crispula</i>	P3				X	42.7	Aug - Sep	Brown sandy clay, yellow loamy sand, red soil, pebbles. Dune ridges, hills, near salt lakes. ²	Yes	Low	Low
<i>Cyathostemon verrucosus</i>	P3				X	43.9	Apr or Jul or Aug or Oct	Yellow sand, gentle undulating plain. ²	Yes	Low	Low
<i>Eremophila annosocaulis</i>	P3				X	69.8	Sep	Stony, flat, sandy plain. Red sand. ²	Yes	Low	Low
<i>Eremophila arachnoides subsp. tenera</i>	P3				X	71.1	Oct - Dec	Undulating plains, Saline plains, drainage, clay. ²	Yes	Low	Low
<i>Eremophila veronica</i>	P3		X			0.5	Apr to May.	Stony clay, clay loam. Lateritic breakaways. ²	No	High	High
<i>Eucalyptus exigua</i>	P3				X	48.7	Mar - Apr or Oct or Dec	Sandy loam, white sand. Sandplains. ²	Yes	Low	Low
<i>Eucalyptus frenchiana</i>	P3				X	42.2	Oct	Brown or orange loam, sand or sandy clay. Granite. Flat plains, low undulating plains. ²	Yes	Low	Low
<i>Eutaxia actinophylla</i>	P3				X	64.8	Sep to Oct.	Red-brown clay loam, red clay loam over granite, gravel. Small depressions.	Yes	Low	Low
<i>Gompholobium cinereum</i>	P3				X	19.9	Feb or May or Sep - Nov	Yellow sand, clayey sand, brown loam, sandy gravel, laterite. Well-drained open sites, slopes, plains, roadsides. ²	Yes	Medium	Low
<i>Grevillea georgeana</i>	P3		X		X	1.1	Jan or Mar or Sep to Nov.	Stony loam/clay. Ironstone hilltops & slopes.	Yes	High	Medium

Appendix D

Inventory of Vascular Flora

Appendix: Inventory of Vascular Flora

Family	Taxon
Aizoaceae	<i>Carpobrotus</i> sp.
Amaranthaceae	<i>Ptilotus exaltatus</i>
	<i>Ptilotus holosericeus</i>
	<i>Ptilotus obovatus</i> var. <i>obovatus</i>
	<i>Ptilotus polystachyus</i>
Anacardiaceae	* <i>Schinus molle</i> var. <i>areira</i>
Apocynaceae	<i>Alyxia buxifolia</i>
	<i>Leichhardtia australis</i>
	<i>Marsdenia australis</i>
	<i>Vincetoxicum lineare</i>
Asparagaceae	* <i>Agave americana</i>
	<i>Thysanotus manglesianus</i>
Asphodelaceae	* <i>Asphodelus fistulosus</i>
Asteraceae	* <i>Centaurea melitensis</i>
	<i>Chrysocephalum puteale</i>
	<i>Cratystylis conocephala</i>
	<i>Olearia muelleri</i>
	<i>Olearia pimeleoides</i>
	* <i>Oligocarpus calendulaceus</i>
	<i>Rhodanthe chlorocephala</i> subsp. <i>rosea</i>
	* <i>Sonchus asper</i>
	<i>Streptoglossa liatroides</i>
	<i>Vittadinia dissecta</i> var. <i>hirta</i>
	<i>Waitzia acuminata</i> var. <i>acuminata</i>
Boraginaceae	<i>Halgania andromedifolia</i>
	<i>Heliotropium curassavicum</i>
	* <i>Heliotropium europaeum</i>
Brassicaceae	* <i>Carrichtera annua</i>
Cactaceae	<i>Opuntia stricta</i>
Casuarinaceae	<i>Allocasuarina ?huegeliana</i>
	<i>Casuarina pauper</i>
Chenopodiaceae	<i>Atriplex ?holocarpa</i>
	<i>Atriplex ?vesicaria</i>
	<i>Atriplex nummularia</i> subsp. <i>spathulata</i>
	<i>Atriplex quadrivalvata</i>
	<i>Atriplex</i> sp.
	<i>Atriplex vesicaria</i>
	<i>Chenopodium curvispicatum</i>
	<i>Dysphania melanocarpa</i> forma <i>leucocarpa</i>
	? <i>Enchylaena tomentosa</i>
	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>
	<i>Maireana ?georgei</i>
	<i>Maireana ?marginata</i>
	<i>Maireana georgei</i>
	<i>Maireana pentatropis</i>
	<i>Maireana sedifolia</i>
	<i>Maireana tomentosa</i>
	<i>Maireana trichoptera</i>
<i>Maireana triptera</i>	

Appendix: Inventory of Vascular Flora

Family	Taxon
Chenopodiaceae	<i>Osteocarpum salsuginosum</i>
	<i>Rhagodia drummondii</i>
	<i>Salsola australis</i>
	<i>Sclerolaena cuneata</i>
	<i>Sclerolaena diacantha</i>
	<i>Sclerolaena fusiformis</i>
	<i>Sclerolaena obliquicuspis</i>
	<i>Tecticornia halocnemoides</i>
Crassulaceae	* <i>Crassula ovata</i>
Euphorbiaceae	* <i>Euphorbia drummondii</i>
Fabaceae	<i>Acacia acuminata</i>
	<i>Acacia collegialis</i>
	<i>Acacia dissona</i> var. <i>dissona</i>
	<i>Acacia erinacea</i>
	<i>Acacia hemiteles</i>
	<i>Acacia jennerae</i>
	<i>Acacia tetragonophylla</i>
	<i>Acacia xerophila</i> var. <i>brevior</i>
	<i>Senna artemisioides</i> subsp. <i>artemisioides</i>
	<i>Senna artemisioides</i> subsp. <i>filifolia</i>
	<i>Senna artemisioides</i> subsp. x <i>artemisioides</i>
	<i>Senna stowardii</i>
Frankeniaceae	<i>Frankenia ?fecunda</i>
Goodeniaceae	<i>Goodenia havilandii</i>
	<i>Goodenia pinnatifida</i>
	<i>Scaevola spinescens</i>
Haloragaceae	<i>Haloragis trigonocarpa</i>
Hemerocallidaceae	<i>Dianella revoluta</i> var. <i>divaricata</i>
Lamiaceae	* <i>Salvia verbenaca</i>
	<i>Westringia rigida</i>
Malvaceae	<i>Abutilon cryptopetalum</i>
	<i>Hibiscus solanifolius</i>
	<i>Hibiscus sturtii</i> var. <i>grandiflorus</i>
	<i>Lawrenca repens</i>
	<i>Malvaceae</i> sp.
	<i>Sida petrophila</i>
	<i>Sida ?petrophila</i>
	<i>Calothamnus ?gracilis</i>
	<i>Eucalyptus ?ravida</i>
	<i>Eucalyptus campaspe</i>
	<i>Eucalyptus celastroides</i>
	<i>Eucalyptus clelandiorum</i>
	<i>Eucalyptus griffithsii</i>
	<i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i>
	<i>Eucalyptus oldfieldii</i>
	<i>Eucalyptus oleosa</i> subsp. <i>oleosa</i>
	<i>Eucalyptus salmonophloia</i>
	<i>Eucalyptus salubris</i>
	<i>Eucalyptus torquata</i>

Appendix: Inventory of Vascular Flora

Family	Taxon
Myrtaceae	<i>Eucalyptus websteriana</i> subsp. <i>websteriana</i>
	<i>Melaleuca ?hamata</i>
	<i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i>
Pittosporaceae	<i>Pittosporum angustifolium</i>
Poaceae	<i>Aristida contorta</i>
	<i>Austrostipa blackii</i> (P3)
	<i>Austrostipa platychaeta</i>
	<i>Austrostipa</i> sp.
	<i>Austrostipa trichophylla</i>
	<i>Chloris truncata</i>
	<i>Enneapogon caerulescens</i>
	<i>Eragrostis dielsii</i>
	<i>Monachather paradoxus</i>
	<i>Rytidosperma</i> sp.
	<i>Triodia desertorum</i>
Polygonaceae	* <i>Rumex vesicarius</i>
Portulacaceae	<i>Calandrinia baccata</i>
	<i>Calandrinia eremaea</i>
Pteridaceae	<i>Cheilanthes lasiophylla</i>
	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>
Rhamnaceae	<i>Trymalium myrtillus</i> subsp. <i>myrtillus</i>
Rutaceae	<i>Phebalium laevigatum</i>
Santalaceae	<i>Exocarpos aphyllus</i>
	<i>Santalum acuminatum</i>
	<i>Santalum spicatum</i>
Sapindaceae	<i>Dodonaea adenophora</i>
	<i>Dodonaea lobulata</i>
	<i>Dodonaea stenozyga</i>
Scrophulariaceae	<i>Eremophila alternifolia</i>
	<i>Eremophila deserti</i>
	<i>Eremophila forrestii</i>
	<i>Eremophila georgei</i>
	<i>Eremophila glabra</i> subsp. <i>glabra</i>
	<i>Eremophila interstans</i> subsp. <i>interstans</i>
	<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>
	<i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>
	<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>
	<i>Eremophila scoparia</i>
	<i>Myoporum platycarpum</i> subsp. <i>platycarpum</i>
Solanaceae	<i>Lycium australe</i>
	* <i>Nicotiana glauca</i>
	<i>Nicotiana rotundifolia</i>
	<i>Solanum cleistogamum</i>
	<i>Solanum lasiophyllum</i>
	<i>Solanum nummularium</i>
Thymelaeaceae	? <i>Pimelea</i> sp.
	<i>Pimelea microcephala</i> subsp. <i>microcephala</i>
	<i>Pimelea spiculigera</i> var. <i>thesioides</i>
Zygophyllaceae	<i>Roepera glauca</i>

Appendix: Inventory of Vascular Flora

Family	Taxon
Zygophyllaceae	<i>Roepera ovata</i>
	<i>Roepera</i> sp.

Appendix E

Flora Site Data

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1Q01
Location MGA 50 326500 mE 6578134 mN

Described by: JW
Date: 12/10/2021
Type: QUADRAT

Landform: Mid slope
Rock Type: Laterite, quartz



Vegetation: *Eremophila georgei* tall open shrubland over *Dodonaea lobulata* mid open shrubland over *Ptilotus obovatus* var. *obovatus*, *Sida petrophila* and *Vincetoxicum lineare* low open herbland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Abutilon cryptopetalum</i>	10	0.1	
<i>Aristida contorta</i>	10	0.1	
<i>Austrostipa blackii</i> (P3)	10	1	
<i>Calandrinia eremaea</i>	10	0.1	
<i>Dodonaea lobulata</i>	150	12	
<i>Eremophila georgei</i>	300	28	
<i>Nicotiana rotundifolia</i>	10	0.1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	35	16	
<i>Sida petrophila</i>	25	11	
<i>Solanum cleistogamum</i>	10	0.1	
<i>Solanum lasiophyllum</i>	25	1	
<i>Vincetoxicum lineare</i>	10	1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1Q02
Location MGA 50 326422 mE 6578029 mN

Described by: JW
Date: 12/10/2021
Type: QUADRAT

Landform: Plain
Rock Type: Laterite, quartz



Vegetation: *Eucalyptus celastroides* and *Eucalyptus clelandiorum* low woodland over *Eremophila scoparia* mid sparse shrubland over *Atriplex* sp., *Atriplex vesicaria* and *Atriplex nummularia* subsp. *spathulata* low open shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex nummularia</i> subsp. <i>spathulata</i>	35	6	
<i>Atriplex</i> sp.	35	16	
<i>Atriplex vesicaria</i>	50	7	
<i>Dodonaea stenozyga</i>	25	1	
<i>Eremophila scoparia</i>	120	6	
<i>Eucalyptus celastroides</i>	500	16	
<i>Eucalyptus clelandiorum</i>	1000	5	
<i>Exocarpos aphyllus</i>	45	1	
<i>Haloragis trigonocarpa</i>	25	0.5	
<i>Lycium australe</i>	40	2	
<i>Ptilotus holosericeus</i>	5	0.1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	35	1	
<i>Roepera</i> sp.	10	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1Q03
Location MGA 50 327421 mE 6577933 mN

Described by: JW
Date: 12/10/2021
Type: QUADRAT

Landform: Plain
Rock Type: Laterite, quartz



Vegetation: *Eucalyptus campaspe* low woodland over *Eremophila scoparia* mid sparse shrubland over *Senna artemisioides* subsp. *x artemisioides*, *Atriplex* sp. and *Olearia muelleri* low open shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex</i> sp.	40	6	
* <i>Carrichtera annua</i>	25	2	
<i>Eremophila scoparia</i>	140	3	
<i>Eucalyptus campaspe</i>	300	26	
<i>Olearia muelleri</i>	50	6	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	20	2	
<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	100	12	
<i>Streptoglossa liatroides</i>	5	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1Q04
Location MGA 50 327671 mE 6577991 mN

Described by: JW
Date: 12/10/2021
Type: QUADRAT

Landform: Plain
Rock Type: N/A



Vegetation: *Exocarpos aphyllus*, *Eremophila oldfieldii* subsp. *angustifolia* and *Acacia tetragonophylla* mid shrubland over *Dodonaea lobulata* mid open shrubland over *Scaevola spinescens*, *Olearia muelleri* and *Eremophila alternifolia* low open shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia tetragonophylla</i>	180	6	
<i>Dodonaea lobulata</i>	110	12	
<i>Eremophila alternifolia</i>	50	1	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	200	12	
<i>Exocarpos aphyllus</i>	200	26	
<i>Lycium australe</i>	5	0.1	
<i>Maireana georgei</i>	18	1	
<i>Marsdenia australis</i>	10	1	
<i>Olearia muelleri</i>	45	2	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	20	1	
<i>Scaevola spinescens</i>	100	6	
<i>Thysanotus manglesianus</i>	100	1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1Q05
Location MGA 50 327597 mE 6577741 mN

Described by: JW
Date: 12/10/2021
Type: QUADRAT

Landform: Plain
Rock Type: Laterite, quartz



Vegetation: *Eucalyptus clelandiorum* and *Eucalyptus campaspe* low open woodland over *Eremophila scoparia* and *Senna artemisioides* subsp. *x artemisioides* mid open shrubland over *Cheilanthes lasiophylla* and *Ptilotus obovatus* var. *obovatus* low sparse herbland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Cheilanthes lasiophylla</i>	15	4	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	35	0.1	
<i>Eremophila scoparia</i>	200	20	
<i>Eucalyptus campaspe</i>	300	4	
<i>Eucalyptus clelandiorum</i>	500	5	
<i>Maireana</i> ? <i>marginata</i>	5	1	
<i>Olearia muelleri</i>	20	1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	30	1	
<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	130	5	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1Q06
Location MGA 50 327323 mE 6576260 mN

Described by: JW
Date: 12/10/2021
Type: QUADRAT

Landform: Mid slope
Rock Type: Laterite, quartz



Vegetation: *Exocarpos aphyllus* tall open shrubland over *Dodonaea lobulata* and *Dodonaea adenophora* low shrubland over *Haloragis trigonocarpa*, *Thysanotus manglesianus* and *Ptilotus obovatus* var. *obovatus* low open herbland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Dodonaea adenophora</i>	100	12	
<i>Dodonaea lobulata</i>	90	25	
<i>Exocarpos aphyllus</i>	220	11	
<i>Haloragis trigonocarpa</i>	10	11	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	20	1	
<i>Thysanotus manglesianus</i>	20	2	
<i>Waitzia acuminata</i> var. <i>acuminata</i>	18	1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1Q07
Location MGA 50 328895 mE 6577682 mN

Described by: JW
Date: 13/10/2021
Type: QUADRAT

Landform: Plain
Rock Type: Laterite, quartz



Vegetation: *Eucalyptus torquata* low woodland over *Exocarpos aphyllus* mid sparse shrubland over *Westringia rigida*, *Olearia muelleri* and *Scaevola spinescens* low shrubland

Condition: Excellent **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>	40	5	
<i>Eucalyptus torquata</i>	400	12	
<i>Exocarpos aphyllus</i>	110	1	
<i>Olearia muelleri</i>	25	11	
<i>Scaevola spinescens</i>	40	6	
<i>Westringia rigida</i>	40	16	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1Q08
Location MGA 50 328889 mE 6577825 mN

Described by: JW
Date: 13/10/2021
Type: QUADRAT

Landform: Mid slope
Rock Type: N/A



Vegetation: *Eucalyptus campaspe* and *Eucalyptus griffithsii* low open woodland over *Eremophila scoparia*, *Senna artemisioides* subsp. *filifolia* and *Exocarpos aphyllus* mid shrubland over *Senna artemisioides* subsp. *x artemisioides*, *Acacia erinacea* and *Olearia muelleri* low shrubland

Condition: Excellent **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia erinacea</i>	40	13	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	200	4	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	35	1	
<i>Eremophila scoparia</i>	140	23	
<i>Eucalyptus campaspe</i>	400	5	
<i>Eucalyptus griffithsii</i>	500	5	
<i>Exocarpos aphyllus</i>	200	8	
<i>Lycium australe</i>	100	0.1	
<i>Maireana georgei</i>	20	0.1	
<i>Myoporum platycarpum</i> subsp. <i>platycarpum</i>	100	1	
<i>Olearia muelleri</i>	35	3	
<i>Santalum acuminatum</i>	55	1	
<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	100	15	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	140	10	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1Q09
Location MGA 50 328932 mE 6578002 mN

Described by: JW
Date: 13/10/2021
Type: QUADRAT

Landform: Mid slope
Rock Type: Laterite



Vegetation: *Eucalyptus oleosa* subsp. *oleosa* low open woodland over *Eremophila oldfieldii* subsp. *angustifolia*, *Senna artemisioides* subsp. *filifolia* and *Trymalium myrtillus* subsp. *myrtillus* mid shrubland over *Westringia rigida*, *Eremophila parvifolia* subsp. *auricampi* and *Calothamnus ?gracilis* low shrubland

Condition: Excellent **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia jennerae</i>	25	1	
<i>Alyxia buxifolia</i>	40	1	
<i>Atriplex vesicaria</i>	60	5	
<i>Calothamnus ?gracilis</i>	70	6	
<i>Dodonaea stenozyga</i>	185	5	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	200	15	
<i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>	130	5	
<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>	50	12	
<i>Eucalyptus oleosa</i> subsp. <i>oleosa</i>	700	10	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	15	1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	200	11	
<i>Trymalium myrtillus</i> subsp. <i>myrtillus</i>	140	11	
<i>Westringia rigida</i>	25	15	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1Q10
Location MGA 50 328368 mE 6578263 mN

Described by: JW
Date: 13/10/2021
Type: QUADRAT

Landform: Mid slope
Rock Type: N/A



Vegetation: *Eucalyptus griffithsii* low open woodland over *Acacia jennerae*, *Eremophila oldfieldii* subsp. *angustifolia* and *Exocarpos aphyllus* mid open shrubland over *Eremophila glabra* subsp. *glabra*, *Dodonaea stenozyga* and *Olearia pimeleoides* low shrubland

Condition: Excellent **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia jennerae</i>	110	10	
<i>Aristida contorta</i>	100	1	
<i>Dodonaea stenozyga</i>	100	6	
<i>Eremophila glabra</i> subsp. <i>glabra</i>	60	18	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	120	5	
<i>Eucalyptus griffithsii</i>	400	5	
<i>Exocarpos aphyllus</i>	130	5	
<i>Olearia pimeleoides</i>	25	6	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	10	0.1	
<i>Santalum spicatum</i>	180	3	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	120	5	
<i>Westringia rigida</i>	20	5	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1Q20
Location MGA 50 328215 mE 6578113 mN

Described by: JW
Date: 13/10/2021
Type: QUADRAT

Landform: Plain
Rock Type: Laterite



Vegetation: *Eucalyptus griffithsii* low open woodland over *Eremophila oldfieldii* subsp. *angustifolia* tall open shrubland over *Eremophila interstans* subsp. *interstans* mid open shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia jennerae</i>	100	5	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	120	15	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	300	19	
<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>	45	6	
<i>Eucalyptus griffithsii</i>	400	2	
<i>Maireana sedifolia</i>	80	3	
<i>Olearia pimeleoides</i>	30	5	
<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	100	2	
<i>Sida petrophila</i>	28	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1Q21
Location MGA 50 326536 mE 6577327 mN

Described by: JW
Date: 13/10/2021
Type: QUADRAT

Landform: Plain
Rock Type: Laterite



Vegetation: *Dodonaea stenozyga*, *Senna artemisioides* subsp. *filifolia* and *Eremophila oldfieldii* subsp. *angustifolia* mid closed shrubland over *Atriplex vesicaria* low sparse shrubland over *Ptilotus obovatus* var. *obovatus* low open hermland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex vesicaria</i>	80	5	
<i>Dodonaea stenozyga</i>	180	40	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	140	15	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	28	16	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	180	20	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1Q22
Location MGA 50 326045 mE 6577335 mN

Described by: JW
Date: 13/10/2021
Type: QUADRAT

Landform: Plain
Rock Type: Laterite, quartz



Vegetation: *Eucalyptus salmonophloia* low open woodland over *Senna artemisioides* subsp. *x artemisioides* and *Senna artemisioides* subsp. *filifolia* low sparse shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Eucalyptus salmonophloia</i>	600	5	
<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	45	6	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	35	1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1Q23
Location MGA 50 326813 mE 6577450 mN

Described by: JW
Date: 14/10/2021
Type: QUADRAT

Landform: Plain
Rock Type: Laterite, quartz



Vegetation: *Eucalyptus salmonophloia* low woodland over *Senna artemisioides* subsp. *x artemisioides*, *Senna artemisioides* subsp. *filifolia* and *Eremophila parvifolia* subsp. *auricampi* low sparse shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>	35	1	
<i>Eucalyptus salmonophloia</i>	1000	19	
<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	100	2	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	75	2	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1Q24
Location MGA 50 326578 mE 6577758 mN

Described by: JW
Date: 14/10/2021
Type: QUADRAT

Landform: Plain
Rock Type: Laterite, quartz



Vegetation: *Eucalyptus campaspe* low woodland over *Senna artemisioides* subsp. *x artemisioides* mid sparse shrubland over *Senna artemisioides* subsp. *filifolia* low sparse shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Eucalyptus campaspe</i>	400	15	
<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	130	2	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	45	1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1Q25
Location MGA 50 326770 mE 6578110 mN

Described by: JW
Date: 14/10/2021
Type: QUADRAT

Landform: Upper slope
Rock Type: N/A



Vegetation: *Acacia acuminata* tall open shrubland over *Eremophila oldfieldii* subsp. *angustifolia* mid sparse shrubland over *Sida petrophila*, *Solanum lasiophyllum* and *Dodonaea stenozyga* low open shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia acuminata</i>	400	20	
<i>Austrostipa</i> sp.	10	1	
<i>Dodonaea stenozyga</i>	50	1	
<i>Eremophila georgei</i>	20	0.1	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	130	10	
<i>Haloragis trigonocarpa</i>	10	3	
<i>Ptilotus exaltatus</i>	30	1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	20	1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	30	0.1	
<i>Sida petrophila</i>	100	5	
<i>Solanum lasiophyllum</i>	30	5	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1Q26
Location MGA 50 327707 mE 6577970 mN

Described by: JW
Date: 14/10/2021
Type: QUADRAT

Landform: Plain
Rock Type: N/A



Vegetation: *Eremophila oldfieldii* subsp. *angustifolia*, *Dodonaea lobulata* and *Senna artemisioides* subsp. *x artemisioides* mid shrubland over *Ptilotus obovatus* var. *obovatus* low sparse herbland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Dodonaea lobulata</i>	140	12	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	190	20	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	35	1	
<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	170	12	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	200	10	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1Q27
Location MGA 50 327762 mE 6578035 mN

Described by: JW
Date: 14/10/2021
Type: QUADRAT

Landform: Plain
Rock Type: N/A



Vegetation: *Eucalyptus torquata* low open woodland over *Eremophila interstans* subsp. *interstans*, *Senna artemisioides* subsp. *filifolia* and *Olearia muelleri* low sparse shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Eremophila interstans</i> subsp. <i>interstans</i>	50	2	
<i>Eucalyptus torquata</i>	500	8	
<i>Exocarpos aphyllus</i>	25	0.1	
<i>Maireana tomentosa</i>	10	1	
<i>Olearia muelleri</i>	35	1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	55	2	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1Q28
Location MGA 50 327436 mE 6575925 mN

Described by: JW
Date: 14/10/2021
Type: QUADRAT

Landform: Gentle slope
Rock Type: Laterite



Vegetation: *Acacia acuminata* tall open shrubland over *Eremophila oldfieldii* subsp. *angustifolia* mid sparse shrubland over *Dodonaea stenozyga* and *Senna artemisioides* subsp. *filifolia* low closed shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia acuminata</i>	300	15	
<i>Austrostipa platychaeta</i>	18	2	
<i>Calandrinia baccata</i>	10	2	
<i>Dodonaea stenozyga</i>	80	70	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	120	6	
<i>Goodenia havilandii</i>	18	1	
<i>Haloragis trigonocarpa</i>	18	1	
<i>Lycium australe</i>	10	0.1	
<i>Maireana pentatropis</i>	10	0.1	
<i>Ptilotus exaltatus</i>	25	1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	40	1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	100	5	
<i>Thysanotus manglesianus</i>	20	3	
<i>Waitzia acuminata</i> var. <i>acuminata</i>	15	5	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1Q29
Location MGA 50 328203 mE 6575013 mN

Described by: JW
Date: 14/10/2021
Type: QUADRAT

Landform: Plain
Rock Type: Laterite



Vegetation: *Eucalyptus torquata* low open woodland over *Eremophila oldfieldii* subsp. *angustifolia*, *Senna artemisioides* subsp. *x artemisioides* and *Dodonaea stenozyga* mid open shrubland over *Ptilotus obovatus* var. *obovatus* and *Ptilotus exaltatus* low sparse herbland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia jennerae</i>	45	1	
<i>Dodonaea stenozyga</i>	150	3	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	200	6	
<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>	35	3	
<i>Eucalyptus torquata</i>	400	5	
<i>Olearia muelleri</i>	25	1	
<i>Ptilotus exaltatus</i>	20	1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	35	3	
<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	190	6	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	190	3	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1Q30
Location MGA 50 328220 mE 6575082 mN

Described by: JW
Date: 14/10/2021
Type: QUADRAT

Landform: Rocky plain
Rock Type: Laterite



Vegetation: *Allocasuarina ?huegeliana* and *Eucalyptus torquata* low woodland over *Santalum spicatum* and *Eremophila oppositifolia* subsp. *angustifolia* mid sparse shrubland over *Dodonaea stenozyga*, *Eremophila glabra* subsp. *glabra* and *Atriplex vesicaria* low open shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Allocasuarina ?huegeliana</i>	400	6	
<i>Atriplex vesicaria</i>	100	3	
<i>Dodonaea stenozyga</i>	80	6	
<i>Eremophila glabra</i> subsp. <i>glabra</i>	90	6	
<i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>	190	1	
<i>Eucalyptus torquata</i>	700	5	
<i>Maireana pentatropis</i>	25	0.1	
<i>Ptilotus exaltatus</i>	20	1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	15	1	
<i>Santalum spicatum</i>	150	2	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	100	3	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1R01
Location MGA 50 328967 mE 6577693 mN

Described by: JW
Date: 13/10/2021
Type: RELEVE

Landform: Plain
Rock Type: N/A



Vegetation: *Eucalyptus torquata* low open woodland over *Exocarpos aphyllus* tall sparse shrubland over *Eremophila parvifolia* subsp. *auricampi*, *Westringia rigida* and *Senna artemisioides* subsp. *filifolia* low sparse shrubland

Condition: Excellent **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>	32	3	
<i>Eucalyptus torquata</i>	400	5	
<i>Exocarpos aphyllus</i>	220	6	
<i>Olearia muelleri</i>	40	1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	35	2	
<i>Westringia rigida</i>	35	3	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1R02
Location MGA 50 328922 mE 6577745 mN

Described by: JW
Date: 13/10/2021
Type: RELEVE

Landform: Plain
Rock Type: N/A



Vegetation: *Eucalyptus torquata* low woodland over *Eremophila interstans* subsp. *interstans* mid sparse shrubland over *Senna artemisioides* subsp. *filifolia*, *Olearia muelleri* and *Westringia rigida* low open shrubland

Condition: Excellent **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Eremophila georgei</i>	28	0.1	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	200	4	
<i>Eucalyptus torquata</i>	500	16	
<i>Olearia muelleri</i>	25	4	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	40	6	
<i>Westringia rigida</i>	25	1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1R03
Location MGA 50 329002 mE 6577925 mN

Described by: JW
Date: 13/10/2021
Type: RELEVE

Landform: Plain
Rock Type: Laterite



Vegetation: *Eucalyptus torquata* low open woodland over *Eremophila alternifolia* tall sparse shrubland over *Dodonaea stenozyga* and *Eremophila oldfieldii* subsp. *angustifolia* mid sparse shrubland

Condition: Excellent **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia jennerae</i>	60	2	
<i>Dodonaea stenozyga</i>	120	5	
<i>Eremophila alternifolia</i>	210	2	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	110	5	
<i>Eucalyptus torquata</i>	400	2	
<i>Maireana tomentosa</i>	25	1	
<i>Westringia rigida</i>	25	2	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1R04
Location MGA 50 326478 mE 6577408 mN

Described by: JW
Date: 13/10/2021
Type: RELEVE

Landform: Plain
Rock Type: Laterite, quartz



Vegetation: *Eremophila oldfieldii* subsp. *angustifolia* tall open shrubland over *Senna artemisioides* subsp. *x artemisioides* and *Senna artemisioides* subsp. *filifolia* mid open shrubland over *Ptilotus obovatus* var. *obovatus* low open herbland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Dodonaea stenozyga</i>	100	12	
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	45	1	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	250	15	
<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>	25	1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	45	28	
<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	120	10	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	110	6	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1R05
Location MGA 50 326536 mE 6577327 mN

Described by: JW
Date: 13/10/2021
Type: RELEVE

Landform: Mid slope
Rock Type: N/A



Vegetation: *Eucalyptus torquata* and *Eucalyptus salmonophloia* low woodland over *Exocarpos aphyllus* mid sparse shrubland over *Senna artemisioides* subsp. *filifolia* and *Senna artemisioides* subsp. *x artemisioides* low open shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Eucalyptus salmonophloia</i>	500	10	
<i>Eucalyptus torquata</i>	400	5	
<i>Exocarpos aphyllus</i>	140	2	
<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	45	1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	90	11	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1R09
Location MGA 50 326358 mE 6577538 mN

Described by: JW
Date: 14/10/2021
Type: RELEVE

Landform: Plain
Rock Type: Laterite



Vegetation: *Eucalyptus celastroides* and *Eucalyptus clelandiorum* low woodland over *Atriplex vesicaria* low sparse shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex vesicaria</i>	40	1	
<i>Eucalyptus celastroides</i>	400	6	
<i>Eucalyptus clelandiorum</i>	400	5	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1R10
Location MGA 50 326982 mE 6578150 mN

Described by: JW
Date: 14/10/2021
Type: RELEVE

Landform: Undulating plain
Rock Type: N/A



Vegetation: *Eucalyptus clelandiorum* low open woodland over *Senna artemisioides* subsp. *x artemisioides*, *Atriplex vesicaria* and *Eremophila interstans* subsp. *interstans* low open shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex vesicaria</i>	28	1	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	45	1	
<i>Eucalyptus clelandiorum</i>	1000	5	
<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	35	10	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1R11
Location MGA 50 327829 mE 6578083 mN

Described by: JW
Date: 14/10/2021
Type: RELEVE

Landform: Plain
Rock Type: Laterite, quartz



Vegetation: *Eucalyptus torquata* mid open woodland over *Eremophila interstans* subsp. *interstans* mid open shrubland over *Senna artemisioides* subsp. *x artemisioides*, *Senna artemisioides* subsp. *filifolia* and *Acacia jennerae* low open shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia jennerae</i>	10	3	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	150	16	
<i>Eucalyptus torquata</i>	1500	5	
<i>Olearia muelleri</i>	35	2	
<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	40	5	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	25	5	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C1R13
Location MGA 50 327488 mE 6575973 mN

Described by: JW
Date: 14/10/2021
Type: RELEVE

Landform: Undulating plain
Rock Type: N/A



Vegetation: *Eucalyptus clelandiorum*, *Eucalyptus salmonophloia* and *Eucalyptus griffithsii* low woodland over *Eremophila interstans* subsp. *interstans* and *Eremophila oldfieldii* subsp. *angustifolia* tall open shrubland over *Atriplex nummularia* subsp. *spathulata* and *Dodonaea stenozyga* low open shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex nummularia</i> subsp. <i>spathulata</i>	45	11	
<i>Dodonaea stenozyga</i>	10	6	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	220	11	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	200	10	
<i>Eucalyptus clelandiorum</i>	500	6	
<i>Eucalyptus griffithsii</i>	300	5	
<i>Eucalyptus salmonophloia</i>	400	6	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q01
Location MGA 50 326721 mE 6571821 mN

Described by: JW
Date: 15/11/2021
Type: QUADRAT

Landform: Scree slope drain line No photo available
Rock Type: Laterite

Vegetation: *Eucalyptus loxophleba* subsp. *lissophloia* and *Eucalyptus campaspe* low open woodland over *Eremophila oldfieldii* subsp. *angustifolia* mid sparse shrubland over *Dodonaea adenophora* and *Olearia muelleri* low sparse shrubland

Condition: Good **Disturbance Type:** Fauna tracks/scats, Infrastructure

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Dodonaea adenophora</i>	35	1	
<i>Eremophila glabra</i> subsp. <i>glabra</i>	5	0.1	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	130	2	
<i>Eucalyptus campaspe</i>	300	1	
<i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i>	300	2	
<i>Maireana georgei</i>	15	0.1	
<i>Olearia muelleri</i>	25	0.5	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q02
Location MGA 50 324588 mE 6571695 mN

Described by: BD,SW
Date: 15/11/2021
Type: QUADRAT

Landform: Plain
Rock Type: Ironstone



Vegetation: *Eucalyptus salmonophloia* low woodland over *Melaleuca ?hamata* and *Eremophila oppositifolia* subsp. *angustifolia* tall open shrubland over *Olearia muelleri* low sparse shrubland

Condition: Very Good **Disturbance Type:** Litter

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia acuminata</i>	40	0.1	
<i>Acacia hemiteles</i>	160	1	
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	40	0.1	
<i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>	250	4	
<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>	60	0.1	
<i>Eucalyptus salmonophloia</i>	650	12	
<i>Exocarpos aphyllus</i>	150	0.5	
<i>Melaleuca ?hamata</i>	300	11	
<i>Olearia muelleri</i>	45	5	
<i>Olearia pimeleoides</i>	30	0.1	
<i>Pimelea microcephala</i> subsp. <i>microcephala</i>	50	0.1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	30	0.1	
<i>Scaevola spinescens</i>	120	1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q03
Location MGA 50 327534 mE 6572097 mN

Described by: JW
Date: 15/11/2021
Type: QUADRAT

Landform: Drainage line No photo available
Rock Type: Laterite

Vegetation: *Atriplex ?vesicaria and Senna artemisioides subsp. x artemisioides low sparse shrubland*

Condition: Good **Disturbance Type:** Vehicle tracks

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex ?vesicaria</i>	100	5	
<i>Eremophila forrestii</i>	20	0.1	
<i>Eremophila scoparia</i>	130	0.1	
<i>Maireana georgei</i>	5	0.1	
<i>Senna artemisioides subsp. x artemisioides</i>	60	5	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q04
Location MGA 50 324603 mE 6571566 mN

Described by: BD,SW
Date: 15/11/2021
Type: QUADRAT

Landform: Plain
Rock Type: Ironstone



Vegetation: *Eucalyptus ?ravida* low open forest over *Eremophila interstans* subsp. *interstans*, *Melaleuca ?hamata* and *Melaleuca pauperiflora* subsp. *fastigiata* tall open shrubland over *Triodia desertorum* low sparse hummock grassland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia acuminata</i>	170	0.1	
<i>Acacia hemiteles</i>	140	0.1	
<i>Atriplex nummularia</i> subsp. <i>spathulata</i>	35	0.1	
<i>Dodonaea lobulata</i>	100	0.1	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	210	11	
<i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>	110	0.1	
<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>	30	0.1	
<i>Eucalyptus ?ravida</i>	550	35	
<i>Exocarpos aphyllus</i>	90	0.1	
<i>Halgania andromedifolia</i>	70	6	
<i>Maireana georgei</i>	30	0.1	
<i>Melaleuca ?hamata</i>	250	2	
<i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i>	350	1	
<i>Myoporum platycarpum</i> subsp. <i>platycarpum</i>	210	1	
<i>Olearia muelleri</i>	30	0.1	
<i>Phebalium laevigatum</i>	120	1	
<i>Scaevola spinescens</i>	45	5	
<i>Sclerolaena fusiformis</i>	10	0.1	
<i>Triodia desertorum</i>	25	2	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q05
Location MGA 50 327403 mE 6572169 mN

Described by: JW
Date: 15/11/2021
Type: QUADRAT

Landform: Scree slope minor drain No photo available
Rock Type: Laterite

Vegetation: *Eucalyptus campaspe* low open woodland over *Eremophila oldfieldii* subsp. *angustifolia* tall open shrubland over *Dodonaea stenozyga*, *Alyxia buxifolia* and *Eremophila glabra* subsp. *glabra* low open shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Alyxia buxifolia</i>	70	1	
<i>Dodonaea stenozyga</i>	90	15	
<i>Eremophila glabra</i> subsp. <i>glabra</i>	100	1	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	200	15	
<i>Eucalyptus campaspe</i>	200	1	
<i>Maireana georgei</i>	15	0.1	
<i>Olearia muelleri</i>	20	0.1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	35	5	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	110	10	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q06
Location MGA 50 324605 mE 6571453 mN

Described by: BD,SW
Date: 15/11/2021
Type: QUADRAT

Landform: Low rise
Rock Type: Ironstone, Quartz



Vegetation: *Eucalyptus clelandiorum* and *Eucalyptus ?ravida* low open woodland over *Eremophila oppositifolia* subsp. *angustifolia* and *Myoporum platycarpum* subsp. *platycarpum* mid open shrubland over *Scaevola spinescens*, *Dodonaea lobulata* and *Phebalium laevigatum* low open shrubland

Condition: Good **Disturbance Type:** Litter, Historical Clearing

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia acuminata</i>	120	0.1	
<i>Acacia tetragonophylla</i>	150	0.1	
<i>Atriplex nummularia</i> subsp. <i>spathulata</i>	120	0.1	
<i>Dodonaea lobulata</i>	100	1	
<i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>	140	8	
<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>	30	0.1	
<i>Eucalyptus ?ravida</i>	450	2	
<i>Eucalyptus clelandiorum</i>	700	5	
<i>Halgania andromedifolia</i>	100	0.1	
<i>Maireana georgei</i>	15	0.1	
<i>Myoporum platycarpum</i> subsp. <i>platycarpum</i>	190	4	
<i>Olearia muelleri</i>	30	0.5	
<i>Phebalium laevigatum</i>	80	1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	30	0.1	
<i>Scaevola spinescens</i>	90	20	
<i>Solanum lasiophyllum</i>	20	0.1	
<i>Triodia desertorum</i>	30	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q07
Location MGA 50 327549 mE 6571711 mN

Described by: JW
Date: 15/11/2021
Type: QUADRAT

Landform: Scree slope No photo available
Rock Type: Laterite

Vegetation: *Eremophila interstans* subsp. *interstans* tall open shrubland over *Dodonaea stenozyga*, *Senna artemisioides* subsp. *filifolia* and *Alyxia buxifolia* mid open shrubland over *Maireana georgei* low sparse chenopod shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Alyxia buxifolia</i>	110	1	
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	25	0.1	
<i>Dodonaea stenozyga</i>	170	5	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	250	15	
<i>Maireana georgei</i>	15	2	
<i>Malvaceae</i> sp.	5	0.1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	190	5	
<i>Solanum cleistogamum</i>	15	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q08
Location MGA 50 324706 mE 6571242 mN

Described by: BD,SW
Date: 15/11/2021
Type: QUADRAT

Landform: Plain
Rock Type: Ironstone, Quartz



Vegetation: *Eucalyptus clelandiorum* and *Eucalyptus salmonophloia* mid open woodland over *Eremophila interstans* subsp. *interstans* mid sparse shrubland over *Maireana trichoptera*, *Atriplex ?vesicaria* and *Sclerolaena fusiformis* low sparse chenopod shrubland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex ?vesicaria</i>	30	1	
<i>Atriplex nummularia</i> subsp. <i>spathulata</i>	100	0.1	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	160	2	
<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>	40	1	
<i>Eucalyptus clelandiorum</i>	1100	2	
<i>Eucalyptus salmonophloia</i>	1100	2	
<i>Exocarpos aphyllus</i>	40	0.1	
<i>Maireana georgei</i>	15	0.1	
<i>Maireana trichoptera</i>	8	2	
<i>Olearia muelleri</i>	35	0.1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	40	0.1	
<i>Scaevola spinescens</i>	80	1	
<i>Sclerolaena diacantha</i>	10	0.5	
<i>Sclerolaena fusiformis</i>	5	1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	100	0.1	
<i>Senna stowardii</i>	60	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q09
Location MGA 50 327372 mE 6571654 mN

Described by: JW
Date: 15/11/2021
Type: QUADRAT

Landform: Slope No photo available
Rock Type: Laterite

Vegetation: *Eremophila oldfieldii* subsp. *angustifolia* tall open shrubland over *Dodonaea stenozyga* and *Acacia acuminata* mid sparse shrubland over *Ptilotus obovatus* var. *obovatus* and *Cheilanthes sieberi* subsp. *sieberi* low sparse herbland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia acuminata</i>	140	2	
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	35	0.5	
<i>Dodonaea stenozyga</i>	200	10	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	250	25	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	25	10	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q10
Location MGA 50 324887 mE 6571294 mN

Described by: BD,SW
Date: 15/11/2021
Type: QUADRAT

Landform: Drainage line
Rock Type: Calcrete, Ironstone, Quartz



Vegetation: *Eucalyptus salubris* low woodland over *Eremophila oldfieldii* subsp. *angustifolia*, *Dodonaea lobulata* and *Eremophila glabra* subsp. *glabra* mid open shrubland over *Atriplex ?vesicaria* low sparse chenopod shrubland

Condition: Very Good **Disturbance Type:** Litter

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex ?vesicaria</i>	40	3	
<i>Atriplex nummularia</i> subsp. <i>spathulata</i>	150	0.1	
<i>Dodonaea lobulata</i>	130	4	
<i>Eremophila glabra</i> subsp. <i>glabra</i>	150	4	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	210	0.1	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	180	11	
<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>	50	0.1	
<i>Eucalyptus salubris</i>	900	20	
<i>Exocarpos aphyllus</i>	150	0.1	
<i>Maireana georgei</i>	30	0.1	
<i>Maireana trichoptera</i>	10	0.1	
<i>Olearia muelleri</i>	35	0.1	
<i>Ptilotus exaltatus</i>	3	0.1	
<i>Scaevola spinescens</i>	100	0.1	
<i>Sclerolaena obliquicuspis</i>	10	0.1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	150	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q11
Location MGA 50 326763 mE 6571675 mN

Described by: JW
Date: 15/11/2021
Type: QUADRAT

Landform: Drainage line
Rock Type: Granite, Laterite, Quartz



Vegetation: *Eucalyptus oleosa* subsp. *oleosa* low woodland over *Eremophila interstans* subsp. *interstans* mid sparse shrubland over *Dodonaea stenozyga*, *Acacia jennerae* and *Eremophila glabra* subsp. *glabra* low sparse shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia jennerae</i>	35	1	
<i>Dodonaea stenozyga</i>	38	5	
<i>Eremophila glabra</i> subsp. <i>glabra</i>	45	1	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	200	1	
<i>Eucalyptus oleosa</i> subsp. <i>oleosa</i>	500	15	
<i>Maireana georgei</i>	20	0.1	
<i>Olearia muelleri</i>	40	1	
<i>Ptilotus exaltatus</i>	15	0.1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	20	1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q12
Location MGA 50 325065 mE 6571260 mN

Described by: BD,SW
Date: 15/11/2021
Type: QUADRAT

Landform: Mid slope
Rock Type: Ironstone, Laterite, Quartz



Vegetation: *Eucalyptus salmonophloia* mid woodland over *Senna artemisioides* subsp. *filifolia* mid isolated shrubs

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Eremophila interstans</i> subsp. <i>interstans</i>	400	0.1	
<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>	25	0.1	
<i>Eucalyptus salmonophloia</i>	1500	25	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	150	0.5	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q13
Location MGA 50 327631 mE 6571898 mN

Described by: JW
Date: 16/11/2021
Type: QUADRAT

Landform: Ridge crest
Rock Type: Laterite



Vegetation: *Eucalyptus oldfieldii* low open woodland over *Dodonaea stenozyga* mid sparse shrubland over *Atriplex vesicaria*, *Senna artemisioides* subsp. *filifolia* and *Maireana pentatropis* low shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex vesicaria</i>	35	15	
<i>Dodonaea stenozyga</i>	110	8	
<i>Eucalyptus oldfieldii</i>	300	5	
<i>Maireana pentatropis</i>	5	5	
<i>Olearia muelleri</i>	20	0.1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	15	6	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	45	15	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q14
Location MGA 50 325050 mE 6570941 mN

Described by: BD,SW
Date: 16/11/2021
Type: QUADRAT

Landform: Mid slope
Rock Type: Ironstone



Vegetation: *Acacia collegialis* and *Eremophila oldfieldii* subsp. *angustifolia* tall sparse shrubland over *Dodonaea lobulata* and *Eremophila alternifolia* mid sparse shrubland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia collegialis</i>	400	6	
<i>Acacia tetragonophylla</i>	100	0.1	
<i>Chenopodium curvispicatum</i>	10	0.1	
<i>Dodonaea lobulata</i>	180	5	
<i>Eremophila alternifolia</i>	190	4	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	250	1	
<i>Maireana georgei</i>	20	0.1	
<i>Maireana trichoptera</i>	8	0.1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	25	0.1	
<i>Rhagodia drummondii</i>	5	0.1	
<i>Sclerolaena diacantha</i>	5	0.1	
<i>Sclerolaena fusiformis</i>	10	0.1	
<i>Sida ?petrophila</i>	15	0.1	
<i>Solanum lasiophyllum</i>	10	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q15
Location MGA 50 327026 mE 6571767 mN

Described by: JW
Date: 16/11/2021
Type: QUADRAT

Landform: Lower slope
Rock Type: Laterite



Vegetation: *Eucalyptus clelandiorum* and *Eucalyptus oldfieldii* low open woodland over *Atriplex vesicaria* and *Eremophila interstans* subsp. *interstans* mid shrubland over *Dodonaea stenozyga*, *Olearia muelleri* and *Maireana pentatropis* low open shrubland

Condition: Good **Disturbance Type:** Fauna tracks/scats, Historical Clearing

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex vesicaria</i>	120	35	
<i>Dodonaea stenozyga</i>	90	6	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	190	20	
<i>Eucalyptus clelandiorum</i>	400	2	
<i>Eucalyptus oldfieldii</i>	60	2	
<i>Maireana georgei</i>	5	0.1	
<i>Maireana pentatropis</i>	20	1	
<i>Olearia muelleri</i>	20	5	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	15	1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q16
Location MGA 50 324948 mE 6570710 mN

Described by: BD,SW
Date: 16/11/2021
Type: QUADRAT

Landform: Mid slope
Rock Type: Ironstone



Vegetation: *Eucalyptus griffithsii* mid woodland over *Eremophila oldfieldii* subsp. *angustifolia* tall sparse shrubland over *Eremophila interstans* subsp. *interstans* mid sparse shrubland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex ?vesicaria</i>	30	0.1	
<i>Dodonaea lobulata</i>	80	1	
<i>Eremophila glabra</i> subsp. <i>glabra</i>	40	0.5	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	180	3	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	500	2	
<i>Eucalyptus griffithsii</i>	1100	25	
<i>Maireana trichoptera</i>	20	0.1	
<i>Olearia muelleri</i>	40	1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	25	0.1	
<i>Rhagodia drummondii</i>	20	0.1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	40	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q17
Location MGA 50 327349 mE 6571149 mN

Described by: JW
Date: 16/11/2021
Type: QUADRAT

Landform: Plain
Rock Type: Laterite, Sandstone, Shale



Vegetation: *Atriplex vesicaria*, *Maireana georgei* and *Maireana pentatropis* low chenopod shrubland over **Asphodelus fistulosus* low sparse herbland

Condition: Poor **Disturbance Type:** Vehicle tracks, Fauna tracks/scats, Historical Clearing, Infrastructure

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>*Asphodelus fistulosus</i>	35	10	
<i>Atriplex vesicaria</i>	100	26	
<i>Maireana georgei</i>	10	15	
<i>Maireana pentatropis</i>	20	10	
<i>*Salvia verbenaca</i>	10	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q18
Location MGA 50 324668 mE 6570076 mN

Described by: BD,SW
Date: 16/11/2021
Type: QUADRAT

Landform: Hilltop
Rock Type: Calcrete, Ironstone



Vegetation: *Acacia collegialis* and *Eremophila oldfieldii* subsp. *angustifolia* tall sparse shrubland over *Dodonaea lobulata* mid sparse shrubland over *Senna artemisioides* subsp. *filifolia* low sparse shrubland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia collegialis</i>	350	5	
<i>Atriplex nummularia</i> subsp. <i>spathulata</i>	140	0.1	
<i>Dodonaea lobulata</i>	140	5	
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	40	0.1	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	350	5	
<i>Maireana pentatropis</i>	15	0.1	
<i>Maireana trichoptera</i>	15	0.1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	25	1	
<i>Santalum acuminatum</i>	250	0.1	
<i>Scaevola spinescens</i>	130	0.1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	15	2	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q19
Location MGA 50 328122 mE 6571915 mN

Described by: JW
Date: 16/11/2021
Type: QUADRAT

Landform: Plain No photo available
Rock Type: Laterite

Vegetation: *Eucalyptus salmonophloia* low woodland over *Eremophila interstans* subsp. *interstans* mid sparse shrubland over *Atriplex vesicaria* and *Atriplex* sp. low open chenopod shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex</i> sp.	35	5	
<i>Atriplex vesicaria</i>	100	20	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	120	5	
<i>Eucalyptus salmonophloia</i>	1000	15	
<i>Maireana georgei</i>	15	0.1	
<i>Salsola australis</i>	5	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q20
Location MGA 50 324559 mE 6569671 mN

Described by: BD,SW
Date: 16/11/2021
Type: QUADRAT

Landform: Upper slope
Rock Type: Ironstone



Vegetation: *Eucalyptus salmonophloia* and *Eucalyptus salubris* mid open woodland over *Eremophila interstans* subsp. *interstans* and *Eremophila oldfieldii* subsp. *angustifolia* tall sparse shrubland over *Senna artemisioides* subsp. *filifolia* and *Atriplex nummularia* subsp. *spathulata* mid sparse shrubland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex ?vesicaria</i>	25	0.1	
<i>Atriplex nummularia</i> subsp. <i>spathulata</i>	120	0.5	
<i>Dodonaea lobulata</i>	60	0.1	
<i>Eremophila glabra</i> subsp. <i>glabra</i>	90	0.1	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	350	3	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	250	1	
<i>Eucalyptus salmonophloia</i>	1200	3	
<i>Eucalyptus salubris</i>	1100	2	
<i>Maireana ?georgei</i>	15	0.1	
<i>Maireana pentatropis</i>	25	0.1	
<i>Maireana sedifolia</i>	100	0.5	
<i>Maireana trichoptera</i>	15	0.1	
<i>Olearia muelleri</i>	30	0.1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	15	0.1	
<i>Scaevola spinescens</i>	30	0.1	
<i>Sclerolaena fusiformis</i>	15	0.1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	130	1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q21
Location MGA 50 327523 mE 6573455 mN

Described by: JW
Date: 16/11/2021
Type: QUADRAT

Landform: Plain
Rock Type: Laterite



Vegetation: *Eucalyptus griffithsii* low open woodland over *Eremophila oldfieldii* subsp. *angustifolia* and *Eremophila interstans* subsp. *interstans* tall open shrubland over *Senna artemisioides* subsp. *filifolia* and *Dodonaea stenozyga* mid sparse shrubland

Condition: Good **Disturbance Type:** Vehicle tracks, Litter

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Dodonaea stenozyga</i>	120	2	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	220	5	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	290	10	
<i>Eucalyptus griffithsii</i>	500	1	
<i>Maireana</i> ? <i>marginata</i>	30	2	
<i>Maireana georgei</i>	15	1	
<i>Olearia muelleri</i>	25	1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	30	10	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	120	5	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q22
Location MGA 50 324398 mE 6569324 mN

Described by: BD,SW
Date: 16/11/2021
Type: QUADRAT

Landform: Mid slope
Rock Type: Ironstone



Vegetation: *Acacia collegialis* and *Eremophila oldfieldii* subsp. *angustifolia* tall open shrubland over *Ptilotus obovatus* var. *obovatus* and **Salvia verbenaca* low herbland

Condition: Good **Disturbance Type:** Grazing,Litter,Fauna tracks/scats,Historical Clearing

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia collegialis</i>	400	8	
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	40	0.1	
<i>Enneapogon caerulescens</i>	4	0.1	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	350	4	
<i>Hibiscus sturtii</i> var. <i>grandiflorus</i>	15	0.1	
<i>Maireana trichoptera</i>	20	0.1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	35	35	
* <i>Salvia verbenaca</i>	30	0.5	
<i>Sclerolaena fusiformis</i>	15	0.1	
<i>Sida petrophila</i>	30	4	
<i>Solanum cleistogamum</i>	10	0.1	
<i>Solanum lasiophyllum</i>	25	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q23
Location MGA 50 327250 mE 6573660 mN

Described by: JW
Date: 16/11/2021
Type: QUADRAT

Landform: Mud slope scree
Rock Type: Laterite



Vegetation: *Eucalyptus torquata* low open woodland over *Eremophila oldfieldii* subsp. *angustifolia* and *Acacia tetragonophylla* tall open shrubland over *Dodonaea stenozyga*, *Senna artemisioides* subsp. *filifolia* and *Alyxia buxifolia* mid shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia tetragonophylla</i>	250	1	
<i>Alyxia buxifolia</i>	130	1	
<i>Dodonaea stenozyga</i>	190	45	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	250	15	
<i>Eucalyptus torquata</i>	900	5	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	170	5	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q24
Location MGA 50 324535 mE 6569030 mN

Described by: BD,SW
Date: 16/11/2021
Type: QUADRAT

Landform: Mid slope
Rock Type: Calcrete, Ironstone



Vegetation: *Eucalyptus salmonophloia* mid open woodland over *Atriplex nummularia* subsp. *spathulata* low sparse chenopod shrubland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex ?vesicaria</i>	15	0.1	
<i>Atriplex nummularia</i> subsp. <i>spathulata</i>	90	5	
<i>Eucalyptus salmonophloia</i>	1200	6	
<i>Maireana pentatropis</i>	20	0.1	
<i>Maireana trichoptera</i>	10	0.1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	50	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q25
Location MGA 50 326779 mE 6572716 mN

Described by: JW
Date: 16/11/2021
Type: QUADRAT

Landform: Plain
Rock Type: Laterite, Limestone, Quartz



Vegetation: *Eucalyptus griffithsii* low open woodland over *Eremophila glabra* subsp. *glabra*, *Atriplex vesicaria* and *Maireana georgei* low shrubland over *Osteocarpum salsuginosum* low sparse herbland

Condition: Poor, Very Poor **Disturbance Type:** Weeds, Vehicle tracks, Litter, Historical Clearing, Infrastructure

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex ?holocarpa</i>	35	5	
<i>Atriplex vesicaria</i>	38	15	
<i>Erneapogon caerulescens</i>	5	0.1	
<i>Eremophila glabra</i> subsp. <i>glabra</i>	35	30	
<i>Eucalyptus griffithsii</i>	400	2	
<i>Maireana georgei</i>	20	15	
<i>Maireana pentatropis</i>	25	1	
<i>Maireana tomentosa</i>	20	5	
<i>Osteocarpum salsuginosum</i>	15	5	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q26
Location MGA 50 325151 mE 6568826 mN

Described by: BD,SW
Date: 16/11/2021
Type: QUADRAT

Landform: Undulating plain
Rock Type: Ironstone



Vegetation: *Eucalyptus salmonophloia* and *Eucalyptus salubris* mid woodland over *Senna artemisioides* subsp. *filifolia* mid isolated shrubs over *Atriplex ?vesicaria* low isolated chenopod shrubs

Condition: Very Good **Disturbance Type:** Historical Clearing

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex ?vesicaria</i>	40	0.5	
<i>Dodonaea lobulata</i>	50	0.1	
<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>	40	0.1	
<i>Eucalyptus salmonophloia</i>	1200	15	
<i>Eucalyptus salubris</i>	1100	5	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	120	0.5	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q27
Location MGA 50 326933 mE 6578601 mN

Described by: JW
Date: 17/11/2021
Type: QUADRAT

Landform: Plain
Rock Type: Laterite, Quartz



Vegetation: *Eucalyptus griffithsii* low open woodland over *Eremophila oldfieldii* subsp. *angustifolia* mid open shrubland over *Dodonaea stenozyga*, *Eremophila glabra* subsp. *glabra* and *Santalum spicatum* mid open shrubland over *Atriplex vesicaria*, *Exocarpos aphyllus* and *Pittosporum angustifolium* low sparse shrubland

Condition: Good **Disturbance Type:** Vehicle tracks

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex ?vesicaria</i>	42	0.5	
<i>Atriplex vesicaria</i>	60	5	
<i>Dodonaea stenozyga</i>	200	20	
<i>Eremophila glabra</i> subsp. <i>glabra</i>	110	1	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	250	20	
<i>Eucalyptus griffithsii</i>	500	1	
<i>Exocarpos aphyllus</i>	100	1	
<i>Lycium australe</i>	40	0.5	
<i>Maireana georgei</i>	20	0.5	
<i>Pittosporum angustifolium</i>	60	1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	30	2	
<i>Santalum spicatum</i>	170	1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	40	0.5	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q28
Location MGA 50 325835 mE 6569465 mN

Described by: BD,SW
Date: 16/11/2021
Type: QUADRAT

Landform: Drainage line
Rock Type: Ironstone



Vegetation: *Eucalyptus salubris* mid open forest over *Eremophila interstans* subsp. *interstans* tall sparse shrubland over *Atriplex nummularia* subsp. *spathulata* mid sparse shrubland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex ?vesicaria</i>	100	2	
<i>Atriplex nummularia</i> subsp. <i>spathulata</i>	120	2	
<i>Dodonaea lobulata</i>	200	0.1	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	300	4	
<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>	50	0.1	
<i>Eucalyptus salubris</i>	1100	35	
<i>Maireana trichoptera</i>	50	0.1	
<i>Olearia muelleri</i>	90	0.1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	40	0.1	
<i>Scaevola spinescens</i>	80	0.1	
<i>Sclerolaena diacantha</i>	10	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q29
Location MGA 50 326944 mE 6579386 mN

Described by: JW
Date: 17/11/2021
Type: QUADRAT

Landform: Plain No photo available
Rock Type: Dolerite, Laterite, Quartz

Vegetation: *Eucalyptus griffithsii* low open woodland over *Acacia hemiteles*, *Dodonaea stenozyga* and *Santalum spicatum* mid shrubland over *Atriplex vesicaria*, *Senna artemisioides* subsp. *filifolia* and *Olearia muelleri* low open shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia hemiteles</i>	140	15	
<i>Alyxia buxifolia</i>	35	1	
<i>Atriplex vesicaria</i>	70	5	
<i>Dodonaea stenozyga</i>	120	15	
<i>Eucalyptus griffithsii</i>	700	10	
<i>Olearia muelleri</i>	15	2	
<i>Santalum spicatum</i>	200	5	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	45	5	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q31
Location MGA 50 326956 mE 6579776 mN

Described by: JW
Date: 17/11/2021
Type: QUADRAT

Landform: Plain No photo available
Rock Type: Laterite

Vegetation: *Eucalyptus griffithsii* low open woodland over *Eremophila interstans* subsp. *interstans* tall shrubland over *Eremophila oppositifolia* subsp. *angustifolia*, *Exocarpos aphyllus* and *Eremophila glabra* subsp. *glabra* mid sparse shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Abutilon cryptopetalum</i>	38	0.1	
<i>Acacia erinacea</i>	40	0.5	
<i>Acacia jennerae</i>	50	5	
<i>Alyxia buxifolia</i>	40	15	
<i>Dodonaea stenozyga</i>	35	1	
<i>Eremophila glabra</i> subsp. <i>glabra</i>	110	0.5	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	220	45	
<i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>	200	1	
<i>Eremophila scoparia</i>	48	0.1	
<i>Eucalyptus griffithsii</i>	500	5	
<i>Exocarpos aphyllus</i>	110	1	
<i>Maireana trichoptera</i>	10	0.1	
<i>Olearia muelleri</i>	20	0.5	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	35	0.5	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q32
Location MGA 50 325641 mE 6569459 mN

Described by: BD,SW
Date: 17/11/2021
Type: QUADRAT

Landform: Mid slope
Rock Type: Laterite, Quartz



Vegetation: *Eucalyptus websteriana* subsp. *websteriana* low open woodland over *Acacia collegialis* tall open shrubland over *Dodonaea lobulata* low open shrubland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia collegialis</i>	450	11	
<i>Austrostipa trichophylla</i>	5	0.1	
<i>Cheilanthes lasiophylla</i>	5	0.1	
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	8	0.1	
<i>Chrysocephalum puteale</i>	10	0.1	
<i>Dodonaea lobulata</i>	100	13	
<i>Enneapogon caerulescens</i>	3	0.1	
<i>Eremophila alternifolia</i>	30	0.1	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	20	0.1	
<i>Eucalyptus websteriana</i> subsp. <i>websteriana</i>	300	1	
* <i>Euphorbia drummondii</i>	5	0.1	
<i>Goodenia havilandii</i>	10	0.1	
<i>Maireana trichoptera</i>	10	0.1	
<i>Olearia muelleri</i>	35	0.1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	20	1	
<i>Scaevola spinescens</i>	50	0.1	
<i>Sida</i> ? <i>petrophila</i>	10	0.1	
<i>Solanum lasiophyllum</i>	10	0.1	
<i>Waitzia acuminata</i> var. <i>acuminata</i>	10	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q33
Location MGA 50 324395 mE 6579552 mN

Described by: JW
Date: 17/11/2021
Type: QUADRAT

Landform: Ridge
Rock Type: Laterite



Vegetation: *Acacia collegialis* tall open shrubland over *Eremophila oldfieldii* subsp. *angustifolia* mid sparse shrubland over *Dodonaea stenozyga* and *Solanum lasiophyllum* low open shrubland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia collegialis</i>	400	21	
<i>Aristida contorta</i>	5	0.1	
<i>Dodonaea stenozyga</i>	50	20	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	120	10	
<i>Goodenia havilandii</i>	15	0.1	
<i>Solanum lasiophyllum</i>	15	0.5	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q34
Location MGA 50 325544 mE 6569645 mN

Described by: BD,SW
Date: 17/11/2021
Type: QUADRAT

Landform: Mid slope
Rock Type: Laterite



Vegetation: *Eucalyptus oleosa* subsp. *oleosa* low isolated trees over *Acacia acuminata* and *Acacia collegialis* tall open shrubland over *Dodonaea lobulata* and *Eremophila georgei* mid open shrubland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia acuminata</i>	450	10	
<i>Acacia collegialis</i>	450	3	
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	5	0.1	
<i>Dodonaea lobulata</i>	120	11	
<i>Eremophila georgei</i>	120	1	
<i>Eucalyptus oleosa</i> subsp. <i>oleosa</i>	500	0.5	
<i>Leichhardtia australis</i>	300	0.1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	15	0.1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	130	0.1	
<i>Solanum lasiophyllum</i>	3	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q35
Location MGA 50 324374 mE 6579775 mN

Described by: JW
Date: 17/11/2021
Type: QUADRAT

Landform: Mld slope
Rock Type: Laterite, Quartz



Vegetation: *Acacia acuminata* tall open shrubland over *Maireana triptera*, *Senna artemisioides* subsp. *filifolia* and *Dodonaea stenozyga* low open shrubland over *Ptilotus obovatus* var. *obovatus* and *Ptilotus polystachyus* low sparse herbland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia acuminata</i>	400	28	
<i>Cheilanthes lasiophylla</i>	5	0.1	
<i>Dodonaea stenozyga</i>	45	3	
<i>Eremophila glabra</i> subsp. <i>glabra</i>	45	2	
<i>Maireana triptera</i>	25	5	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	15	1	
<i>Ptilotus polystachyus</i>	35	1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	46	5	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q36
Location MGA 50 324947 mE 6578526 mN

Described by: BD,SW
Date: 17/11/2021
Type: QUADRAT

Landform: Upper slope
Rock Type: Granite, Laterite



Vegetation: *Eucalyptus clelandiorum* and *Eucalyptus salmonophloia* mid open woodland over *Eremophila interstans* subsp. *interstans* tall sparse shrubland over *Eremophila parvifolia* subsp. *auricampi* and *Atriplex nummularia* subsp. *spathulata* low sparse shrubland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex ?vesicaria</i>	40	0.1	
<i>Atriplex nummularia</i> subsp. <i>spathulata</i>	80	0.5	
<i>Cratystylis conocephala</i>	40	0.1	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	250	3	
<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>	100	1	
<i>Eucalyptus clelandiorum</i>	1100	3	
<i>Eucalyptus salmonophloia</i>	1100	2	
<i>Exocarpos aphyllus</i>	100	0.1	
<i>Maireana trichoptera</i>	10	0.1	
<i>Roepera ovata</i>	5	0.1	
<i>Scaevola spinescens</i>	50	0.1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	160	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q37
Location MGA 50 323658 mE 6579927 mN

Described by: JW
Date: 17/11/2021
Type: QUADRAT

Landform: Plain
Rock Type: Laterite, Quartz



Vegetation: *Eucalyptus salmonophloia* and *Eucalyptus oleosa* subsp. *oleosa* mid woodland over *Eremophila interstans* subsp. *interstans* and *Atriplex ?vesicaria* mid shrubland over *Senna artemisioides* subsp. *filifolia*, *Chenopodium curvispicatum* and *Olearia muelleri* low open shrubland

Condition: Good **Disturbance Type:** Vehicle tracks

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex ?vesicaria</i>	140	15	
<i>Chenopodium curvispicatum</i>	45	2	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	200	25	
<i>Eucalyptus oleosa</i> subsp. <i>oleosa</i>	1300	2	
<i>Eucalyptus salmonophloia</i>	1500	15	
<i>Maireana pentatropis</i>	15	0.1	
<i>Maireana sedifolia</i>	45	1	
<i>Olearia muelleri</i>	35	2	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	35	5	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q38
Location MGA 50 324822 mE 6578130 mN

Described by: BD,SW
Date: 17/11/2021
Type: QUADRAT

Landform: Mid slope
Rock Type: Laterite



Vegetation: *Acacia collegialis* and *Eremophila oldfieldii* subsp. *angustifolia* tall open shrubland over *Dodonaea lobulata* and *Eremophila georgei* mid sparse shrubland over *Ptilotus obovatus* var. *obovatus* low isolated herbs

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia collegialis</i>	450	20	
<i>Aristida contorta</i>	5	0.1	
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	5	0.1	
<i>Dodonaea lobulata</i>	100	7	
<i>Eremophila georgei</i>	130	0.5	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	230	2	
<i>Goodenia havilandii</i>	15	0.1	
<i>Leichhardtia australis</i>	30	0.1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	30	0.5	
<i>Santalum acuminatum</i>	300	0.1	
<i>Scaevola spinescens</i>	45	0.1	
<i>Sida</i> ? <i>petrophila</i>	10	0.5	
<i>Solanum lasiophyllum</i>	10	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q39
Location MGA 50 323564 mE 6579153 mN

Described by: JW
Date: 17/11/2021
Type: QUADRAT

Landform: Plain
Rock Type: Ironstone, Laterite, Quartz



Vegetation: *Eucalyptus celastroides* low woodland over *Eremophila interstans* subsp. *interstans* mid sparse shrubland over *Maireana pentatropis*, *Atriplex vesicaria* and *Chenopodium curvispicatum* low sparse chenopod shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex vesicaria</i>	100	2	
<i>Chenopodium curvispicatum</i>	35	1	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	120	10	
<i>Eucalyptus celastroides</i>	600	20	
<i>Maireana pentatropis</i>	25	5	
<i>Olearia muelleri</i>	35	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q40
Location MGA 50 324436 mE 6578315 mN

Described by: BD,SW
Date: 17/11/2021
Type: QUADRAT

Landform: Mid slope
Rock Type: Laterite, Quartz



Vegetation: *Acacia collegialis* tall open shrubland over *Dodonaea lobulata* and *Eremophila georgei* mid open shrubland over *Ptilotus obovatus* var. *obovatus* low isolated herbs

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia collegialis</i>	450	15	
<i>Acacia tetragonophylla</i>	210	0.1	
<i>Aristida contorta</i>	10	0.1	
<i>Cheilanthes lasiophylla</i>	5	0.1	
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	8	0.1	
<i>Dodonaea lobulata</i>	170	10	
<i>Eremophila georgei</i>	140	3	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	50	0.1	
<i>Goodenia havilandii</i>	15	0.1	
<i>Leichhardtia australis</i>	10	0.1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	15	0.5	
<i>Santalum acuminatum</i>	270	0.1	
<i>Scaevola spinescens</i>	120	0.1	
<i>Solanum lasiophyllum</i>	5	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q41
Location MGA 50 323554 mE 6579206 mN

Described by: JW
Date: 18/11/2021
Type: QUADRAT

Landform: Plain
Rock Type: Laterite, Quartz



Vegetation: *Eucalyptus griffithsii* low open woodland over *Eremophila interstans* subsp. *interstans*, *Eremophila glabra* subsp. *glabra* and *Acacia hemiteles* mid open shrubland over *Tecticornia halocnemoides*, *Atriplex* sp. and *Maireana trichoptera* low chenopod shrubland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia hemiteles</i>	160	3	
<i>Atriplex</i> sp.	25	5	
<i>Eremophila glabra</i> subsp. <i>glabra</i>	110	5	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	140	15	
<i>Eucalyptus griffithsii</i>	1000	5	
<i>Exocarpos aphyllus</i>	180	1	
<i>Frankenia ?fecunda</i>	5	0.1	
<i>Maireana trichoptera</i>	20	5	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	60	2	
<i>Tecticornia halocnemoides</i>	100	25	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q42
Location MGA 50 323685 mE 6577907 mN

Described by: BD,SW
Date: 17/11/2021
Type: QUADRAT

Landform: Foothlope
Rock Type: Ironstone, Quartz



Vegetation: *Eremophila interstans* subsp. *interstans* mid sparse shrubland over *Tecticornia halocnemoides* low open samphire shrubland

Condition: Good **Disturbance Type:** Vehicle tracks

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex ?vesicaria</i>	50	2	
<i>Atriplex nummularia</i> subsp. <i>spathulata</i>	90	1	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	180	2	
<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>	30	0.1	
<i>Exocarpos aphyllus</i>	30	0.1	
<i>Frankenia ?fecunda</i>	20	0.1	
<i>Lawrenzia repens</i>	3	0.1	
<i>Maireana trichoptera</i>	10	0.1	
<i>Ptilotus exaltatus</i>	2	0.1	
<i>Rhagodia drummondii</i>	15	0.1	
<i>Roepera ovata</i>	8	0.1	
<i>Sclerolaena fusiformis</i>	5	0.1	
<i>Tecticornia halocnemoides</i>	90	11	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q43
Location MGA 50 323723 mE 6578705 mN

Described by: JW
Date: 18/11/2021
Type: QUADRAT

Landform: Ridge crwat
Rock Type: Ironstone, Laterite, Quartz



Vegetation: *Eucalyptus celastroides* low woodland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Eucalyptus celastroides</i>	700	25	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2R44
Location MGA 50 323751 mE 6577898 mN

Described by: BD,SW
Date: 17/11/2021
Type: RELEVE

Landform: Cracking clay No photo available
Rock Type: Ironstone, Quartz

Vegetation: *Streptoglossa liatroides* and *Sclerolaena cuneata* low sparse herbland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Goodenia pinnatifida</i>	5	0.1	
<i>Ptilotus exaltatus</i>	25	0.1	
<i>Sclerolaena cuneata</i>	5	0.5	
<i>Streptoglossa liatroides</i>	2	1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q45
Location MGA 50 323830 mE 6584592 mN

Described by: JW
Date: 18/11/2021
Type: QUADRAT

Landform: Plain No photo available
Rock Type: Laterite, Quartz

Vegetation: *Eremophila oldfieldii* subsp. *angustifolia* tall sparse shrubland over *Acacia acuminata* and *Senna artemisioides* subsp. *filifolia* mid sparse shrubland over *Atriplex vesicaria*, *Maireana pentatropis* and *Maireana georgei* low sparse chenopod shrubland

Condition: Poor **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia acuminata</i>	170	5	
<i>Atriplex vesicaria</i>	45	5	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	220	5	
<i>Maireana georgei</i>	15	0.5	
<i>Maireana pentatropis</i>	15	2	
<i>Ptilotus exaltatus</i>	25	5	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	35	1	
<i>Rhodanthe chlorocephala</i> subsp. <i>rosea</i>	5	0.1	
* <i>Salvia verbenaca</i>	15	0.5	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	140	1	
<i>Solanum lasiophyllum</i>	20	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q46
Location MGA 50 324398 mE 6577581 mN

Described by: BD,SW
Date: 17/11/2021
Type: QUADRAT

Landform: Mid slope
Rock Type: Ironstone, Quartz



Vegetation: *Eucalyptus salmonophloia* mid open woodland over *Eremophila interstans* subsp. *interstans* tall sparse shrubland over *Atriplex nummularia* subsp. *spathulata* mid sparse shrubland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex ?vesicaria</i>	50	2	
<i>Atriplex nummularia</i> subsp. <i>spathulata</i>	160	6	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	250	1	
<i>Eucalyptus salmonophloia</i>	1300	7	
<i>Maireana trichoptera</i>	15	0.1	
<i>Scaevola spinescens</i>	30	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q48
Location MGA 50 324472 mE 6578839 mN

Described by: BD,SW
Date: 17/11/2021
Type: QUADRAT

Landform: Mid slope
Rock Type: Granite, Ironstone, Quartz



Vegetation: *Eucalyptus salubris* low open woodland over *Eremophila oldfieldii* subsp. *angustifolia* and *Acacia collegialis* tall sparse shrubland over *Dodonaea lobulata* and *Senna artemisioides* subsp. *filifolia* mid sparse shrubland

Condition: Good **Disturbance Type:** Litter, Historical Clearing

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia collegialis</i>	300	2	
<i>Aristida contorta</i>	5	0.1	
<i>Dodonaea lobulata</i>	130	4	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	250	4	
<i>Eucalyptus salubris</i>	600	1	
<i>Maireana trichoptera</i>	10	0.1	
<i>Olearia muelleri</i>	40	0.1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	15	0.1	
<i>Scaevola spinescens</i>	50	1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	150	3	
<i>Trymalium myrtillus</i> subsp. <i>myrtillus</i>	150	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q50
Location MGA 50 325838 mE 6579783 mN

Described by: BD,SW
Date: 18/11/2021
Type: QUADRAT

Landform: Plain
Rock Type: Ironstone, Quartz



Vegetation: *Acacia hemiteles*, *Casuarina pauper* and *Eremophila oldfieldii* subsp. *angustifolia* tall sparse shrubland over *Senna artemisioides* subsp. *filifolia*, *Acacia jennerae* and *Eremophila deserti* mid sparse shrubland over *Scaevola spinescens*, *Chenopodium curvispicatum* and *Maireana trichoptera* low sparse shrubland

Condition: Good **Disturbance Type:** Vehicle tracks, Fauna tracks/scats, Historical Clearing

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia hemiteles</i>	230	4	
<i>Acacia jennerae</i>	130	2	
<i>Aristida contorta</i>	10	0.1	
<i>Atriplex ?vesicaria</i>	40	0.1	
<i>Atriplex nummularia</i> subsp. <i>spathulata</i>	330	0.1	
<i>Austrostipa platychaeta</i>	150	0.1	
* <i>Carrichtera annua</i>	15	0.1	
<i>Casuarina pauper</i>	300	1	
<i>Chenopodium curvispicatum</i>	20	0.5	
<i>Eremophila deserti</i>	170	1	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	220	1	
<i>Leichhardtia australis</i>	100	0.1	
<i>Maireana sedifolia</i>	160	2	
<i>Maireana tomentosa</i>	5	0.1	
<i>Maireana trichoptera</i>	30	0.5	
<i>Pimelea microcephala</i> subsp. <i>microcephala</i>	190	1	
<i>Pittosporum angustifolium</i>	200	0.1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	35	0.1	
<i>Salsola australis</i>	4	0.1	
* <i>Salvia verbenaca</i>	25	0.1	
<i>Scaevola spinescens</i>	100	3	
<i>Sclerolaena fusiformis</i>	10	0.5	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	170	3	
<i>Solanum nummularium</i>	35	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q52
Location MGA 50 325464 mE 6579380 mN

Described by: BD,SW
Date: 18/11/2021
Type: QUADRAT

Landform: Claypan
Rock Type: Calcrete, Ironstone, Quartz



Vegetation: *Dodonaea lobulata* and *Eremophila interstans* subsp. *interstans* mid sparse shrubland over *Maireana trichoptera*, *Atriplex vesicaria* and *Maireana georgei* low sparse chenopod shrubland over **Salvia verbenaca*, *Ptilotus exaltatus* and *Sclerolaena fusiformis* low herbland

Condition: Good **Disturbance Type:** Weeds, Vehicle tracks

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex vesicaria</i>	50	1	
<i>Calandrinia baccata</i>	5	0.1	
* <i>Carrichtera annua</i>	15	1	
* <i>Centaurea melitensis</i>	25	0.1	
<i>Chenopodium curvispicatum</i>	30	0.1	
<i>Dodonaea lobulata</i>	150	4	
<i>Dysphania melanocarpa</i> forma <i>leucocarpa</i>	10	0.1	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	180	1	
<i>Lawrenzia repens</i>	5	1	
<i>Maireana georgei</i>	20	1	
<i>Maireana trichoptera</i>	40	3	
<i>Monachather paradoxus</i>	5	0.1	
* <i>Oligocarpus calendulaceus</i>	5	0.1	
<i>Ptilotus exaltatus</i>	35	12	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	20	0.1	
* <i>Salvia verbenaca</i>	20	15	
<i>Sclerolaena fusiformis</i>	8	5	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	150	0.1	
<i>Solanum lasiophyllum</i>	10	0.1	
<i>Streptoglossa liatroides</i>	5	3	
<i>Vittadinia dissecta</i> var. <i>hirta</i>	30	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2Q54
Location MGA 50 324779 mE 6583442 mN

Described by: BD,SW
Date: 18/11/2021
Type: QUADRAT

Landform: Undulating plain
Rock Type: Ironstone, Laterite



Vegetation: *Eucalyptus salmonophloia* low open woodland over *Eremophila oldfieldii* subsp. *angustifolia* tall isolated shrubs over *Senna artemisioides* subsp. *filifolia*, *Eremophila interstans* subsp. *interstans* and *Dodonaea lobulata* mid open shrubland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia tetragonophylla</i>	170	0.1	
<i>Aristida contorta</i>	15	0.1	
<i>Atriplex nummularia</i> subsp. <i>spathulata</i>	120	0.1	
<i>Dodonaea lobulata</i>	100	2	
<i>Eremophila glabra</i> subsp. <i>glabra</i>	160	1	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	160	3	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	250	0.5	
<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>	130	1	
<i>Eucalyptus salmonophloia</i>	900	5	
<i>Leichhardtia australis</i>	150	0.1	
<i>Maireana trichoptera</i>	15	0.1	
<i>Olearia muelleri</i>	30	0.1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	30	0.1	
<i>Roepera ovata</i>	5	0.1	
<i>Scaevola spinescens</i>	50	0.1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	140	8	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2R05
Location MGA 50 327540 mE 6571802 mN

Described by: JW
Date: 16/11/2021
Type: RELEVE

Landform: Minor creek line No photo available
Rock Type: Laterite

Vegetation: *Eucalyptus torquata* low woodland over *Dodonaea stenozyga* mid sparse shrubland over *Ptilotus obovatus* var. *obovatus* and *Haloragis trigonocarpa* low sparse herbland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Dodonaea stenozyga</i>	110	5	
<i>Eucalyptus torquata</i>	400	20	
<i>Haloragis trigonocarpa</i>	40	2	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	25	6	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	48	5	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2R06
Location MGA 50 327365 mE 6572989 mN

Described by: JW
Date: 16/11/2021
Type: RELEVE

Landform: Lake
Rock Type: N/A



Vegetation: **Schinus molle var. areira* low woodland over *Aristida contorta* low grassland over **Heliotropium europaeum*, *Heliotropium curassavicum* and **Sonchus asper* low herbland

Condition: Degraded **Disturbance Type:** Weeds, Grazing, Vehicle tracks, Litter, Fauna tracks/scats

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Aristida contorta</i>	30	70	
<i>Heliotropium curassavicum</i>	18	1	
<i>*Heliotropium europaeum</i>	2	40	
<i>*Schinus molle var. areira</i>	300	15	
<i>*Sonchus asper</i>	70	1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2R07
Location MGA 50 327376 mE 6570901 mN

Described by: JW
Date: 16/11/2021
Type: RELEVE

Landform: Mld slope
Rock Type: Laterite



Vegetation: *Eucalyptus oleosa* subsp. *oleosa* low woodland over *Atriplex vesicaria* low sparse chenopod shrubland over *Heliotropium curassavicum* low sparse herbland

Condition: Good **Disturbance Type:** Vehicle tracks

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex vesicaria</i>	60	10	
<i>Eucalyptus oleosa</i> subsp. <i>oleosa</i>	700	15	
<i>Heliotropium curassavicum</i>	40	10	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2R09
Location MGA 50 327166 mE 6574087 mN

Described by: JW
Date: 16/11/2021
Type: RELEVE

Landform: Plain
Rock Type: Laterite



Vegetation: *Eucalyptus torquata* and *Eucalyptus griffithsii* low woodland over *Eremophila oldfieldii* subsp. *angustifolia* and *Santalum acuminatum* tall open shrubland over *Dodonaea stenozyga*, *Senna artemisioides* subsp. *filifolia* and *Alyxia buxifolia* low shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Alyxia buxifolia</i>	50	5	
<i>Dodonaea stenozyga</i>	80	25	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	300	25	
<i>Eucalyptus griffithsii</i>	800	2	
<i>Eucalyptus torquata</i>	1000	15	
<i>Santalum acuminatum</i>	220	2	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	90	18	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2R11
Location MGA 50 325721 mE 6569452 mN

Described by: BD,SW
Date: 16/11/2021
Type: RELEVE

Landform: Drainage line
Rock Type: Ironstone



Vegetation: *Eucalyptus salmonophloia* mid woodland over *Eremophila interstans* subsp. *interstans* and *Acacia collegialis* tall open shrubland over *Senna artemisioides* subsp. *filifolia* and *Dodonaea lobulata* mid open shrubland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia acuminata</i>	250	0.1	
<i>Acacia collegialis</i>	300	1	
<i>Dodonaea lobulata</i>	120	2	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	250	20	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	250	0.1	
<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>	40	0.1	
<i>Eucalyptus salmonophloia</i>	1200	20	
<i>Olearia muelleri</i>	40	0.1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	40	0.1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	150	15	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2R13
Location MGA 50 324764 mE 6579229 mN

Described by: BD,SW
Date: 17/11/2021
Type: RELEVE

Landform: Plain No photo available
Rock Type: Calcrete, Laterite

Vegetation: *Maireana georgei* mid sparse chenopod shrubland over *Atriplex nummularia* subsp. *spathulata*, *Maireana tomentosa* and *Atriplex ?vesicaria* low sparse chenopod shrubland over **Centaurea melitensis* and *Ptilotus obovatus* var. *obovatus* low open hermland

Condition: Very Poor **Disturbance Type:** Weeds, Vehicle tracks, Litter, Historical Clearing, Infrastructure

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex ?vesicaria</i>	25	0.5	
<i>Atriplex nummularia</i> subsp. <i>spathulata</i>	20	1	
<i>Atriplex quadrivalvata</i>	15	0.1	
* <i>Centaurea melitensis</i>	40	10	
<i>Hibiscus solanifolius</i>	120	0.1	
<i>Maireana georgei</i>	120	2	
<i>Maireana tomentosa</i>	30	1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	35	10	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2R15
Location MGA 50 324420 mE 6579488 mN

Described by: JW
Date: 17/11/2021
Type: RELEVE

Landform: Ridge crwst
Rock Type: Laterite, Quartz



Vegetation: *Eucalyptus campaspe* and *Eucalyptus oleosa* subsp. *oleosa* low open forest over *Senna artemisioides* subsp. *filifolia* mid open shrubland over *Olearia muelleri* and *Eremophila glabra* subsp. *glabra* low open shrubland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Eremophila glabra</i> subsp. <i>glabra</i>	90	1	
<i>Eucalyptus campaspe</i>	1000	25	
<i>Eucalyptus oleosa</i> subsp. <i>oleosa</i>	1000	15	
<i>Olearia muelleri</i>	28	10	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	200	18	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C2R17
Location MGA 50 323480 mE 6579368 mN

Described by: JW
Date: 17/11/2021
Type: RELEVE

Landform: Plain
Rock Type: Ironstone, Laterite



Vegetation: *Eucalyptus oleosa* subsp. *oleosa* and *Eucalyptus celastroides* low woodland over *Senna artemisioides* subsp. *filifolia* and *Eremophila interstans* subsp. *interstans* low sparse shrubland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Eremophila interstans</i> subsp. <i>interstans</i>	35	0.5	
<i>Eucalyptus celastroides</i>	500	1	
<i>Eucalyptus oleosa</i> subsp. <i>oleosa</i>	700	10	
<i>Olearia muelleri</i>	25	0.1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	60	1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C3Q01
Location MGA 50 328133 mE 6574120 mN

Described by: JW
Date: 18/11/2021
Type: QUADRAT

Landform: Plai
Rock Type: Laterite



Vegetation: *Eucalyptus griffithsii* low open woodland over *Eremophila interstans* subsp. *interstans*, *Senna artemisioides* subsp. *filifolia* and *Acacia jennerae* mid open shrubland over *Alyxia buxifolia*, *Westringia rigida* and *Olearia muelleri* low sparse shrubland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia acuminata</i>	120	1	
<i>Acacia jennerae</i>	140	1	
<i>Alyxia buxifolia</i>	90	2	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	130	5	
<i>Eucalyptus griffithsii</i>	700	5	
<i>Exocarpos aphyllus</i>	150	1	
<i>Maireana tomentosa</i>	10	0.1	
<i>Olearia muelleri</i>	28	0.5	
<i>Ptilotus exaltatus</i>	15	0.1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	120	5	
<i>Westringia rigida</i>	45	2	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C3Q02
Location MGA 50 328109 mE 6573080 mN

Described by: BD,SW
Date: 18/11/2021
Type: QUADRAT

Landform: Upper slope
Rock Type: Granite, Laterite



Vegetation: *Eucalyptus torquata* low open forest over *Dodonaea stenozyga* low sparse shrubland

Condition: Good **Disturbance Type:** Litter

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
? <i>Enchylaena tomentosa</i>	20	0.1	
<i>Atriplex</i> ? <i>vesicaria</i>	40	0.1	
<i>Dodonaea lobulata</i>	90	0.1	
<i>Dodonaea stenozyga</i>	80	3	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	180	0.1	
<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>	60	0.1	
<i>Eucalyptus torquata</i>	800	35	
<i>Exocarpos aphyllus</i>	40	0.1	
<i>Maireana trichoptera</i>	10	0.1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	10	0.1	
<i>Rytidosperma</i> sp.	10	0.1	
<i>Scaevola spinescens</i>	50	0.1	
<i>Solanum nummularium</i>	5	0.1	
<i>Trymalium myrtilus</i> subsp. <i>myrtilus</i>	20	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C3Q02A
Location MGA 50 327861 mE 6573908 mN

Described by: JW
Date: 18/11/2021
Type: QUADRAT

Landform: Hill top
Rock Type: Granite, Ironstone, Laterite



Vegetation: *Eucalyptus torquata* low open woodland over *Dodonaea stenozyga*, *Acacia acuminata* and *Eremophila oldfieldii* subsp. *angustifolia* mid open shrubland over *Alyxia buxifolia* and *Senna artemisioides* subsp. *filifolia* low sparse shrubland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia acuminata</i>	200	3	
<i>Acacia dissona</i> var. <i>dissona</i>	200	1	
<i>Alyxia buxifolia</i>	50	1	
<i>Dodonaea stenozyga</i>	110	12	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	150	3	
<i>Eucalyptus torquata</i>	1000	5	
<i>Maireana georgei</i>	5	0.1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	70	1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C3Q02B
Location MGA 50 327412 mE 6574092 mN

Described by: JW
Date: 18/11/2021
Type: QUADRAT

Landform: Plain
Rock Type: Ironstone, Laterite



Vegetation: *Eucalyptus griffithsii* low open woodland over *Eremophila oldfieldii* subsp. *angustifolia* mid sparse shrubland over *Atriplex vesicaria*, *Dodonaea stenozyga* and *Acacia dissona* var. *dissona* low open shrubland

Condition: Very Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Acacia dissona</i> var. <i>dissona</i>	25	1	
<i>Acacia hemiteles</i>	100	1	
<i>Atriplex vesicaria</i>	45	15	
<i>Dodonaea stenozyga</i>	25	5	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	25	1	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	150	5	
<i>Eucalyptus griffithsii</i>	700	5	
<i>Maireana pentatropis</i>	15	0.1	
<i>Maireana tomentosa</i>	10	0.5	
<i>Olearia muelleri</i>	25	1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	15	1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C3Q06
Location MGA 50 327864 mE 6573343 mN

Described by: BD,SW
Date: 18/11/2021
Type: QUADRAT

Landform: Mid slope
Rock Type: Calcrete, Laterite



Vegetation: *Eucalyptus torquata* low woodland over *Eremophila interstans* subsp. *interstans* tall sparse shrubland over *Dodonaea stenozyga* mid sparse shrubland

Condition: Good **Disturbance Type:** Vehicle tracks, Fauna tracks/scats

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Atriplex ?vesicaria</i>	50	0.1	
<i>Atriplex nummularia</i> subsp. <i>spathulata</i>	40	0.1	
<i>Austrostipa platychaeta</i>	80	0.1	
<i>Dodonaea stenozyga</i>	150	1	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	370	1	
<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>	30	0.1	
<i>Eucalyptus torquata</i>	800	15	
<i>Maireana sedifolia</i>	120	0.1	
<i>Maireana tomentosa</i>	5	0.1	
<i>Maireana trichoptera</i>	15	0.1	
<i>Olearia muelleri</i>	40	0.1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	60	0.1	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C3R01
Location MGA 50 328239 mE 6574703 mN

Described by: JW
Date: 18/11/2021
Type: RELEVE

Landform: Plain
Rock Type: Laterite



Vegetation: *Eucalyptus griffithsii* low open woodland over *Eremophila interstans* subsp. *interstans* tall open shrubland over *Atriplex vesicaria* and *Exocarpos aphyllus* mid open shrubland

Condition: Good **Disturbance Type:** None

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
<i>Alyxia buxifolia</i>	90	1	
<i>Atriplex vesicaria</i>	110	15	
<i>Dianella revoluta</i> var. <i>divaricata</i>	60	0.5	
<i>Dodonaea stenozyga</i>	15	0.5	
<i>Eremophila glabra</i> subsp. <i>glabra</i>	70	2	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	220	15	
<i>Eucalyptus griffithsii</i>	1000	5	
<i>Exocarpos aphyllus</i>	130	5	
<i>Maireana pentatropis</i>	15	0.5	
<i>Maireana trichoptera</i>	20	0.1	
<i>Olearia muelleri</i>	15	0.5	
<i>Pimelea spiculigera</i> var. <i>thesioides</i>	20	0.1	
<i>Ptilotus exaltatus</i>	35	5	

FLORA SITE SHEET

Project Name 4794 Coolgardie Biological Survey
Site: C3R04
Location MGA 50 328218 mE 6573560 mN

Described by: BD,SW
Date: 18/11/2021
Type: RELEVE

Landform: Creek line
Rock Type: Granite, Quartz



Vegetation: *Eucalyptus salmonophloia* mid open forest over *Eremophila interstans* subsp. *interstans* tall sparse shrubland over *Acacia jennerae* mid sparse shrubland

Condition: Good **Disturbance Type:** Weeds, Vehicle tracks

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
? <i>Pimelea</i> sp.	170	0.1	
<i>Acacia jennerae</i>	150	5	
* <i>Asphodelus fistulosus</i>	30	0.1	
<i>Atriplex</i> ? <i>vesicaria</i>	30	2	
<i>Atriplex nummularia</i> subsp. <i>spathulata</i>	50	1	
* <i>Carrichtera annua</i>	20	0.1	
* <i>Centaurea melitensis</i>	20	0.1	
<i>Chloris truncata</i>	30	0.1	
<i>Eragrostis dielsii</i>	3	0.1	
<i>Eremophila interstans</i> subsp. <i>interstans</i>	210	4	
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	140	0.1	
<i>Eucalyptus salmonophloia</i>	1100	40	
<i>Maireana trichoptera</i>	20	0.1	
<i>Olearia muelleri</i>	40	0.1	
* <i>Oligocarpus calendulaceus</i>	5	0.1	
<i>Pittosporum angustifolium</i>	210	0.1	
<i>Ptilotus exaltatus</i>	30	0.1	
<i>Ptilotus obovatus</i> var. <i>obovatus</i>	25	0.1	
<i>Sclerolaena diacantha</i>	5	0.1	
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	120	0.1	
<i>Vittadinia dissecta</i> var. <i>hirta</i>	15	0.1	

Appendix F

Fauna Habitat Assessments

HABC01

Project:	4794 Coolgardie Biological Spring Survey		
Date	2021-10-12	Personnel	LC
Easting	899984.8973525156	Northing	6572010.013459269
Landform and soil		Rock	
Landform	Mid slope	Rock type/s	Granite,Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Brown,Orange	Surface stone size classes present	5 - 25%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Leaf litter,Peeling bark,Rock crevices,Woody debris
Disturbance	Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Low (<10 m)	Open forest (50-80%)	<i>Acacia sp.</i>
Mid stratum	Mid (1-2 m)	Open shrubland and/or heathland (20-50%)	<i>dodonaea sp.</i>
Ground stratum	Low (>0.5 m)	Isolated forbs (<0.25%)	<i>ptilotus sp.</i>



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HABC02

Project:	4795 Coolgardie Biological Spring Survey		
Date	2021-10-12	Personnel	LC
Easting	899822.8621105128	Northing	6571973.766455285
Landform and soil		Rock	
Landform	Mid slope	Rock type/s	Granite,Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Brown,Orange	Surface stone size classes present	25 - 50%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Leaf litter,Peeling bark,Rock crevices,Woody debris
Disturbance	None observed		
Introduced fauna	Rabbit		
Vegetation			
Upper stratum	Low (<10 m)	Open woodland (0.25-20%)	<i>Acacia sp.</i>
Mid stratum	Mid (1-2 m)	Open mallee shrubland (20-50%)	
Ground stratum	Low (>0.5 m)	Open forbland (20-50%)	<i>ptilotus sp.</i>



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HABC03

Project:	4796 Coolgardie Biological Spring Survey		
Date	2021-10-12	Personnel	LC
Easting	899951.8547312932	Northing	6571730.697303254
Landform and soil		Rock	
Landform	Plain	Rock type/s	Quartz
Soil type	Sandy loam	Surface stone cover	
Soil colour	Brown	Surface stone size classes present	0 - 5%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Hollows - trees, Leaf litter, Peeling bark, Woody debris
Disturbance	Litter, Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Isolated shrubs and/or heath shrubs (<0.25%)	<i>eucalyptus mallee</i>
Ground stratum	Low (>0.5 m)	Open forbland (20-50%)	<i>eremophila sp, salt Bush, acacia sp.</i>



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HABC04

Project:	4797 Coolgardie Biological Spring Survey		
Date	2021-10-12	Personnel	LC
Easting	899917.5832372475	Northing	6571665.113011075
Landform and soil		Rock	
Landform	Undulating plain	Rock type/s	Granite, Quartz
Soil type	Sandy loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	5 - 25%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Peeling bark, Rock crevices, Woody debris
Disturbance	Vehicle tracks		
Introduced fauna	Cattle		
Vegetation			
Upper stratum	Low (<10 m)	Isolated trees (<0.25%)	<i>Eremophila sp.</i>
Mid stratum	Mid (1-2 m)	Shrubland and/or heathland (50-80%)	<i>eremophila sp.</i>
Ground stratum	Low (>0.5 m)	Isolated forbs (<0.25%)	<i>ptilotus sp.</i>



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HABC05

Project:	4798 Coolgardie Biological Spring Survey		
Date	2021-10-12	Personnel	LC
Easting	900074.8952529589	Northing	6571739.672393914
Landform and soil		Rock	
Landform	Plain	Rock type/s	Granite,Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Brown,Orange	Surface stone size classes present	0 - 5%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Hollows - logs,Leaf litter,Peeling bark,Woody debris
Disturbance	Litter,Vehicle tracks,Weeds		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Isolated shrubs and/or heath shrubs (<0.25%)	<i>eremophila sp.</i>
Ground stratum	Low (>0.5 m)	Forbland (50-80%)	<i>saltbush sp.</i>



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HABC06

Project:	4799 Coolgardie Biological Spring Survey		
Date	2021-10-12	Personnel	LC
Easting	900594.4049126134	Northing	6571695.699349251
Landform and soil		Rock	
Landform	Gorge	Rock type/s	Granite
Soil type	Clay	Surface stone cover	
Soil colour	Brown	Surface stone size classes present	0 - 5%
Condition		Habitat Features	
Quality	Highly degraded	Water Source	Present
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Exfoliating rock
Disturbance	Clearing,Litter,Vehicle tracks		
Introduced fauna	Goat		
Vegetation			
Upper stratum	Absent		
Mid stratum	Absent		
Ground stratum	Low (>0.5 m)	Sparse tussock grassland (0.25-20%)	<i>eraharta sp.</i>



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HABC07

Project:	4800 Coolgardie Biological Spring Survey		
Date	2021-10-12	Personnel	LC
Easting	901166.9975909423	Northing	6571815.560922004
Landform and soil		Rock	
Landform	Undulating plain	Rock type/s	Granite
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	0 - 5%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Burrows,Leaf litter,Peeling bark,Woody debris
Disturbance	Litter,Vehicle tracks		
Introduced fauna	Cattle,Rabbit		
Vegetation			
Upper stratum	Low (<10 m)	Isolated trees (<0.25%)	<i>Eucalyptus sp. and eremophila sp.</i>
Mid stratum	Low (0.5-1 m)	Shrubland and/or heathland (50-80%)	<i>dodonaea</i>
Ground stratum	Low (>0.5 m)	Isolated forbs (<0.25%)	<i>saltbush and Ptilotus sp.</i>



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HABC08

Project:	4801 Coolgardie Biological Spring Survey		
Date	2021-10-12	Personnel	LC
Easting	901301.0032407076	Northing	6571962.571508318
Landform and soil		Rock	
Landform	Undulating plain	Rock type/s	Granite
Soil type	Sandy loam	Surface stone cover	
Soil colour	Grey,Orange	Surface stone size classes present	0 - 5%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Hollows - logs,Leaf litter,Peeling bark,Woody debris
Disturbance	Vehicle tracks		
Introduced fauna	Cattle		
Vegetation			
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Open shrubland and/or heathland (20-50%)	<i>eremophila sp.</i>
Ground stratum	Low (>0.5 m)	Isolated forbs (<0.25%)	<i>saltbush sp.</i>



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HABC09

Project:	4802 Coolgardie Biological Spring Survey		
Date	2021-10-12	Personnel	LC
Easting	901682.8518081398	Northing	6571863.583170791
Landform and soil		Rock	
Landform	Plain	Rock type/s	Granite,Quartz
Soil type	Sandy clay	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	0 - 5%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Hollows - logs,Leaf litter,Peeling bark,Woody debris
Disturbance	Litter		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>eremophila sp.</i>
Ground stratum	Absent		



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HABC10

Project:	4803 Coolgardie Biological Spring Survey		
Date	2021-10-12	Personnel	LC
Easting	902022.5631623187	Northing	6572062.188234046
Landform and soil		Rock	
Landform	Upper slope	Rock type/s	Granite
Soil type	Clay loam	Surface stone cover	
Soil colour	Red	Surface stone size classes present	25 - 50%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Hollows - logs,Leaf litter,Peeling bark,Rock crevices,Woody debris
Disturbance	None observed		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Absent		
Mid stratum	Tall (>2 m)	Shrubland and/or heathland (50-80%)	<i>acacia sp. eremophila sp.</i>
Ground stratum	Low (>0.5 m)	Isolated forbs (<0.25%)	



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HABC11

Project:	4804 Coolgardie Biological Spring Survey		
Date	2021-10-12	Personnel	LC
Easting	902400.9875870193	Northing	6571798.486756262
Landform and soil		Rock	
Landform	Mid slope	Rock type/s	Calcrete,Granite
Soil type	Sandy loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	25 - 50%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Leaf litter,Peeling bark,Rock crevices,Woody debris
Disturbance	None observed		
Introduced fauna	Goat,Rabbit		
Vegetation			
Upper stratum	Low (<10 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Shrubland and/or heathland (50-80%)	<i>eremophila sp. dodenea sp. acacia sp.</i>
Ground stratum	Low (>0.5 m)	Isolated forbs (<0.25%)	<i>eremophila</i>



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HABC12

Project:	4805 Coolgardie Biological Spring Survey		
Date	2021-10-12	Personnel	LC
Easting	902370.029827407	Northing	6571589.932107501
Landform and soil		Rock	
Landform	Plain	Rock type/s	Unknown
Soil type	Sandy loam	Surface stone cover	
Soil colour	Brown,Orange	Surface stone size classes present	0 - 5%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Leaf litter,Peeling bark,Woody debris
Disturbance	None observed		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Shrubland and/or heathland (50-80%)	<i>eremophila sp.</i>
Ground stratum	Low (>0.5 m)	Sparse forbland (0.25-20%)	



Fulcrum photo ID aef600dc-722f-4dd1-a355-599e69a6b123,e75ca763-a192-495f-a373-

HABC13

Project:	4806 Coolgardie Biological Spring Survey		
Date	2021-10-12	Personnel	LC
Easting	900730.9056804918	Northing	6570131.034563001
Landform and soil		Rock	
Landform	Mid slope	Rock type/s	Granite
Soil type	Clay loam	Surface stone cover	
Soil colour	Brown,Red	Surface stone size classes present	50 - 75%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Leaf litter,Peeling bark,Rock crevices,Woody debris
Disturbance			
Introduced fauna	Goat,Rabbit		
Vegetation			
Upper stratum	Low (<10 m)	Open woodland (0.25-20%)	<i>Acacia sp.</i>
Mid stratum	Mid (1-2 m)	Open shrubland and/or heathland (20-50%)	<i>dodonaea sp.</i>
Ground stratum	Low (>0.5 m)	Isolated tussock grasses (<0.25%)	<i>grass species</i>



Fulcrum photo ID 58005a12-2165-49c3-b705-24e2a50985e8,0b2d1291-65d4-48da-b5d6

HABC14

Project:	4807 Coolgardie Biological Spring Survey		
Date	2021-10-12	Personnel	LC
Easting	900889.8561838119	Northing	6569940.604672145
Landform and soil		Rock	
Landform	Mid slope	Rock type/s	Calcrete,Granite,Quartz
Soil type	Sandy loam	Surface stone cover	
Soil colour	Brown,Grey	Surface stone size classes present	25 - 50%
Condition		Habitat Features	
Quality	Disturbed	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Leaf litter,Peeling bark,Woody debris
Disturbance	Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>eremophila sp. salt bush</i>
Ground stratum	Mid (0.5-1 m)	Open forbland (20-50%)	<i>salt bush sp.</i>



Fulcrum photo ID 3b56a64c-51c9-4e00-bdc1-f54d4301f218,c0fddb0c-66e8-40b3-9c48-

HABC15

Project:	4808 Coolgardie Biological Spring Survey		
Date	2021-10-12	Personnel	LC
Easting	901542.5074801195	Northing	6568846.8061696505
Landform and soil		Rock	
Landform	Mid slope	Rock type/s	Calcrete,Granite
Soil type	Sandy loam	Surface stone cover	
Soil colour	Brown,Red	Surface stone size classes present	50 - 75%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Hollows - logs,Leaf litter,Peeling bark,Rock crevices,Woody debris
Disturbance	None observed		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>acacia sp.</i>
Ground stratum	Low (>0.5 m)	Isolated forbs (<0.25%)	<i>ptilotus sp</i>



Fulcrum photo ID bfb61e82-be29-4f8f-a414-761f945af8e4,e6e2629f-1f45-4bcd-9213-

HABC16

Project:	4809 Coolgardie Biological Spring Survey		
Date	2021-10-13	Personnel	LC
Easting	902295.8342707243	Northing	6571439.575077539
Landform and soil		Rock	
Landform	Drainage line	Rock type/s	Calcrete,Granite,Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	0 - 5%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Hollows - trees,Leaf litter,Peeling bark,Woody debris
Disturbance	Erosion		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Low (<10 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>eremophila sp.</i>
Ground stratum	Low (>0.5 m)	Isolated forbs (<0.25%)	<i>Saltbush sp.</i>



Fulcrum photo ID b70c7eb9-827e-46df-b8e4-5e4e110d293a,85f73721-6a97-4980-94c7-

HABC17

Project:	4810 Coolgardie Biological Spring Survey		
Date	2021-10-13	Personnel	LC
Easting	901495.8347967644	Northing	6571719.769933704
Landform and soil		Rock	
Landform	Plain	Rock type/s	Calcrete,Granite,Quartz
Soil type	Sandy loam	Surface stone cover	
Soil colour	Brown,Orange,Yellow	Surface stone size classes present	0 - 5%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Burrows,Hollows - logs,Hollows - trees,Leaf litter,Peeling bark,Woody debris
Disturbance	Litter,Vehicle tracks		
Introduced fauna	Rabbit		
Vegetation			
Upper stratum	Mid (10-30 m)	Woodland (20-50%)	<i>Eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>eremophila sp.</i>
Ground stratum	Low (>0.5 m)	Sparse forbland (0.25-20%)	<i>ptilotus sp. and herb sp.</i>



Fulcrum photo ID 372a2bcc-d839-41ff-9db2-d990a2431994,cd2c96ca-6b1d-49e3-b273-

HABC18

Project:	4811 Coolgardie Biological Spring Survey		
Date	2021-10-13	Personnel	LC
Easting	899905.7739034619	Northing	6571300.257774439
Landform and soil		Rock	
Landform	Mid slope	Rock type/s	Granite,Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange,Red	Surface stone size classes present	25 - 50%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Leaf litter,Peeling bark,Rock crevices,Woody debris
Disturbance	Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Isolated trees (<0.25%)	<i>Eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Shrubland and/or heathland (50-80%)	<i>dodenea sp. eremophila sp.</i>
Ground stratum	Low (>0.5 m)	Isolated forbs (<0.25%)	<i>ptilotus sp.</i>



Fulcrum photo ID 3663874c-d46e-438f-8c20-f9744960ca60,30a5a95b-d86a-4c39-8c3b-

HABC19

Project:	4812 Coolgardie Biological Spring Survey		
Date	2021-10-13	Personnel	LC
Easting	899738.7645235118	Northing	6571320.002878793
Landform and soil		Rock	
Landform	Mid slope	Rock type/s	Granite,Quartz
Soil type	Sandy loam	Surface stone cover	
Soil colour	Brown	Surface stone size classes present	0 - 5%
Condition		Habitat Features	
Quality	Disturbed	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Hollows - logs,Leaf litter,Peeling bark,Woody debris
Disturbance	Vehicle tracks		
Introduced fauna	Rabbit		
Vegetation			
Upper stratum	Mid (10-30 m)	Woodland (20-50%)	<i>Eucalyptus sp.</i>
Mid stratum	Absent		
Ground stratum	Low (>0.5 m)	Sparse forbland (0.25-20%)	<i>saltbush sp. and Ptilotus sp.</i>



Fulcrum photo ID 3996f487-e2d9-4d38-9be8-65219fc9ea13,d5e4af84-5d54-464a-b161-

HABC20

Project:	4813 Coolgardie Biological Spring Survey		
Date	2021-10-14	Personnel	LC
Easting	900350.4372829349	Northing	6571342.937353729
Landform and soil		Rock	
Landform	Mid slope	Rock type/s	Calcrete,Granite,Quartz
Soil type	Sandy loam	Surface stone cover	
Soil colour	Brown,Grey	Surface stone size classes present	5 - 25%
Condition		Habitat Features	
Quality	Disturbed	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Leaf litter,Peeling bark,Woody debris
Disturbance	Erosion,Litter,Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>saltbush sp. and herb sp.</i>
Ground stratum	Low (>0.5 m)	Sparse forbland (0.25-20%)	<i>saltbush sp.</i>



Fulcrum photo ID cfd77415-c024-4198-bd3a-e011a5fb5404,15466c44-d7ac-4902-a088-

HABC21

Project:	4814 Coolgardie Biological Spring Survey		
Date	2021-10-14	Personnel	LC
Easting	900421.5213021053	Northing	6571645.335509442
Landform and soil		Rock	
Landform	Claypan	Rock type/s	Granite
Soil type	Clay	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	0 - 5%
Condition		Habitat Features	
Quality	Highly degraded	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Rock crevices, Woody debris
Disturbance	Clearing, Erosion, Litter, Overgrazing, Vehicle		
Introduced fauna	Cattle		
Vegetation			
Upper stratum	Mid (10-30 m)	Isolated trees (<0.25%)	<i>Eucalyptus sp.</i>
Mid stratum	Absent		
Ground stratum	Low (>0.5 m)	Tussock grassland (50-80%)	<i>grass sp. and thistle sp. sedges boemia sp.</i>



Fulcrum photo ID bfe042ed-7948-4c78-9fe1-7c8541220392,7696b9b4-9eeb-4df8-8e63-

HABC22

Project:	4815 Coolgardie Biological Spring Survey		
Date	2021-10-14	Personnel	LC
Easting	900235.352356134	Northing	6572033.776216977
Landform and soil		Rock	
Landform	Upper slope	Rock type/s	Calcrete, Granite, Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange, Red	Surface stone size classes present	5 - 25%
Condition		Habitat Features	
Quality	Disturbed	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Leaf litter, Peeling bark, Rock crevices, Woody debris
Disturbance	Clearing, Litter, Vehicle tracks, Weeds		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Low (<10 m)	Woodland (20-50%)	<i>Acacia sp.</i>
Mid stratum	Low (0.5-1 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>dodenea sp.</i>
Ground stratum	Low (>0.5 m)	Sparse forbland (0.25-20%)	<i>ptilotus sp. herbs</i>



Fulcrum photo ID 51a9f868-dbf8-4d0d-aa65-cebf271c9d24, bcb04dd4-53d3-407a-9ce9-

HABC23

Project:	4816 Coolgardie Biological Spring Survey		
Date	2021-10-14	Personnel	LC
Easting	900167.7359049395	Northing	6570928.550377593
Landform and soil		Rock	
Landform	Plain	Rock type/s	Calcrete,Granite,Quartz
Soil type	Sandy loam	Surface stone cover	
Soil colour	Brown,Grey,Orange	Surface stone size classes present	0 - 5%
Condition		Habitat Features	
Quality	Highly degraded	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Leaf litter,Peeling bark,Woody debris
Disturbance	Clearing,Litter,Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Woodland (20-50%)	<i>Eucalyptus sp.</i>
Mid stratum	Low (0.5-1 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>eremophila sp.</i>
Ground stratum	Low (>0.5 m)	Sparse forbland (0.25-20%)	<i>saltbush cena sp. herbs sp.</i>



Fulcrum photo ID 4e1b0f41-0592-423d-8408-a19672a9d5c6,f06cb18e-09e9-41d6-a61b-

HABC24

Project:	4817 Coolgardie Biological Spring Survey		
Date	2021-10-14	Personnel	LC
Easting	899663.2610756675	Northing	6571226.542719762
Landform and soil		Rock	
Landform	Upper slope	Rock type/s	Calcrete,Granite,Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	50 - 75%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Peeling bark,Rock crevices,Woody debris
Disturbance	Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Isolated trees (<0.25%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Open shrubland and/or heathland (20-50%)	<i>eremophila sp. dodenea sp.</i>
Ground stratum	Low (>0.5 m)	Sparse forbland (0.25-20%)	<i>ptilotus sp. salt bush sp.</i>



Fulcrum photo ID 8f123c2e-9663-4712-845a-fe15deec853c,26ed00e2-46e6-4415-ad80-

C2H2

Project:	4818 Coolgardie Biological Spring Survey		
Date	2021-11-15	Personnel	SW
Easting	897743.7674614477	Northing	6565685.35287808
Landform and soil		Rock	
Landform	Plain	Rock type/s	Laterite
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	50 - 75%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Little or no fire evidence (>5 years)	Microhabitats	Leaf litter, Peeling bark
Disturbance	Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Open shrubland and/or heathland (20-50%)	<i>Acacia and Melaleuca sp</i>
Ground stratum	Low (>0.5 m)	Isolated hummock grasses (<0.25%)	<i>Scaveola spin</i>



Fulcrum photo ID c4cad0bd-4f57-4209-9459-7401a6a867d2

C2H4

Project:	4819 Coolgardie Biological Spring Survey		
Date	2021-11-15	Personnel	SW
Easting	897738.8708299723	Northing	6565557.982810425
Landform and soil		Rock	
Landform	Plain	Rock type/s	Laterite, Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	75 - 100%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter, Peeling bark
Disturbance	Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Low (<10 m)	Woodland (20-50%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Open shrubland and/or heathland (20-50%)	<i>Melaleuca sp</i>
Ground stratum	Low (>0.5 m)	Open hummock grassland (20-50%)	<i>Scaveola spin</i>



Fulcrum photo ID a0f87fb2-1a73-43d5-bfb4-bf7e2ce804a4

C2H6

Project:	4820 Coolgardie Biological Spring Survey		
Date	2021-11-15	Personnel	SW
Easting	897718.2217606371	Northing	6565454.049011737
Landform and soil		Rock	
Landform	Plain	Rock type/s	Laterite,Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	75 - 100%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - logs,Leaf litter,Peeling bark,Woody debris
Disturbance			
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Isolated trees (<0.25%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>Eucalyptus sp</i>
Ground stratum	Low (>0.5 m)		



Fulcrum photo ID a25ac42a-b0be-4c30-a8b2-8e07a2f5bcd9

C2H8

Project:	4821 Coolgardie Biological Spring Survey		
Date	2021-11-15	Personnel	SW
Easting	897820.0346483674	Northing	6565227.984386012
Landform and soil		Rock	
Landform	Plain	Rock type/s	Laterite
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	5 - 25%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - logs,Leaf litter,Peeling bark,Woody debris
Disturbance	None observed		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Isolated trees (<0.25%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>Eremophila sp</i>
Ground stratum			



Fulcrum photo ID 93421722-1ad4-4c10-9e11-de2ef1902d8b

C2H10

Project:	4822 Coolgardie Biological Spring Survey		
Date	2021-11-15	Personnel	SW
Easting	898008.8963851782	Northing	6565265.629842697
Landform and soil		Rock	
Landform	Drainage line	Rock type/s	Calcrete, Laterite, Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange, Red	Surface stone size classes present	25 - 50%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - logs, Leaf litter, Peeling bark, Woody debris
Disturbance	Erosion		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Open shrubland and/or heathland (20-50%)	<i>Eremophila</i>
Ground stratum			



Fulcrum photo ID 45de2c23-38f7-401c-8d48-42e59fe7b842

C2H12

Project:	4823 Coolgardie Biological Spring Survey		
Date	2021-11-15	Personnel	SW
Easting	898183.4047518701	Northing	6565240.394553069
Landform and soil		Rock	
Landform	Mid slope	Rock type/s	Laterite, Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	25 - 50%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - logs, Leaf litter, Peeling bark, Woody debris
Disturbance	Erosion		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Woodland (20-50%)	<i>Eucalyptus sp.</i>
Mid stratum	Low (0.5-1 m)	Isolated shrubs and/or heath shrubs (<0.25%)	<i>Senna art fil</i>
Ground stratum			



Fulcrum photo ID 08469bcc-a34b-4b23-bf34-76982cd97e9c

HABC2LC01

Project:	4824 Coolgardie Biological Spring Survey		
Date	2021-11-15	Personnel	LC
Easting	899664.2211246493	Northing	6565980.506265143
Landform and soil		Rock	
Landform	Gorge	Rock type/s	Granite,Quartz
Soil type	Sandy loam	Surface stone cover	
Soil colour	Brown,Yellow	Surface stone size classes present	50 - 75%
Condition		Habitat Features	
Quality	Highly degraded	Water Source	Absent
Fire History	Unknown	Microhabitats	Exfoliating rock,Rock crevices
Disturbance			
Introduced fauna	None observed		
Vegetation			
Upper stratum	Absent		
Mid stratum	Mid (1-2 m)	Isolated shrubs and/or heath shrubs (<0.25%)	<i>eremophila sp.</i>
Ground stratum	Low (>0.5 m)	Sparse forbland (0.25-20%)	<i>eremophila sp. salt bush sp.</i>



Fulcrum photo ID 4ebf3251-d69c-4d7e-93c5-260eba7ae549,d2ea3ab1-5502-453c-9997-

HABC2LC02

Project:	4825 Coolgardie Biological Spring Survey		
Date	2021-11-15	Personnel	LC
Easting	899850.8139667105	Northing	6565706.821050039
Landform and soil		Rock	
Landform	Drainage line	Rock type/s	Granite,Quartz
Soil type	Sandy clay	Surface stone cover	
Soil colour	Brown,Orange	Surface stone size classes present	50 - 75%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Peeling bark,Rock crevices,Woody debris
Disturbance			
Introduced fauna	Goat		
Vegetation			
Upper stratum	Low (<10 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Sparse shrubland and/or heathland (0.25-20%)	
Ground stratum	Low (>0.5 m)	Isolated forbs (<0.25%)	<i>eremophila sp.</i>



Fulcrum photo ID 4b2247e7-9fed-441d-b103-59e6bf65756c,a6bfbb91-71be-4e28-992d-

HABC2LC03

Project:	4826 Coolgardie Biological Spring Survey		
Date	2021-11-15	Personnel	LC
Easting	900665.7028282916	Northing	6565871.541426335
Landform and soil		Rock	
Landform	Plain	Rock type/s	Granite,Quartz
Soil type	Sandy clay	Surface stone cover	
Soil colour	Orange,Red	Surface stone size classes present	25 - 50%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Logs > 10 cm,Peeling bark,Rock crevices,Woody debris
Disturbance	Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Low (<10 m)	Open forest (50-80%)	<i>Eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>eremophila sp.</i>
Ground stratum	Mid (0.5-1 m)	Sparse forbland (0.25-20%)	<i>eremophila sp.</i>



Fulcrum photo ID b0752528-0a49-4733-a884-d5b48bd2d627,ce6b6969-95db-4c53-bfdd-

HABC2LC04

Project:	4827 Coolgardie Biological Spring Survey		
Date	2021-11-15	Personnel	LC
Easting	900563.0312287982	Northing	6565632.278082406
Landform and soil		Rock	
Landform	Mid slope	Rock type/s	Granite,Quartz
Soil type	Clay	Surface stone cover	
Soil colour	Orange,Red	Surface stone size classes present	25 - 50%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Logs > 10 cm,Peeling bark,Rock crevices,Woody debris
Disturbance	Litter,Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Low (<10 m)	Woodland (20-50%)	<i>eremophila sp. Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>eremophila sp.</i>
Ground stratum	Low (>0.5 m)	Sparse forbland (0.25-20%)	<i>ptilotus sp.</i>



Fulcrum photo ID 2b2a12b3-b9f2-4fd2-9d5d-b72a773595d9,19860892-f6e1-4a85-843a-

HABC2LC05

Project:	4828 Coolgardie Biological Spring Survey		
Date	2021-11-15	Personnel	LC
Easting	900752.345712022	Northing	6565409.609161669
Landform and soil		Rock	
Landform	Drainage line	Rock type/s	Granite,Quartz
Soil type	Clay	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	25 - 50%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Peeling bark,Rock crevices,Woody debris
Disturbance	Erosion,Vehicle tracks		
Introduced fauna	Rabbit		
Vegetation			
Upper stratum	Mid (10-30 m)	Woodland (20-50%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>eremophila sp.</i>
Ground stratum	Low (>0.5 m)	Sparse forbland (0.25-20%)	<i>eremophila sp.</i>



Fulcrum photo ID bc023295-6531-4172-95cc-e3d96c28e365,3b64dc10-30df-4627-8e7f-

HABC2LC06

Project:	4829 Coolgardie Biological Spring Survey		
Date	2021-11-15	Personnel	LC
Easting	900415.1933355466	Northing	6565440.556371264
Landform and soil		Rock	
Landform	Plain	Rock type/s	Granite,Quartz
Soil type	Clay	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	25 - 50%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - logs,Leaf litter,Logs > 10 cm,Peeling bark,Woody debris
Disturbance	Litter,Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Low (<10 m)	Open forest (50-80%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>eremophila sp., salt bush sp. (in photos)</i>
Ground stratum	Absent		



Fulcrum photo ID 30f77ad9-d6b9-45a3-885d-56cf525debd8,a70c538c-fc2a-4dbd-be76-

C2H14

Project:	4830 Coolgardie Biological Spring Survey		
Date	2021-11-16	Personnel	SW
Easting	898138.1000480026	Northing	6564928.758600489
Landform and soil		Rock	
Landform	Mid slope	Rock type/s	Ironstone
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	50 - 75%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - logs, Leaf litter, Peeling bark, Woody debris
Disturbance	None observed		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Absent		
Mid stratum	Tall (>2 m)	Open shrubland and/or heathland (20-50%)	<i>Acacia sp</i>
Ground stratum	Absent		



Fulcrum photo ID 6eb608e3-e562-4314-b5d8-0ecf176e3906

C2H16

Project:	4831 Coolgardie Biological Spring Survey		
Date	2021-11-16	Personnel	SW
Easting	898035.707931469	Northing	6564690.336170336
Landform and soil		Rock	
Landform	Mid slope	Rock type/s	Ironstone
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	0 - 5%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - logs, Leaf litter, Peeling bark, Woody debris
Disturbance	None observed		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Woodland (20-50%)	<i>Eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>Eremophila</i>
Ground stratum	Absent		



Fulcrum photo ID 10efecf9-ff45-4474-8f07-5ef50a3af30e

C2H18

Project:	4832 Coolgardie Biological Spring Survey		
Date	2021-11-16	Personnel	SW
Easting	897721.3419470013	Northing	6564081.199149741
Landform and soil		Rock	
Landform	Upper slope	Rock type/s	Calcrete, Laterite
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	25 - 50%
Condition		Habitat Features	
Quality	Disturbed	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - logs, Leaf litter, Peeling bark, Woody debris
Disturbance			
Introduced fauna	None observed		
Vegetation			
Upper stratum	Absent		
Mid stratum	Tall (>2 m)	Open shrubland and/or heathland (20-50%)	<i>Eremophila</i>
Ground stratum	Absent		



Fulcrum photo ID 25ba9c30-9a14-438f-952a-4d1cff16da86

C2H20

Project:	4833 Coolgardie Biological Spring Survey		
Date	2021-11-16	Personnel	SW
Easting	897584.545833359	Northing	6563668.195859093
Landform and soil		Rock	
Landform	Escarpment	Rock type/s	Laterite
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	25 - 50%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - logs, Leaf litter, Peeling bark, Woody debris
Disturbance	None observed		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>Eremophila</i>
Ground stratum			



Fulcrum photo ID 2cd10b5a-17ad-4733-9cfb-f59f28c2f915

C2H22

Project:	4834 Coolgardie Biological Spring Survey		
Date	2021-11-16	Personnel	SW
Easting	897407.7797388354	Northing	6563338.106537405
Landform and soil		Rock	
Landform	Lower slope	Rock type/s	Laterite,Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	25 - 50%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - trees,Leaf litter,Peeling bark,Woody debris
Disturbance			
Introduced fauna	Rabbit		
Vegetation			
Upper stratum	Absent		
Mid stratum	Tall (>2 m)	Open shrubland and/or heathland (20-50%)	<i>Acacia sp</i>
Ground stratum	Absent		



Fulcrum photo ID 41f4047f-24e6-432f-a252-5b9c5469bfc3

C2H24

Project:	4835 Coolgardie Biological Spring Survey		
Date	2021-11-16	Personnel	SW
Easting	897534.3882230611	Northing	6563041.229803004
Landform and soil		Rock	
Landform	Mid slope	Rock type/s	Calcrete,Laterite
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	50 - 75%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - logs,Leaf litter,Peeling bark,Woody debris
Disturbance	None observed		
Introduced fauna	Rabbit		
Vegetation			
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>Atriplex sp</i>
Ground stratum	Absent		



Fulcrum photo ID 271b8409-d185-4552-a223-f5daf7b9d31a

C2H26

Project:	4836 Coolgardie Biological Spring Survey		
Date	2021-11-16	Personnel	SW
Easting	898122.0154905103	Northing	6562781.590976534
Landform and soil		Rock	
Landform	Plain	Rock type/s	Laterite,Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	0 - 5%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - logs,Leaf litter,Peeling bark,Woody debris
Disturbance	Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Woodland (20-50%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Isolated shrubs and/or heath shrubs (<0.25%)	<i>Senna sp</i>
Ground stratum			



Fulcrum photo ID 1f602d5d-5404-457f-b29f-7f84c7aaf087

C2H28

Project:	4837 Coolgardie Biological Spring Survey		
Date	2021-11-16	Personnel	SW
Easting	898839.090998794	Northing	6563393.36065102
Landform and soil		Rock	
Landform	Drainage line	Rock type/s	Laterite
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	25 - 50%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - logs,Leaf litter,Peeling bark,Woody debris
Disturbance	None observed		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Woodland (20-50%)	<i>Eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Open shrubland and/or heathland (20-50%)	<i>Eremophila</i>
Ground stratum	Absent		



Fulcrum photo ID c4b932de-0fdf-423c-ad63-8302ddd73365

C2H30

Project:	4838 Coolgardie Biological Spring Survey		
Date	2021-11-16	Personnel	SW
Easting	898737.6863762725	Northing	6563394.817201562
Landform and soil		Rock	
Landform	Drainage line	Rock type/s	Laterite,Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	25 - 50%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - logs,Leaf litter,Peeling bark,Woody debris
Disturbance	Erosion		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Open shrubland and/or heathland (20-50%)	<i>Acacia</i>
Ground stratum	Absent		



Fulcrum photo ID d16a4f03-6dd4-407a-9184-f1b3cd802bc0

HABC2LC07

Project:	4839 Coolgardie Biological Spring Survey		
Date	2021-11-16	Personnel	LC
Easting	900704.6350980257	Northing	6565575.750708525
Landform and soil		Rock	
Landform	Drainage line	Rock type/s	Granite,Quartz
Soil type	Clay	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	0 - 5%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Peeling bark,Woody debris
Disturbance	Erosion		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Low (<10 m)	Woodland (20-50%)	<i>Eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Open shrubland and/or heathland (20-50%)	<i>eremophila sp.</i>
Ground stratum	Low (>0.5 m)	Sparse forbland (0.25-20%)	<i>eremophila sp.</i>



Fulcrum photo ID 51affc75-b427-4809-8ef2-d024d562bb5f,266b71e9-b0ea-422e-8f3d-

HABC2LC08

Project:	4840 Coolgardie Biological Spring Survey		
Date	2021-11-16	Personnel	LC
Easting	900776.5532258475	Northing	6565713.262605984
Landform and soil		Rock	
Landform	Upper slope	Rock type/s	Granite
Soil type	Clay	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	25 - 50%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Peeling bark,Rock crevices,Woody debris
Disturbance	None observed		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Open shrubland and/or heathland (20-50%)	<i>eremophila sp.</i>
Ground stratum	Low (>0.5 m)	Sparse forbland (0.25-20%)	<i>ptilotus sp.</i>



Fulcrum photo ID 21c66f48-529d-461a-b6c1-d0ce4033c0f2,193ee8c1-7c0d-4271-ac0a-

HABC2LC09

Project:	4841 Coolgardie Biological Spring Survey		
Date	2021-11-16	Personnel	LC
Easting	900164.9336511727	Northing	6565653.958929246
Landform and soil		Rock	
Landform	Drainage line	Rock type/s	Granite,Quartz
Soil type	Sand	Surface stone cover	
Soil colour	Orange,White	Surface stone size classes present	5 - 25%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - logs,Hollows - trees,Leaf litter,Logs > 10 cm,Peeling bark,Woody debris
Disturbance	Erosion		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Low (<10 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Open shrubland and/or heathland (20-50%)	<i>eremophila sp.</i>
Ground stratum	Mid (0.5-1 m)	Forbland (50-80%)	<i>eremophila sp.</i>



Fulcrum photo ID 0fca10bc-0b3f-4884-a596-1bdc49f0718d,8c8bcab2-c4f1-453a-9933-

HABC2LC10

Project:	4842 Coolgardie Biological Spring Survey		
Date	2021-11-16	Personnel	LC
Easting	900449.314056684	Northing	6564956.76156202
Landform and soil		Rock	
Landform	Plain	Rock type/s	Granite,Quartz
Soil type	Clay	Surface stone cover	
Soil colour	Brown,Orange	Surface stone size classes present	5 - 25%
Condition		Habitat Features	
Quality	Disturbed	Water Source	Absent
Fire History	Unknown	Microhabitats	Peeling bark,Woody debris
Disturbance	Clearing,Erosion,Litter		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Absent		
Mid stratum	Mid (1-2 m)	Isolated shrubs and/or heath shrubs (<0.25%)	<i>eremophila sp.</i>
Ground stratum	Mid (0.5-1 m)	Forbland (50-80%)	<i>eremophila sp.</i>



Fulcrum photo ID 490f139c-c787-45ce-8b70-4790296ee53c,e21395e7-7464-42cf-bbb9-

HABC2LC11

Project:	4843 Coolgardie Biological Spring Survey		
Date	2021-11-16	Personnel	LC
Easting	901276.6564614684	Northing	6565677.347229139
Landform and soil		Rock	
Landform	Plain	Rock type/s	Granite,Quartz
Soil type	Clay	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	5 - 25%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Logs > 10 cm,Peeling bark,Woody debris
Disturbance	Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Woodland (20-50%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Isolated shrubs and/or heath shrubs (<0.25%)	<i>eremophila sp.</i>
Ground stratum	Low (>0.5 m)	Forbland (50-80%)	<i>eremophila sp.</i>



Fulcrum photo ID bbb0226c-b301-4a5f-ae00-44c3dc787f94,d6688097-4e41-4751-a79f-

HABC2LC12

Project:	4844 Coolgardie Biological Spring Survey		
Date	2021-11-16	Personnel	LC
Easting	900519.9630059553	Northing	6566882.003260277
Landform and soil		Rock	
Landform	Claypan	Rock type/s	None
Soil type	Clay	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	
Condition		Habitat Features	
Quality	Disturbed	Water Source	Present
Fire History	Unknown	Microhabitats	
Disturbance	Vehicle tracks,Weeds		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Absent		
Mid stratum	Absent		
Ground stratum	Low (>0.5 m)	Grassland (50-80%)	<i>various weeds</i>



Fulcrum photo ID 5e418349-31da-4044-8d04-a4990c1f72b0,450a84a8-a05b-4ee2-a0d1-

HABC2LC13

Project:	4845 Coolgardie Biological Spring Survey		
Date	2021-11-16	Personnel	LC
Easting	900731.210354395	Northing	6567309.737509467
Landform and soil		Rock	
Landform	Plain	Rock type/s	Granite
Soil type	Clay loam	Surface stone cover	
Soil colour	Brown,Orange	Surface stone size classes present	0 - 5%
Condition		Habitat Features	
Quality	High quality	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Logs > 10 cm,Peeling bark,Woody debris
Disturbance	None observed		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Low (<10 m)	Woodland (20-50%)	<i>eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Shrubland and/or heathland (50-80%)	<i>eremophila sp.</i>
Ground stratum	Mid (0.5-1 m)	Open forbland (20-50%)	<i>eremophila sp. amd other mixed herbs</i>



Fulcrum photo ID 570709d4-00c6-43d2-9de6-ef44159e1c8e,2c8bbe5f-630c-45f1-87bb-

HABC2LC14

Project:	4846 Coolgardie Biological Spring Survey		
Date	2021-11-16	Personnel	LC
Easting	900023.0356903123	Northing	6566601.201476825
Landform and soil		Rock	
Landform	Plain	Rock type/s	Granite,Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Brown,Orange	Surface stone size classes present	25 - 50%
Condition		Habitat Features	
Quality	Disturbed	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Logs > 10 cm,Peeling bark,Rock crevices,Woody debris
Disturbance	Clearing,Vehicle tracks,Weeds		
Introduced fauna	Goat,Rabbit		
Vegetation			
Upper stratum	Low (<10 m)	Isolated trees (<0.25%)	<i>eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Isolated shrubs and/or heath shrubs (<0.25%)	<i>acacia sp.</i>
Ground stratum	Low (>0.5 m)	Forbland (50-80%)	<i>eremophila sp.</i>



Fulcrum photo ID 2cc3ef18-e4b7-46ee-9c1d-0f4614438dc9,6c342fc0-f7f5-443d-9f15-

HABC2LC15

Project:	4847 Coolgardie Biological Spring Survey		
Date	2021-11-17	Personnel	LC
Easting	900431.2214361653	Northing	6572530.387661901
Landform and soil		Rock	
Landform	Plain	Rock type/s	Granite,Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	0 - 5%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Peeling bark,Woody debris
Disturbance	Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Low (<10 m)	Open woodland (0.25-20%)	<i>eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Open shrubland and/or heathland (20-50%)	<i>dodenea sp.</i>
Ground stratum	Low (>0.5 m)	Isolated forbs (<0.25%)	<i>ptilotus sp.</i>



Fulcrum photo ID 4199f50b-b3c4-4fd5-9f8a-3a7d7df69999,761b02e4-9a61-427a-b17e-

HABC2LC16

Project:	4848 Coolgardie Biological Spring Survey		
Date	2021-11-17	Personnel	LC
Easting	900465.6771902259	Northing	6573277.0945564695
Landform and soil		Rock	
Landform	Plain	Rock type/s	Calcrete,Granite
Soil type	Sandy loam	Surface stone cover	
Soil colour	Brown	Surface stone size classes present	0 - 5%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Logs > 10 cm,Peeling bark,Woody debris
Disturbance	Vehicle tracks		
Introduced fauna	Cattle		
Vegetation			
Upper stratum	Low (<10 m)	Open forest (50-80%)	<i>eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>eremophila sp.</i>
Ground stratum	Mid (0.5-1 m)	Sparse forbland (0.25-20%)	<i>eremophila sp. mixed herbs</i>



Fulcrum photo ID c208e2cf-2947-4ff4-b0f0-2556bb277948,c4d25400-28ff-4427-be00-

HABC2LC17

Project:	4849 Coolgardie Biological Spring Survey		
Date	2021-11-17	Personnel	LC
Easting	897973.2561752913	Northing	6573513.342421641
Landform and soil		Rock	
Landform	Upper slope	Rock type/s	Calcrete,Granite,Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	5 - 25%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Logs > 10 cm,Peeling bark,Woody debris
Disturbance	None observed		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Low (<10 m)	Open forest (50-80%)	<i>eucalyptus sp., acacia sp.</i>
Mid stratum	Low (0.5-1 m)	Shrubland and/or heathland (50-80%)	<i>dodenea sp., eremophila sp.</i>
Ground stratum	Low (>0.5 m)	Sparse forbland (0.25-20%)	<i>ptilotus sp., eremophila sp.</i>



Fulcrum photo ID 372d8949-1d3b-4870-87bd-7951b013d9e4,6cf82aac-74d5-4f6d-afb6-

HABC2LC18

Project:	4850 Coolgardie Biological Spring Survey		
Date	2021-11-17	Personnel	LC
Easting	897208.723548352	Northing	6573995.251239745
Landform and soil		Rock	
Landform	Plain	Rock type/s	Granite,Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Brown,Orange	Surface stone size classes present	5 - 25%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Logs > 10 cm,Peeling bark,Woody debris
Disturbance	Litter,Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Woodland (20-50%)	<i>eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Isolated shrubs and/or heath shrubs (<0.25%)	<i>eremophila sp.</i>
Ground stratum	Tall (1-2 m)	Forbland (50-80%)	<i>eremophila sp.</i>



Fulcrum photo ID 7081e49e-b513-4cfc-a25e-8219bc15b8f3,4be2e29b-ea2a-4adf-9a60-

HABC2LC19

Project:	4851 Coolgardie Biological Spring Survey		
Date	2021-11-17	Personnel	LC
Easting	897024.5424583412	Northing	6573400.948208064
Landform and soil		Rock	
Landform	Plain	Rock type/s	Calcrete,Ironstone,Laterite
Soil type	Sandy loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	75 - 100%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Logs > 10 cm,Peeling bark,Woody debris
Disturbance	Vehicle tracks		
Introduced fauna	Rabbit		
Vegetation			
Upper stratum	Mid (10-30 m)	Woodland (20-50%)	<i>eucalyptus sp.</i>
Mid stratum	Low (0.5-1 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>eremophila sp.</i>
Ground stratum	Low (>0.5 m)	Isolated forbs (<0.25%)	<i>herb in photos</i>



Fulcrum photo ID 4635704e-82e0-486f-bffd-6cb63a245066,db940a29-9610-40ed-a43e-

HABC2LC20

Project:	4852 Coolgardie Biological Spring Survey		
Date	2021-11-17	Personnel	LC
Easting	897207.7894486763	Northing	6573276.328611162
Landform and soil		Rock	
Landform	Plain	Rock type/s	Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	5 - 25%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - trees, Leaf litter, Logs > 10 cm, Peeling bark, Woody debris
Disturbance	Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	<i>eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>eucalyptus sp.</i>
Ground stratum	Mid (0.5-1 m)	Forbland (50-80%)	<i>eremophila sp. eremophila sp.</i>



Fulcrum photo ID b50692de-a768-4d17-bf33-bb534451e50e,1a36084b-a01d-479b-8a3d-

C2H32

Project:	4853 Coolgardie Biological Spring Survey		
Date	2021-11-17	Personnel	SW
Easting	898647.6288961614	Northing	6563412.670039611
Landform and soil		Rock	
Landform	Escarpment	Rock type/s	Granite, Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	50 - 75%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - logs, Leaf litter, Logs > 10 cm, Peeling bark, Woody debris
Disturbance	None observed		
Introduced fauna	Rabbit		
Vegetation			
Upper stratum	Low (<10 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Open shrubland and/or heathland (20-50%)	<i>Acacia sp</i>
Ground stratum	Absent		



Fulcrum photo ID 6fed3548-6854-44ad-ace1-79cee900d9bb

C2H34

Project:	4854 Coolgardie Biological Spring Survey		
Date	2021-11-17	Personnel	SW
Easting	898574.3445931688	Northing	6563567.903756286
Landform and soil		Rock	
Landform	Lower slope	Rock type/s	Laterite
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	50 - 75%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - logs, Leaf litter, Peeling bark, Woody debris
Disturbance			
Introduced fauna	None observed		
Vegetation			
Upper stratum	Absent		
Mid stratum	Tall (>2 m)	Open shrubland and/or heathland (20-50%)	<i>Acacia</i>
Ground stratum	Absent		



Fulcrum photo ID 5cebab13-aadb-470a-b104-5994b272e88d

C2H36

Project:	4855 Coolgardie Biological Spring Survey		
Date	2021-11-17	Personnel	SW
Easting	898440.2002370819	Northing	6572518.477781318
Landform and soil		Rock	
Landform	Upper slope	Rock type/s	Granite, Laterite
Soil type	Loam	Surface stone cover	
Soil colour	Brown, Orange	Surface stone size classes present	5 - 25%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - logs, Leaf litter, Peeling bark, Woody debris
Disturbance	None observed		
Introduced fauna	Rabbit		
Vegetation			
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>Eremophila</i>
Ground stratum	Absent		



Fulcrum photo ID 3ee1eb2e-e0e3-4e77-9780-bb40cd650728

C2H38

Project:	4856 Coolgardie Biological Spring Survey		
Date	2021-11-17	Personnel	SW
Easting	898296.4071683842	Northing	6572123.600769359
Landform and soil		Rock	
Landform	Mid slope	Rock type/s	Granite,Laterite,Quartz
Soil type	Loam	Surface stone cover	
Soil colour	Orange,Red	Surface stone size classes present	50 - 75%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - logs,Leaf litter,Logs > 10 cm,Peeling bark,Woody debris
Disturbance			
Introduced fauna	Rabbit		
Vegetation			
Upper stratum	Absent		
Mid stratum	Tall (>2 m)	Open shrubland and/or heathland (20-50%)	Acacia
Ground stratum	Absent		



Fulcrum photo ID b933e67c-48b0-421d-8100-6518118a4171

C2H40

Project:	4857 Coolgardie Biological Spring Survey		
Date	2021-11-17	Personnel	SW
Easting	897937.4325779848	Northing	6572315.898469241
Landform and soil		Rock	
Landform	Mid slope	Rock type/s	Laterite,Quartz
Soil type	Loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	50 - 75%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - logs,Leaf litter,Logs > 10 cm,Peeling bark,Woody debris
Disturbance	Vehicle tracks		
Introduced fauna	Rabbit		
Vegetation			
Upper stratum	Absent		
Mid stratum	Tall (>2 m)	Open shrubland and/or heathland (20-50%)	Acacia
Ground stratum	Absent		



Fulcrum photo ID 219563fd-c9bd-4cd0-8160-634649c52222

C2H42

Project:	4858 Coolgardie Biological Spring Survey		
Date	2021-11-17	Personnel	SW
Easting	897160.8402197923	Northing	6571960.858564717
Landform and soil		Rock	
Landform	Lower slope	Rock type/s	Ironstone, Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	75 - 100%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter, Woody debris
Disturbance	Vehicle tracks		
Introduced fauna	Rabbit		
Vegetation			
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>Eremophila</i>
Ground stratum	Absent		



Fulcrum photo ID e4db22e5-83d5-4438-9c84-680175928daf

C2H46

Project:	4859 Coolgardie Biological Spring Survey		
Date	2021-11-17	Personnel	SW
Easting	897842.0485219336	Northing	6571592.065394482
Landform and soil		Rock	
Landform	Undulating plain	Rock type/s	Ironstone, Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	25 - 50%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - logs, Leaf litter, Peeling bark, Woody debris
Disturbance	None observed		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Open shrubland and/or heathland (20-50%)	<i>Eremophila</i> and <i>Atriplex</i>
Ground stratum	Absent		



Fulcrum photo ID d8c7d48f-634c-4c46-a402-4949c69c1196

C2H48

Project:	4860 Coolgardie Biological Spring Survey		
Date	2021-11-17	Personnel	SW
Easting	897986.3585784157	Northing	6572856.793533593
Landform and soil		Rock	
Landform	Upper slope	Rock type/s	Granite, Ironstone, Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	50 - 75%
Condition		Habitat Features	
Quality	Disturbed	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - logs, Leaf litter, Peeling bark, Woody debris
Disturbance			
Introduced fauna			
Vegetation			
Upper stratum	Low (<10 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Open shrubland and/or heathland (20-50%)	<i>Acacia, eremophila, senna</i>
Ground stratum	Absent		



Fulcrum photo ID 77fa71fc-2061-4776-b46f-5533c5547e69

C2H50

Project:	4861 Coolgardie Biological Spring Survey		
Date	2021-11-18	Personnel	SW
Easting	899410.3384907652	Northing	6573733.02122001
Landform and soil		Rock	
Landform	Plain	Rock type/s	Laterite
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	0 - 5%
Condition		Habitat Features	
Quality	Disturbed	Water Source	Absent
Fire History	Unknown	Microhabitats	Woody debris
Disturbance	Vehicle tracks		
Introduced fauna	Rabbit		
Vegetation			
Upper stratum	Absent		
Mid stratum	Tall (>2 m)	Open shrubland and/or heathland (20-50%)	<i>Allocasuarina, Acacia</i>
Ground stratum	Absent		



Fulcrum photo ID fc56790e-0b7a-4af8-83ad-43361892dc2a

C2H52

Project:	4862 Coolgardie Biological Spring Survey		
Date	2021-11-18	Personnel	SW
Easting	899024.133330778	Northing	6573326.9469294455
Landform and soil		Rock	
Landform	Claypan	Rock type/s	Laterite,Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	5 - 25%
Condition		Habitat Features	
Quality	Disturbed	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Logs > 10 cm,Woody debris
Disturbance	Vehicle tracks		
Introduced fauna	Cattle,Rabbit		
Vegetation			
Upper stratum	Absent		
Mid stratum	Mid (1-2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>Eremophila</i>
Ground stratum	Low (>0.5 m)	Sparse forbland (0.25-20%)	<i>Weed</i>



Fulcrum photo ID 3932ba5f-4aea-4948-89e6-ec5c8ba929e9

C2H54

Project:	4863 Coolgardie Biological Spring Survey		
Date	2021-11-18	Personnel	SW
Easting	898558.6120445768	Northing	6577434.127282435
Landform and soil		Rock	
Landform	Undulating plain	Rock type/s	Ironstone,Laterite,Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	25 - 50%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Hollows - logs,Leaf litter,Logs > 10 cm,Peeling bark,Woody debris
Disturbance	None observed		
Introduced fauna	Rabbit		
Vegetation			
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Open shrubland and/or heathland (20-50%)	<i>Eremophila</i>
Ground stratum	Absent		



Fulcrum photo ID 90af6e6b-2828-4926-bd8c-7ce23e0bbedf

C3H2

Project:	4864 Coolgardie Biological Spring Survey		
Date	2021-11-18	Personnel	SW
Easting	901330.4863598039	Northing	6566876.698387651
Landform and soil		Rock	
Landform	Upper slope	Rock type/s	Granite,Laterite
Soil type	Clay loam	Surface stone cover	
Soil colour	Brown	Surface stone size classes present	50 - 75%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Logs > 10 cm,Peeling bark,Woody debris
Disturbance	Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Woodland (20-50%)	<i>Eucalyptus sp.</i>
Mid stratum	Low (0.5-1 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>Senna sp</i>
Ground stratum	Absent		



Fulcrum photo ID 9639322a-c25b-452c-9395-2d845a0db67d

C3H6

Project:	4865 Coolgardie Biological Spring Survey		
Date	2021-11-18	Personnel	SW
Easting	901099.8592427254	Northing	6567133.638773368
Landform and soil		Rock	
Landform	Mid slope	Rock type/s	Granite,Laterite,Quartz
Soil type	Clay	Surface stone cover	
Soil colour	Brown	Surface stone size classes present	25 - 50%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Logs > 10 cm,Peeling bark,Woody debris
Disturbance	None observed		
Introduced fauna	Cattle		
Vegetation			
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>Eremophila</i>
Ground stratum	Absent		



Fulcrum photo ID 8c9b4a09-e53a-4d9d-8d80-11e634b91457

HABC2LC21

Project:	4866 Coolgardie Biological Spring Survey		
Date	2021-11-18	Personnel	LC
Easting	897544.5825756477	Northing	6572777.829306185
Landform and soil		Rock	
Landform	Plain	Rock type/s	Granite,Ironstone,Quartz
Soil type	Clay	Surface stone cover	
Soil colour	Brown,Orange	Surface stone size classes present	5 - 25%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Logs > 10 cm,Peeling bark,Woody debris
Disturbance	Litter,Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>eremophila sp</i>
Ground stratum	Low (>0.5 m)	Sparse forbland (0.25-20%)	<i>eremophila sp</i>



Fulcrum photo ID 0f0d98ec-ac0a-44f0-8ad5-c4fc373482ad,537a883e-d403-430b-8f06-

HABC2LC22

Project:	4867 Coolgardie Biological Spring Survey		
Date	2021-11-18	Personnel	LC
Easting	897656.784997021	Northing	6572883.799383562
Landform and soil		Rock	
Landform	Mid slope	Rock type/s	Calcrete,Granite,Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Brown,Orange	Surface stone size classes present	25 - 50%
Condition		Habitat Features	
Quality	Highly degraded	Water Source	Absent
Fire History	Unknown	Microhabitats	Rock crevices,Woody debris
Disturbance	Clearing,Erosion,Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Absent		
Mid stratum	Mid (1-2 m)	Isolated shrubs and/or heath shrubs (<0.25%)	<i>eucalyptus sp.</i>
Ground stratum	Low (>0.5 m)	Sparse forbland (0.25-20%)	<i>eremophila sp.</i>



Fulcrum photo ID 0cc91ff4-82c9-4e1a-8a1d-4d2ee6573b54,5ea1acb4-732a-4029-ace5-

HABC2LC23

Project:	4868 Coolgardie Biological Spring Survey		
Date	2021-11-18	Personnel	LC
Easting	897726.5517688439	Northing	6573587.154734112
Landform and soil		Rock	
Landform	Plain	Rock type/s	Granite,Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	0 - 5%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Woody debris
Disturbance	Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Absent		
Mid stratum	Mid (1-2 m)	Open shrubland and/or heathland (20-50%)	<i>eremophila sp.</i>
Ground stratum	Low (>0.5 m)	Open hummock grassland (20-50%)	<i>eremophila sp.</i>



Fulcrum photo ID af1106ec-72c2-4078-a6cf-65fdc8ed54e0,772849ce-8e9f-4ea7-8aff-

HABC2LC24

Project:	4869 Coolgardie Biological Spring Survey		
Date	2021-11-18	Personnel	LC
Easting	897731.7215430276	Northing	6578600.152287805
Landform and soil		Rock	
Landform	Plain	Rock type/s	Calcrete,Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Brown,Orange	Surface stone size classes present	0 - 5%
Condition		Habitat Features	
Quality	Disturbed	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Peeling bark,Woody debris
Disturbance	Litter,Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Low (<10 m)	Isolated trees (<0.25%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>eremophila sp.</i>
Ground stratum	Low (>0.5 m)	Sparse forbland (0.25-20%)	<i>eremophila sp.</i>



Fulcrum photo ID 7264e4af-f5e3-4399-a7c3-718a30cf91f9,043ac726-f8bb-4b81-9e64-

HABC3LC01

Project:	4870 Coolgardie Biological Spring Survey		
Date	2021-11-18	Personnel	LC
Easting	901535.8496579034	Northing	6568495.428023138
Landform and soil		Rock	
Landform	Plain	Rock type/s	Granite,Ironstone,Quartz
Soil type	Clay loam	Surface stone cover	
Soil colour	Brown,Orange	Surface stone size classes present	0 - 5%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Logs > 10 cm,Peeling bark,Woody debris
Disturbance	Vehicle tracks,Weeds		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Low (<10 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Shrubland and/or heathland (50-80%)	<i>eremophila sp.</i>
Ground stratum	Mid (0.5-1 m)	Forbland (50-80%)	<i>eremophila sp.</i>



Fulcrum photo ID 8e57e003-8ef0-4049-8a3d-f7be3316a26a,985a366e-c098-4cbd-9c83-

HABC3LC02

Project:	4871 Coolgardie Biological Spring Survey		
Date	2021-11-18	Personnel	LC
Easting	901385.6159884571	Northing	6567944.72848946
Landform and soil		Rock	
Landform	Plain	Rock type/s	Calcrete,Granite,Ironstone
Soil type	Sandy loam	Surface stone cover	
Soil colour	Brown,Orange	Surface stone size classes present	5 - 25%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Logs > 10 cm,Peeling bark,Woody debris
Disturbance	Litter,Vehicle tracks		
Introduced fauna	Cattle		
Vegetation			
Upper stratum	Low (<10 m)	Woodland (20-50%)	<i>Eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>eremophila sp., sandlewood</i>
Ground stratum	Low (>0.5 m)	Sparse forbland (0.25-20%)	<i>eremophila sp. and mixed herbs</i>



Fulcrum photo ID 0456611e-322d-43f0-961a-92e3214f4ff6,b383b714-6500-46fb-b290-

HABC3LC03

Project:	4872 Coolgardie Biological Spring Survey		
Date	2021-11-18	Personnel	LC
Easting	901116.1473216031	Northing	6567716.167221133
Landform and soil		Rock	
Landform	Undulating plain	Rock type/s	Calcrete,Granite
Soil type	Sandy loam	Surface stone cover	
Soil colour	Brown,Orange,Red	Surface stone size classes present	50 - 75%
Condition		Habitat Features	
Quality	Good	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Logs > 10 cm,Peeling bark,Woody debris
Disturbance	Litter,Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Low (<10 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Mid (1-2 m)	Sparse shrubland and/or heathland (0.25-20%)	<i>dodenea sp., mixed shrubs</i>
Ground stratum	Low (>0.5 m)	Sparse forbland (0.25-20%)	<i>mixed herbs</i>



Fulcrum photo ID a233588d-1aef-4741-8ae9-5b0d1c66fa0a,42b4783a-a56b-40d7-8240-

HABC3LC04

Project:	4873 Coolgardie Biological Spring Survey		
Date	2021-11-18	Personnel	LC
Easting	900730.2686670613	Northing	6567991.079386459
Landform and soil		Rock	
Landform	Plain	Rock type/s	Calcrete,Granite
Soil type	Sandy loam	Surface stone cover	
Soil colour	Orange	Surface stone size classes present	25 - 50%
Condition		Habitat Features	
Quality	Very good	Water Source	Absent
Fire History	Unknown	Microhabitats	Leaf litter,Logs > 10 cm,Peeling bark,Woody debris
Disturbance	Vehicle tracks		
Introduced fauna	None observed		
Vegetation			
Upper stratum	Low (<10 m)	Open woodland (0.25-20%)	<i>Eucalyptus sp.</i>
Mid stratum	Tall (>2 m)	Open shrubland and/or heathland (20-50%)	<i>eremophila sp.</i>
Ground stratum	Mid (0.5-1 m)	Sparse forbland (0.25-20%)	<i>eremophila sp., mixed herbs</i>



Fulcrum photo ID 20c229a2-37df-4ff5-9e14-6fa99181557f,a6d138ee-2032-4f92-93bc-

Appendix G

Fauna Inventory

Conservation Status: State - Listed under Biodiversity Conservation Act 2016 or Department of Biodiversity, Conservation and Attractions Conservation, Federal - Listed under Environmental Protection and Biodiversity Conservation Act 1999. VU - Vulnerable, MA - Marine. * - Introduced species.

Family	Scientific Name	Common Name	Conservation Status		Method						
			State	Federal	Sighting	Call	Remains	Scat	Tracks	Burrow	Digging
Aves											
Acanthizidae	<i>Smicrorhis brevirostris</i>	Weebill				2					
	<i>Acanthiza inornata</i>	Western Thornbill				2					
	<i>Aphelocephala leucopsis</i>	Southern Whiteface				1					
	<i>Calamanthus cautus</i>	Shy Groundwren (Shy Heathwren)				1					
	<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill				2	1				
	<i>Sericornis frontalis</i>					1					
Artamidae	<i>Artamus personatus</i>	Masked Woodswallow				2					
Cacatuidae	<i>Cacatua roseicapilla</i>	Galah				1					
	<i>Cacatua leadbeateri</i>	Major Mitchell's Cockatoo				1					
Campephagidae	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike		MA		2		1			
	<i>Coracina maxima</i>	Ground Cuckoo-shrike				1					
	<i>Lalage tricolor</i>	White-winged Triller				1					
Climacteridae	<i>Climacteris rufus</i>	Rufous Treecreeper				1					
Columbidae	<i>Phaps chalcoptera</i>	Common Bronzewing				1					
	<i>Ocyphaps lophotes</i>	Crested Pigeon				3					
Corvidae	<i>Corvus bennetti</i>	Little Crow				5					
	<i>Corvus orru ceciliae</i>	Western Crow				1					
	<i>Corvus coronoides</i>	Australian Raven				2					
Cracticidae	<i>Strepera versicolor</i>	Grey Currawong				4	2				
Dromaiidae	<i>Dromaius novaehollandiae</i>	Emu						1	2		
Estrildidae	<i>Taeniopygia guttata</i>	Zebra Finch				2					
Falconidae	<i>Falco cenchroides</i>	Australian Kestrel (Nankeen Kestrel)		MA		3					
Maluridae	<i>Malurus splendens</i>	Splendid Fairywren				1					
Meliphagidae	<i>Anthochaera carunculata</i>	Red Wattlebird				1	3				
	<i>Lichmera indistincta</i>	Brown Honeyeater				1					
	<i>Gavicalis virescens</i>	Singing Honeyeater				13	2				

Family	Scientific Name	Common Name	Conservation Status		Method							
			State	Federal	Sighting	Call	Remains	Scat	Tracks	Burrow	Digging	
	<i>Manorina flavigula</i>	Yellow-throated Miner				4						
	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater				7						
	<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater					1					
	<i>Gliciphila melanops</i>	Tawny-crowned Honeyeater				2	1					
Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater		MA		1						
Monarchidae	<i>Grallina cyanoleuca</i>	Magpie-lark		MA		2						
Motacillidae	<i>Anthus australis</i>	Australian Pipit				4						
Oreoicidae	<i>Oreoica gutturalis</i>	Crested Bellbird				1	11					
Otididae	<i>Ardeotis australis</i>	Australian Bustard								1		
Pachycephalidae	<i>Pachycephala rufiventris</i>	Rufous Whistler				5	8					
	<i>Pachycephala occidentalis</i>	Western Golden Whistler (Western Whistler)				6						
Petroicidae	<i>Microeca fascinans</i>	Jacky Winter				1	1					
Psittacidae	<i>Melopsittacus undulatus</i>	Budgerigar				23						
	<i>Platycercus zonarius</i>	Australian Ringneck				17	2					
Psophodidae	<i>Cinlosoma clarum</i>	Western Chestnut Quail-thrush (Copperback Quail-thrush)				2						
Rhipiduridae	<i>Rhipidura leucophrys</i>	Willie Wagtail				2						
Mammalia												
Bovidae	<i>*Capra hircus</i>	Goat							8	1		
	<i>*Bos taurus</i>	European Cattle							9	7		
Canidae	<i>*Canis familiaris familiaris</i>	Dog							2			
	<i>*Vulpes vulpes</i>	Red Fox							1			
Dasyuridae	<i>Dasyurus geoffroii fortis</i>	Western Quoll, Chuditch	VU	VU					1			
Equidae	<i>*Equus caballus</i>	Horse							1			
Felidae	<i>*Felis catus</i>	Cat							1			
Leporidae	<i>*Oryctolagus cuniculus</i>	Rabbit				1		3	18		1	2
Macropodidae	<i>Macropus fuliginosus melanops</i>	Western Grey Kangaroo				1			39	2		
	<i>Osphranter rufus</i>	Red Kangaroo, Marlu				2						
Reptilia												
Agamidae	<i>Ctenophorus maculatus</i>					2						

Family	Scientific Name	Common Name	Conservation Status		Method							
			State	Federal	Sighting	Call	Remains	Scat	Tracks	Burrow	Digging	
	<i>Ctenophorus cristatus</i>	Bicycle Dragon			6							
	<i>Tympanocryptis pseudopsephos</i>	Goldfields pebble-mimic dragons			2							
	<i>Ctenophorus ornatus</i>	Ornate Crevice Dragon			1							
Diplodactylidae	<i>Crenadactylus ocellatus</i>	South-western Clawless Gecko			3							
Gekkonidae	<i>Heteronotia binoei</i>	Bynoe's Gecko			8							
	<i>Gehyra variegata</i>	Variegated gehyra			2							
Scincidae	<i>Tiliqua rugosa</i>	Bobtail			8		2					
Varanidae	<i>Varanus gouldii</i>	Bungarra or Sand Goanna			1							

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Bonnievale Level 1 Fauna Assessment



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EXECUTIVE SUMMARY

Focus Minerals Limited (Focus) proposes to develop the Bonnievale Project, located 10km north of Coolgardie, in the Goldfields region of Western Australia. As part of the Environmental Impact Assessment for the project, Kingfisher Environmental Consulting was commissioned by Terratree Pty Ltd on behalf of Focus to undertake a Level 1 fauna assessment of the proposed development area (termed project area).

The fauna assessment comprised a desktop review and reconnaissance (field) survey which was conducted during April 2017 over the Bonnievale Project area and its immediate surrounds. The field survey sampled all major fauna habitats present and included target searches for significant fauna, bird census, the use of motion sensitive cameras and acoustic bat recorders.

The desktop review identified 290 fauna species potentially occurring within the project area, of which 62 fauna species were recorded during the field survey (five reptiles, 47 birds, seven native mammals and three introduced mammals). Four species of conservation significance were recorded during the survey: the Malleefowl (one bird observed outside the project area) and three locally significant bird species. The sighting of the Malleefowl was of interest and therefore searches were undertaken to determine the extent of breeding habitat within and directly adjacent to the project area, as the species can forage widely. Seven old, inactive mounds (breeding sites) were recorded outside the project area and one ancient, inactive mound was recorded within the project area.

The Bonnievale project area is predominantly comprised of Eucalypt Woodland on loam flats, with the lower stony slopes of Emu Hill occurring on its southern margins. Most of the area is unsuitable for the Malleefowl to breed within and no other species of high conservation significance were recorded. Potential impacts associated with the project to the federally listed Malleefowl are not expected to be significant under the EPBC Significant Impact criteria.

Management strategies to reduce potential impacts of the development include:

-) Avoid disturbance to Malleefowl mounds;
-) Report any sightings of Malleefowl.
-) Avoid disturbance to the dense shrublands within the gullies associated with Emu Hill;
-) Avoid disturbance to large mature, hollow bearing Eucalypt trees;
-) Limit disturbance footprint to minimise the cumulative clearing of the regionally significant Great Western Woodlands.

If additional areas are proposed to be developed then impacts to the local Malleefowl populations may require consideration.

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1. INTRODUCTION

1.1 Project Background

Focus Minerals Limited (Focus) proposes to develop the Bonnievale Project located 10km north of Coolgardie, in the Goldfields region of Western Australia. The Bonnievale Project lies adjacent to the historic Bonnievale townsite and includes disturbed areas associated with historical mining activities.

Kingfisher Environmental Consulting (Kingfisher) was commissioned by Terratree Pty Ltd on behalf of Focus to conduct a Level 1 Fauna Survey of the Bonnievale Project Area. A Level 1 Fauna Assessment is required to identify the fauna values of a site so that impacts upon these from any proposed development can be assessed and, where possible, minimised.

1.2 Fauna Assessment Objectives

Where a project is likely to affect biodiversity, the information gathered for Environmental Impact Assessment (EIA) via desktop studies and fauna surveys should enable the impacts of the proposal and their environmental significance to be determined to an acceptable level. Fauna assessments should provide a sufficient level of detail so that proposals that receive environmental approval by government agencies, meet state, national and international legislative requirements (EPA, 2002). The requirements of fauna surveys and desktop studies associated with EIA are detailed in Environmental Protection Agency (EPA) documents including Guidance Statement 56 (EPA, 2004), Position Statement No. 3 (EPA, 2002), and Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA, 2010). The key objectives of fauna studies are to:

1. Conduct a review of background information (a search of all sources for literature, data and map-based information);
2. Compile an inventory of vertebrate fauna expected to occur within the site in light of fauna habitats present;
3. Identify significant fauna species occurring or likely to utilise habitat within the project area;
4. Document the characteristics of the fauna assemblage of the site including significance at an international, national, state, regional and local level;
5. Delineate key fauna values present in the area and potential sensitivity to impacts;
6. Identify significant or fragile fauna habitats within the project area; and
7. Identify potential impacts to fauna and propose recommendations to minimise impacts.

The Bonnievale Level 1 Fauna Assessment therefore included a “Desktop Survey”, field “Reconnaissance Survey” and a detailed report (this report) discussing the survey results.

1.3 Survey Area

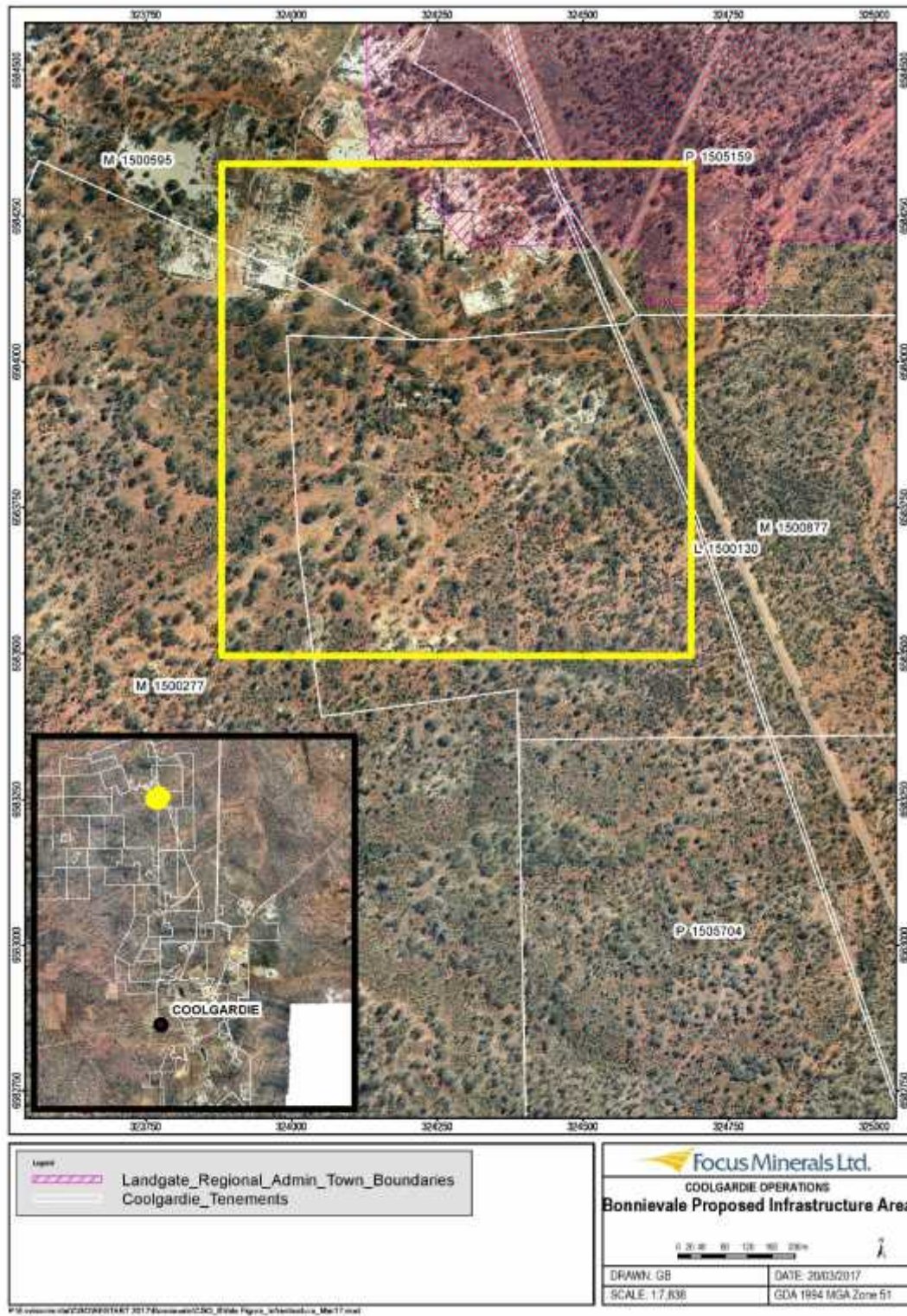
The area covered by the fauna assessment (the “survey area”) corresponds to the Bonnievale Project Area and its immediate surrounds (see Figure 1). It is situated adjacent to the historic Bonnievale townsite and so supports intact native vegetation (dominated by Salmon Gum woodland) however there has been some localised historical mining disturbance.

1.4 Scoping Requirements

This document has been developed in consideration of the following:

1. EPA Position Statement No 3, Terrestrial Biological Surveys as an element of Biodiversity Protection (EPA, 2002);
2. EPA Guidance Statement No 56, Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia (EPA, 2004); and
3. EPA Technical guide - Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA, 2010).

Figure 1. The Bonnievale Project location – note the project area is shown in yellow.



2. BACKGROUND

2.1 Regional Description

The Interim Biogeographic Regionalisation of Australia (IBRA) has identified 26 bioregions in Western Australia (Figure 2). Bioregions are classified on the basis of climate, geology, landforms, vegetation and fauna (Thackway and Cresswell, 1995). IBRA Bioregions are affected by a range of different threatening processes and have varying levels of sensitivity to impact (EPA, 2004).

Coolgardie Bioregion

The project is located within the Coolgardie Bioregion and the Eastern Goldfields Subregion (Coolgardie 3, IBRA, 2008). The Coolgardie Bioregion falls within the Bioregion Group 2 classification (EPA, 2004). Bioregions within Group 2 have “native vegetation that is largely contiguous but is used for commercial grazing.”

Cowan (2001) describes the Eastern Goldfields subregion as:

“The vegetation is of Mallees, Acacia thickets and shrub heaths on sandplains. Diverse Eucalyptus woodlands occur around salt lakes, on ranges, and in valleys. Salt lakes support dwarf shrublands of samphire. The area is rich in endemic Acacias. The climate is Arid to Semi-arid with 200-300 mm of rainfall, sometimes in summer but usually in winter. The subregional area is 5,102,428ha.”

The dominant land use in this subregion is grazing, with smaller areas of crown reserves, mining, freehold, and conservation. Only 4.35 % of the sub-region is vested within conservation reserves (Cowan, 2001). Cowan (2001) describes the Goldfields Woodlands as having an exceptionally high diversity of Eucalyptus species with as many as 170 species occurring in the bioregion.

McKenzie *et al.* (2003) identifies several significant species occurring within the Eastern Goldfields Subregion, including:

-) Malleefowl (*Leipoa ocellata*);
-) Carpet Python (*Morelia spilota*);
-) Slender-billed Thornbill (*Acanthiza iredalei iredalei*);
-) Chuditch (*Dasyurus geoffroii*);
-) Peregrine Falcon (*Falco peregrinus*); and
-) Major Mitchell Cockatoo (*Cacatua leadbeateri*).

Bonnievale lies within the Great Western Woodlands, one of the very few, large, intact landscapes remaining in temperate Australia and is of global significance. Beard (1972) describes the vegetation of the region to include:

- ▯ Greenstone Ridges supporting a characteristic *Eucalyptus torquata* – *E. le souefii* association. Both *E. torquata* and *E. le souefii* are co-dominant, abundant and characteristic. Associated trees include *E. clelandii*, *E. campaspe*, *Casuarina pauper* and *Grevillea nematophylla*. There is an open shrub understorey, largely of *Eremophila* spp. (“Broombush”), *Dodonia*

lobulata, *Senna cardiosperma* and *Acacia species*, interspersed with *Atriplex nummularia*. Two understorey types, “broombush” and “saltbush”, occur on slopes, with broombush appearing on less alkaline soils;

- ▯ Eucalypt Woodlands of the lower slopes and flats consist typically of *Eucalyptus salmonophloia*, often with *E. salubris*, *E. torquata* and *E. longicornis*. *Melaleuca pauperiflora* (boree) occurs as a dominant understorey on heavy, periodically wet soils;
- ▯ Salt lakes and samphire flats. Distinct localised vegetation communities occur in saline or alkaline soils and fringed with open saltbush or bluebush, lightly wooded with *Casuarina pauper*, *Myoporum platycarpum* and some *Acacia species*; and
- ▯ Red sand dunes with scattered *Callitris columellaris*, *Pittosporum angustifolium*, *Acacia tetragonophylla*, *Eremophila miniata* and shrubs of *Grevillea sarissa* and *Acacia species* (Beard, 1972).

2.2 Previous Studies

Previous biological studies conducted in a local and regional context can serve to inform and direct desktop assessments and field surveys. Kingfisher has conducted several fauna assessments in the region, which provide useful background information relevant to the survey area. The local distribution of conservation significant fauna and their associated habitat types are of particular relevance.

The author (J. Turpin) has conducted several fauna assessments in the Coolgardie – Kalgoorlie area, including at Gunga West (7km south-west of Bonnievale); Shirl (13km south-east of Bonnievale); Mt Marion (34km south-east of Bonnievale); South Kalgoorlie (30km east of Bonnievale); Mount Martin (50km south-east of Bonnievale); Bulong (57km east of Bonnievale); Bardoc (58km north-east of Bonnievale) and Red Hill, Kambalda (60km south-east of Bonnievale). Table 1 lists previous reports utilized during the desktop and field assessments. The results of these surveys are included in the desktop assessment and are detailed in Appendix 2.

Table 1: Relevant local and regional fauna surveys

Title	Comments	Year
Gunga West Fauna Survey	Level 1 fauna survey 7km south-west of Bonnievale	2016
Kambalda Fauna Survey	Level 1 survey 60km south-east of Bonnievale	2015
Bulong (Cannon) Fauna Assessment	Level 1 Survey 57km east of Bonnievale at Bulong	2015
Mount Marion Fauna Assessments	Two fauna surveys conducted by J Turpin 34km south-east of Bonnievale	2015 / 2012
Fauna Assessment at South Bardoc	Level 1 Survey 45km south-east of Bonnievale at Bardoc	2012
Fauna Assessment at Italian Gully (Shirl)	Level 1 Survey 13km south-east of Bonnievale	2012
Fauna Assessment of the South Kalgoorlie Powerline	Level 1 Survey 30km south-east of Bonnievale	2012
Fauna Assessment of at South Kalgoorlie	Level 1 Survey 45km south-east of Bonnievale	2012
Fauna Assessment at Mount Martin	Level 1 Survey 50km south-east of Bonnievale	2012

2.3 Conservation Significance

Biodiversity in Western Australia is protected, managed and assessed under international, national and state agreements, legislation and policy. For Environmental Impact Assessment, the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *Western Australian Wildlife Conservation Act 1950* (WC Act) are of particular relevance to Western Australian fauna.

EPBC Act

At the national level, fauna is protected under the EPBC Act. Schedule 1 of the Commonwealth EPBC Act contains a list of species that are considered Critically Endangered (CE), Endangered (E), Vulnerable (V), Extinct (Ex), Extinct in the wild (ExW) and Conservation Dependent (CD). These categories are described in Appendix 1. The significance levels for fauna used in the EPBC Act are those recommended by the International Union for the Conservation of Nature and Natural Resources (IUCN) and reviewed by Mace and Stuart (1994).

Under the provisions of the Commonwealth EPBC Act proposed actions which have the potential to have a significant impact on a matter of national environmental significance must be referred to the Commonwealth Minister for the Environment for a decision as to whether an assessment is required under the provisions of that Act (EPA, 2004).

The EPBC Act also has lists of migratory species that are recognised under international treaties such as the China Australia Migratory Bird Agreement (CAMBA), the Japan Australia Migratory Bird Agreement (JAMBA) and the Bonn Convention (The Convention on the Conservation of Migratory Species of Wild Animals).

Wildlife Conservation Act

At the state level, significant fauna is listed under the *Western Australian Wildlife Conservation Act 1950: Wildlife Conservation (Specially Protected Fauna) Notice 2016*. There are seven levels of conservation significance provided for fauna. Scheduled species are prioritised and listed as:

-) Schedule 1 (S1): Fauna that is rare or likely to become extinct – Critically Endangered;
-) Schedule 2 (S2): Fauna that is rare or likely to become extinct – Endangered;
-) Schedule 3 (S3): Fauna that is rare or likely to become extinct – Vulnerable;
-) Schedule 4 (S4): Fauna that is rare or likely to become extinct – Extinct;
-) Schedule 5 (S5): Birds subject to international agreements – the protection of migratory species;
-) Schedule 6 (S6): Fauna that are of special conservation need - species dependent on ongoing conservation;
-) Schedule 7 (S7): Fauna that is in need of special protection.

The WC Act uses a set of schedules but also classifies species using some of the IUCN categories. These categories and Schedules are described in Appendix 1.

Priority Fauna

In Western Australia, the Department of Parks and Wildlife (DPaW) has produced a supplementary list of Priority Fauna for species that do not meet the criteria for listing as threatened under Schedule 1 (of the WC Act). These species however are often poorly known and/or of conservation dependence. Some Priority species, however, are also assigned to the IUCN Conservation Dependant Category. Levels of Priority are described in Appendix 1 (Priority 1 – 4).

Conservation Significant Fauna

Fauna species included under conservation acts and/or agreements are formally recognised as of conservation significance under state or federal legislation. Species listed as Priority by DPaW, or that are included in biodiversity publications (such as the Action Plan for Australian Birds 2010), are also of recognised conservation significance. In addition, species that are at the limit of their distribution, those that have a very restricted range and those that occur in breeding colonies, such as some waterbirds, can be considered of conservation significance, although this level of significance has no legislative or published recognition and is based on interpretation of distribution information.

Locally significant fauna are species not listed under Acts or in publications, but considered of at least local significance because of their pattern of distribution. This level may have links to preserving biodiversity at the genetic level (EPA, 2002). For example, if a population is isolated but a subset of a widespread (common) species, then it may not be recognised as threatened, but may have unique genetic characteristics. Species on the edge of their range, or that are sensitive to impacts such as habitat fragmentation, may also be classed as locally significant.

3. SURVEY METHODS

3.1 Approach

The level of fauna assessment required by the EPA is determined by the size and location of the proposed disturbance and the sensitivity of the surrounding environment in which the disturbance is planned. Due to the size and location of the proposed project, a Level 1 Fauna Assessment was sufficient to satisfy the EPA guidelines (EPA, 2004).

A Level 1 Fauna Assessment consists of a desktop study and reconnaissance survey. The EPA (2004) describes a Level 1 Assessment as “research to gather background information on the target area (usually at the locality scale). This involves a search of all sources for literature, data and map-based information”. The purpose of a reconnaissance survey is to verify the accuracy of the background study to further delineate and characterise the fauna and faunal assemblages present in the target area and to identify potential impacts. This involves a “target area visit by suitably qualified personnel to undertake selective, low intensity sampling of the fauna and faunal assemblages, and to provide habitat descriptions and habitat maps of the project area” (EPA, 2004).

Kingfisher has conducted numerous fauna surveys within the vicinity of project area (see Section 2.2) and holds an extensive fauna database for the area. These provided the background information on which the desktop study was based. This fauna assessment was conducted with reference to guidance and position statements published by the WA Environmental Protection Authority (EPA) on fauna surveys and environmental protection, and commonwealth biodiversity legislation (e.g. EPA, 2002, 2004; EPA and DEC, 2010).

3.2 Personnel and Survey Timing

The Bonnievale Fauna Assessment was undertaken from 24th till 26th April 2017 by Jeff Turpin (Principal Zoologist, B.Sc. Zoology). This report was prepared by Jeff Turpin.

3.3 Desktop Survey

As per the recommendations of EPA and DEC (2010), the nomenclature and taxonomic order presented in this report are based on the Western Australian Museum’s Checklist of the Vertebrates of Western Australia (Western Australian Museum, 2016). Information for this fauna assessment was drawn primarily from the DPaW threatened species database and “NatureMap” (DPaW, 2017), the BirdLife Australia Atlas Database (BirdLife Australia, 2017), EPBC Protected Matters Search Tool (DOTE, 2017) and the results of fauna surveys conducted in the region (J Turpin records – see section 2.2; Bamford Consulting Ecologists 2012, 2015, 2016). All databases were interrogated in April 2017 (

Table 2). This information was supplemented with species expected in the area based on general patterns of distribution.

Table 2: Fauna databases

Title	Comments	Area Searched / Year
NatureMap	Records of specimens held in the WA Museum and DPaw database records. Includes historical data.	Survey area with a 40 km Buffer.
Birds Australia Atlas Database	Records of bird observations in Australia, 1998-2017.	Species list for the 1 degree grid cell containing the survey area
EPBC Protected Matters Search Tool	Records on matters protected under the EPBC Act, including threatened species and conservation estate.	Survey area (plus~100 km buffer)
DPaw Threatened and Priority Fauna database	Records of significant fauna within DPaw databases	Survey area with 30km buffer, 2017.
J Turpin database	Fauna recorded during previous fauna surveys in the region. Several surveys conducted in the Coolgardie – Kalgoorlie area were consulted.	2012-2017

3.4 Field Survey

The Bonnievale Fauna Assessment was undertaken concurrent to the Flora and Vegetation survey of the area, and in accordance with EPA Guidance Statement 56 (EPA, 2004). During the fauna survey, the project area was visually inspected and extensively traversed on foot. All major fauna habitats (major vegetation types) present were sampled and assessed for the likelihood of supporting conservation significant fauna. Those habitats deemed suitable to support such significant fauna were also subject to further intensive targeted surveying. While surveying focused on locating evidence of significant fauna, all species observed were recorded. Surveying included:

-) Identification of fauna habitats;
-) Targeted searching for species of conservation significance;
-) Bird Census;
-) Targeted herpetofauna searches (hand searching, head-torching);
-) Use of Motion-sensitive Cameras;
-) Use of Acoustic Bat detectors;
-) Spotlighting;
-) Opportunistic Surveying; and
-) Fauna habitat assessment – the suitability of vegetation communities (fauna habitats) to support species of conservation significance.

Species of Conservation Significance

The presence of many conservation significant fauna species can be confirmed by searching for evidence of their activities (e.g. scats, tracks, diggings, burrows, nests). Searching for significant fauna was therefore undertaken by walking through habitat considered suitable for such species. The Malleefowl (*Leipoa ocellata*) and Arid

Bronze Azure Butterfly (*Ogyris subterrestris petrina*) were of particular interest and specifically targeted during the survey as they are species of high conservation significance known from the region. Surveying focused on searching for:

-) Malleefowl – distinctive tracks, mounds, feathers and scats;
-) Arid Bronze Azure Butterfly – searches including for the associated ant *Camponotus terebrans*;
-) Priority fauna species; and
-) Locally significant birds (bird census in appropriate habitat).

Motion sensitive cameras (Bushnell Trophy Cam) were placed at four locations within the survey area to sample for conservation significant fauna (eg. Malleefowl and Chuditch), larger mammals and reptiles (Table 3). Cameras were operated over two nights and baited with universal bait (a mixture of sardines, rolled oats and peanut butter).

Table 3: Camera locations

Camera	Habitat	Easting	Northing	Comments
1	Gully / Woodland	324455	6583558	Targeting small mammals / reptiles
2	Dense Acacia gully	323710	6582836	Targeting small mammals / reptiles
3	Eucalypt Woodland	324413	6583136	Targeting small mammals / reptiles
4	Eucalypt Woodland	324421	6584254	Targeting small mammals / reptiles

To sample for bats an ANABAT SD1 detector was placed at two locations within the survey area (Table 4). One unit recorded bat calls over one night at each location.

Table 4: ANABAT locations

Camera	Habitat	Easting	Northing	Comments
1	Gully in stony rise	324388	6583200	Recorded full night
2	Eucalypt Woodland	324421	6584254	Recorded full night

Nocturnal surveying was conducted both on foot and by vehicle along access tracks throughout the project area. Spotlighting was conducted on the night of the 25th of April by two personnel over a total of four person hours.

Arid Bronze Azure

The Arid Bronze Azure Butterfly has a symbiotic relationship with the “pale-coloured” or “Goldfields” form of a sugar ant (*Camponotus terebrans*). The butterfly larvae feed on, or are fed by the ants and they live entirely within the ant’s subterranean nests during their development (Gamblin *et al*, 2010). Therefore, the Arid Bronze Azure Butterfly requires the presence of *Camponotus terebrans* to occur. Within the range of the Arid Bronze Azure Butterfly, *Camponotus terebrans* nests have been recorded at the base of several Eucalypt species, predominantly Gimlet (*E. salubris*) and also *E. salmonophloia* and *E. capillosa*. The dominant Eucalypt at Lake Douglas, where the Arid Bronze Azure Butterfly was known to occur was *Eucalyptus concinna*. As such, targeted searches for *Camponotus terebrans* were conducted both diurnally (searching for ants’ nests at the base of smooth-barked Eucalypts) and nocturnally, searching for active ants along the trunks of smooth-barked Eucalypts (such as *Eucalyptus clelandii*, *Eucalyptus salubris* and *E. salmonophloi*).

At all times, observations of fauna were noted when they contributed to the accumulation of information on the local fauna assemblage. These included such casual observations as birds or reptiles seen while travelling through the site.

3.5 Limitations

EPA Guidance Statement 56 (EPA 2004) outlines a number of limitations that may arise during surveying. These survey limitations are addressed below (Table 5).

Table 5: Potential fauna survey limitations

Limitation	Comment
Level of survey.	Level 1 (desktop study, reconnaissance survey with some targeted surveying for conservation significant fauna).
Competency/experience of the consultant(s) carrying out the survey.	The field personnel/authors have had extensive experience in conducting desktop reviews and fauna surveys. This includes several Level 1 and Level 2 surveys conducted across the region.
Scope (What faunal groups were sampled and were some sampling methods not able to be employed because of constraints?).	Birds were extensively sampled due to the nature of the survey, and some foraging was conducted to sample for reptiles, amphibians and mammals. Additional mammal species occurring in the area were detected using the motion sensitive cameras and bat detectors.
Proportion of fauna identified, recorded and/or collected.	All fauna observed were identified.
Sources of information e.g. previously available information (whether historic or recent) as distinct from new data.	Sources include previous reports on the fauna of the region (BCE 2010, 2012, 2015, 2016); databases (BirdLife Australia, DPaW, EPBC, J Turpin) and local fauna records obtained by J Turpin.
The proportion of the task achieved and further work which might be needed.	Survey Complete.
Timing/weather/season/cycle.	Field survey conducted during April 2017. Weather conditions were mild during the survey and many plants (<i>Eucalypt</i> and <i>Eremophila</i> spp.) were in flower, indicating an optimal time to conduct the survey.
Disturbances (e.g. fire, flood, accidental human intervention etc.) which affected results of survey.	No disturbances affected the survey results.
Intensity. (In retrospect, was the intensity adequate?)	Survey intensity was moderate (desktop study, reconnaissance survey with some targeted surveying for conservation significant fauna) and was adequate to satisfy EPA guidelines.
Completeness (e.g. was relevant area fully surveyed).	The entire survey area was visually inspected and all major fauna habitats sampled. Habitats likely to support conservation significant fauna were subject to further intensive sampling.
Resources (e.g. degree of expertise available in animal identification to taxon level).	All species identified to taxon level.
Remoteness and/or access problems.	Not Applicable.
Availability of contextual (e.g. biogeographic) information on the region.	Regional information was available and was consulted. See Section 2.2 "Previous Studies".

4. SURVEY RESULTS

4.1 Fauna Habitats

The fauna survey area extended from the slopes of Emu Hill (8km north of Coolgardie) to the abandoned Bonnievale Mine. It comprised mostly Eucalypt Woodland on loam flats however contained the lower stony slopes associated with Emu Hill on its southern margins. Three major fauna habitats were recognised within the survey area (Table 6, photographs depicted in Appendix 3).

Table 6: Fauna Habitats.

Landform	Vegetation
Undulating loam and stony plains	Eucalypt Woodland and Mallee dominated by <i>E. salubris</i> , <i>E. lesouefii</i> and <i>E. salmonophloia</i> with an open understorey including <i>Eremophila scoparia</i> , <i>Santalum spicatum</i> and sparsely occurring chenopods.
Greenstone Hills	Shrublands dominated by <i>A. quadrimarginea</i> with <i>A. tetragonophylla</i> , <i>A. burkitii</i> , <i>Scaevola spinescens</i> and <i>Eremophila</i> species (e.g. <i>E. oldfieldii</i>). Occasional smaller stands of <i>Eucalyptus</i> Woodland occur. The southern margins of the survey area are situated on the lower slopes of Emu Hill and include several incised gullies supporting dense thickets of vegetation (particularly <i>A. quadrimarginea</i> , <i>Scaevola spinescens</i> and <i>Eremophila oldfieldii</i>).
Lower stony slopes	Sheaok (<i>Casuarina pauper</i>) Woodland with a variable understorey occurs on the lower slopes and foothills of Emu Hill.
Disturbed Areas	Disturbed land from public off-road vehicle use, illegal rubbish disposal, timber cutting and previous mining and exploration activities.

4.2 Vertebrate Fauna

The desktop survey identified 290 vertebrate fauna species potentially occurring in the survey area (Appendix 2). Based on the results of the database searches and literature reviews, 5 frog, 85 reptile, 164 bird, 26 native mammal and 10 introduced mammal species may potentially occur. This list includes 24 species of conservation significance, based on species distributions and the habitats present within the survey area. The vertebrate fauna expected to occur within the survey area has the following composition (Table 7, Appendix 2).

Table 7: Expected Fauna Summary Table

Taxon	Species Expected	Species Recorded	Conservation Significant Fauna Potentially Occurring (Species recorded listed in parenthesis)		
			EPBC / WC Acts	DPAW Priority	Locally Significant
Frogs	5	0	0	0	0
Reptiles	85	5	1	0	0
Birds	164	47	4 (1)	1	13 (3)
Native Mammals	26	7	1	1	1
Introduced Mammals	10	3	0	0	0
Invertebrates	NA	NA	1	1	0
Total	290	62	7	3	14

A total of 62 fauna species were recorded during the field survey, comprising five reptile, 47 bird, seven native mammal and three introduced mammal species (Appendix 2). This included four fauna species of conservation significance.

5. CONSERVATION SIGNIFICANT FAUNA

5.1 Conservation Significant Fauna Recorded or Expected to Occur

Conservation significant fauna recorded during the survey comprised the Malleefowl (listed under legislation) and three locally significant species:

-) Malleefowl (*Leipoa ocellata*) – EPBC Vulnerable, one sighted and seven mounds recorded;
-) Western Yellow Robin (*Eopsaltria griseogularis*) – locally significant, three pairs recorded;
-) Gilbert's Whistler (*Pachycephala inornata*) – locally significant, two recorded; and
-) Chestnut Quail-thrush (*Cinclosoma castanotum*) – locally significant, one group recorded.

Details on species of conservation significance recorded or expected to occur in the survey area are presented in Table 8 and Status Codes:)CS1: EPBC Act listed species: End = Endangered, Vul = Vulnerable, Mig = Migratory, CrE = Critically Endangered;

)CS2: WC Act listed species: S1 - 7 = Schedule 1 – 7; DPaW Priority Species: P1 - 4 = Priority 1 - 4;

)CS3: Locally Significant species: L = Locally Significant.

Table 9. Conservation significance codes are detailed in **Section 2.2**. The project area (and its surrounds) is likely to be important for several significant species which are expected to occur there in resident populations or may utilise the project area during foraging or breeding. These species are discussed below.

Table 8: Significant fauna recorded from the Bonnievale area.

Common Name	Species Name	Status	Easting	Northing	Comments
Malleefowl	<i>Leipoa ocellata</i>	VUL	323781	6582812	Individual observed
Malleefowl	<i>Leipoa ocellata</i>	VUL	323519	6583033	Fresh tracks
Malleefowl	<i>Leipoa ocellata</i>	VUL	324300	6583616	Inactive Mound
Malleefowl	<i>Leipoa ocellata</i>	VUL	324245	6583003	Inactive Mound
Malleefowl	<i>Leipoa ocellata</i>	VUL	324701	6583140	Inactive Mound
Malleefowl	<i>Leipoa ocellata</i>	VUL	324029	6583215	Inactive Mound
Malleefowl	<i>Leipoa ocellata</i>	VUL	324087	6582913	Inactive Mound
Malleefowl	<i>Leipoa ocellata</i>	VUL	323405	6583080	Inactive Mound
Malleefowl	<i>Leipoa ocellata</i>	VUL	323358	6582384	Inactive Mound
Malleefowl	<i>Leipoa ocellata</i>	VUL	322523	6582835	Mega Mound
Western Yellow Robin	<i>Eopsaltria griseogularis</i>	Local	322526	6582242	1 recorded
Western Yellow Robin	<i>Eopsaltria griseogularis</i>	Local	323176	6581972	2 recorded
Western Yellow Robin	<i>Eopsaltria griseogularis</i>	Local	323503	6582829	2 recorded
Western Yellow Robin	<i>Eopsaltria griseogularis</i>	Local	323702	6582828	2 recorded
Gilbert's Whistler	<i>Pachycephala inornata</i>	Local	324391	6583325	1 recorded
Gilbert's Whistler	<i>Pachycephala inornata</i>	Local	324199	6583431	1 recorded
Gilbert's Whistler	<i>Pachycephala inornata</i>	Local	324029	6583215	1 recorded

Chestnut Quail Thrush	<i>Cinclusoma castanotus</i>	Local	323945	6583186	2 recorded
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Status Codes:)CS1: EPBC Act listed species: End = Endangered, Vul = Vulnerable, Mig = Migratory, CrE = Critically Endangered;
)CS2: WC Act listed species: S1 - 7 = Schedule 1 – 7; DPaw Priority Species: P1 - 4 = Priority 1 - 4;
)CS3: Locally Significant species: L = Locally Significant.

Table 9: Significant fauna species recorded (BOLD) or expected in the survey area.

Taxon	Species Name	Conservation Status				Expected status in project area	Local records
		EPBC	WCA	P	L		
Malleefowl	<i>Leipoa ocellata</i>	Vul	S3			Visitor	Bonnievale
Rainbow Bee-eater	<i>Merops ornatus</i>	Mig	S5			Migrant	Shirl
Fork-tailed Swift	<i>Apus pacificus</i>	Mig	S5			Irregular visitor	Woolgangie
Peregrine Falcon	<i>Falco peregrinus</i>		S7			Resident / Visitor	Victoria Rocks Rd
Major Mitchell's Cockatoo	<i>Cacatua leadbeateri</i>				L	Irregular visitor	Coolgardie
Chuditch	<i>Dasyurus geoffroyii</i>	Vul	S3			Unlikely / Vagrant	Kaloorlie
Carpet Python	<i>Morelia spilota</i>		S7	4		Resident	Kaloorlie
Eastern Great Egret	<i>Ardea modesta</i>	Mig	S5			Vagrant	Coolgardie
Common Sandpiper	<i>Acitis hypoleucos</i>	Mig	S5			Unlikely to occur	Kundana
Common Greenshank	<i>Tringa nebularia</i>	Mig	S5			Unlikely to occur	Kundana
Wood Sandpiper	<i>Tringa glareola</i>	Mig	S3			Unlikely to occur	Kaloorlie
Red-necked Stint	<i>Calidris ruficollis</i>	Mig	S5			Unlikely to occur	Kaloorlie
Sharp-tailed Sandpiper	<i>Calidris acuminata</i>	Mig	S5			Unlikely to occur	Kaloorlie
Arid Bronze Azure	<i>Ogyris subterrestris</i>	CE	S1			Unknown	Lake Douglas
Western Rosella	<i>Platycercus icterotis</i>			4		Irregular Visitor	Kaloorlie
Central Long-eared Bat	<i>Nyctophilus major tor</i>			4		Resident	Coolgardie
Hooded Plover	<i>Thinornis rubricollis</i>			4		Unlikely to occur	Yindarligooda
Tree-stem Trapdoor	<i>Aganippe castellum</i>			4		Unlikely to occur	Koolyanobbing
Inland Hairstreak	<i>Jalmenus aridus</i>			1		Potential Visitor	Lake Douglas
Australian Bustard	<i>Ardeotis australis</i>				L	Visitor	Credo
Shy Heathwren	<i>Hylacola cauta</i>				L	Visitor / Resident	St Ives
Square-tailed Kite	<i>Lophoictinia isura</i>				L	Visitor	St Ives
Slender-billed Thornbill	<i>Acanthiza iredalei</i>				L	Unlikely / Vagrant	Coolgardie
Crested Shrike-tit	<i>Falcunculus frontatus</i>				L	Resident / Visitor	Kaloorlie
Scarlet-chested Parrot	<i>Neophema splendida</i>				L	Irregular Visitor	St Ives
Regent Parrot	<i>Polytelis anthopeplus</i>				L	Visitor / Resident	St Ives
Bush Stone-curlew	<i>Burhinus grallarius</i>				L	Vagrant	Jilbadji
Southern Scrub-robin	<i>Drymodes brunneopygia</i>				L	Visitor / Vagrant	Coolgardie
Western Yellow-robin	<i>Eopsaltria griseogularis</i>				L	Resident	Bonnievale
Rufous Tree-creeper	<i>Climacteris rufus</i>				L	Resident	Gunga West
Chestnut Quail-thrush	<i>Cinclusoma castanotus</i>				L	Resident	Bonnievale
Gilbert's Whistler	<i>Pachycephala inornata</i>				L	Resident	Bonnievale
Purple-gaped Honeyeater	<i>Lichenostomus cratitius</i>				L	Resident	Kaloorlie
Kultarr	<i>Antechinomys laniger</i>				L	Vagrant	Kaloorlie

Status Codes:

)CS1: EPBC Act listed species: End = Endangered, Vul = Vulnerable, Mig = Migratory, CrE = Critically Endangered;

)CS2: WC Act listed species: S1 - 7 = Schedule 1 – 7; DPaW Priority Species: P1 - 4 = Priority 1 - 4;

)CS3: Locally Significant species: L = Locally Significant.

5.2 Malleefowl

The Malleefowl is listed as Vulnerable under the EPBC and WC Act. In WA, Malleefowl occur mainly in scrubs and thickets of Mallee (*Eucalyptus* spp.), Boree (*Melaleuca lanceolata*), Bowgada (*Acacia linophylla*), and also other dense litter-forming shrublands including Mulga (*Acacia aneura*) (Johnstone and Storr, 2004). The species distribution was once larger and less fragmented, but the widespread clearing of suitable habitat, coupled with the degradation of habitat by fire and livestock, and fox predation has reduced Malleefowl numbers considerably (Johnstone and Storr, 2004).

The Malleefowl Mound

The Malleefowl has developed a highly sophisticated method of temperature control for egg incubation. They construct distinctive nests that comprise a large mound covering a central core of leaf litter. The mound is constructed out of sand, loam, pebbles or small rocks, depending on the substrate available. Mounds have a large central depression which is filled with leaf litter and covered with soil. Eggs are laid within the mound, buried and left to incubate by the heat generated from decomposing leaf litter (Malleefowl Preservation Group (MPG), 2013). An adult pair maintains the mound temperature of 32 – 34 degrees by adjusting soil cover to either retain or expel heat from the egg chamber (MPG, 2013).

Malleefowl are monogamous with pair bonds maintained for life (Priddel and Wheeler, 2003). The mound is constructed and maintained by an adult pair over 9 - 11 months of the year. Nest preparation occurs in autumn and the male will tend the nest through summer until temperatures begin to fall (MPG, 2013).

Malleefowl mounds range in size and diameter, depending on age and activity, however mounds commonly span more than five metres and up to one metre high. A pair of Malleefowl will often use the same nest over subsequent seasons however nest fidelity is highly variable. Some Malleefowl pairs have been recorded using the same mound for up to nine years while others relocate seasonally between a cluster of two, three or four mounds (Priddel and Wheeler, 2003). Where Malleefowl mounds are used over many generations, mounds can attain a size of over 20 metres (MPG, 2013).

Mound construction and breeding rely heavily on rainfall. Malleefowl have been recorded abandoning mound construction or failing to use a mound during seasons of low rainfall (Priddel and Wheeler, 2003). Priddel and Wheeler (2003) studied the nesting activity of Malleefowl within an isolated remnant of mallee in central New South Wales. The maximum longevity recorded for breeding adults was 12 years with an average of 7.5 years. Over a twenty year period the population declined, with large population decreases coincident with years of low rainfall and unsuccessful breeding.

Breeding Malleefowl tend to be sedentary, as they nest and roost in the same area year after year. Breeding males do not stray far from the active nest however birds may range over several kilometres outside the breeding season (MPG, 2013). Malleefowl also require large amounts of leaf litter for egg incubation and so are generally restricted to areas of dense vegetation that have not been burnt for many years. In the Kalgoorlie region, Malleefowl are often associated with dense vegetation on rocky hills, slopes and gravelly rises (J. Turpin, pers. obs.).

Established pairs generally breed annually with eggs laid from September to January. The average clutch size is 16 (but may range from five to 30) and the incubation period lasts for between 62 and 64 days (Priddel and Wheeler, 2003). Malleefowl chicks receive no parental care and as a result chick mortality is high due to predation and exposure (Priddel and Wheeler, 2003).

Mound Profile

The profile of a Malleefowl mound changes with breeding activity and age (erosion and vegetation growth). A number of profile stages are classified according to age (Benshemesh et. al., 2000) and include:

- J Profile 1: Typical crater with raised rims. This is the typical shape of an inactive nest. However, the nest may also be active and open;
- J Profile 2: Nest fully dugout. The characteristic of this profile is that the crater slopes down steeply and at the base the sides drop vertically to form a box- like structure with side usually 20 to 30 cm deep. Often, litter will have been raked into windrows, and may have started to enter the nest;
- J Profile 3: Nest with litter. This is the next stage after profile 2. Litter will have been raked into the nest by Malleefowl, and thick layers of litter are evident on the surface. There may or may not be sand mixed with the litter at this stage;
- J Profile 4: Nest mounded up (no crater). This is the typical profile of an active but unopened Malleefowl nest. The active mound is closed and dome shaped;
- J Profile 5: Nest a crater with peak in centre. This is a typical profile of an active nest which is in the process of being closed by Malleefowl;
- J Profile 6: Abandoned nest, with reduced height and depth due to inactivity and erosion however still contains an obvious central depression; and
- J Profile 7: Nest low and flat without peak or crater. This mound has not been used for some time and weathering and erosion have “flattened” the original mound. No central depression.

Survey Results

Searches for Malleefowl and its associated mounds were undertaken on foot by traversing through areas of suitable habitat and concentrated on areas of dense

shrubland. One Malleefowl was observed during the field survey, which prompted a wider scale survey of suitable habitat to ascertain if the species breeds in the local area (as the species can forage widely). Seven Malleefowl mounds were recorded from the lower slopes of Emu Hill (Table 10,

Plate 1 to

Plate 1: Malleefowl Mound 1. Plate 7) and shown in Figure 2. When Malleefowl mounds were detected, the location, vegetation type and physical characteristics (mound width, height, depth, shape / profile and substrate) were recorded and shown in Table 10. The approximate age of each mound was classified according to the criteria listed below:

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

Table 10: Malleefowl Mounds recorded during the fauna survey (UTM Zone 51)

Mound	Easting	Northing	Substrate	Profile	Width (m)	Height (cm)	Depth (cm)	Vegetation	Status	Age
1	324300	6583616	Gravel	6	9	30	5	<i>Acacia tetragonophylla</i> , <i>A. burkittii</i> , <i>Eremophila oldfieldii</i> , <i>Dodonaea</i>	Within Project	Old
2	324245	6583003	Gravel	6	5	40	10	<i>Acacia quadrimarginea</i> , <i>E oldfieldii</i> , <i>Senna sp.</i>	Outside Project	Old
3	324701	6583140	Gravel, loam	6	6	40	10	<i>Casuarina pauper</i> , <i>E oldfieldii</i> , <i>E. scoparia</i> , <i>Dodonaea</i> , Mallee	Outside Project	Old
4	324029	6583215	Gravel	1	9	60	10	<i>Acacia quadrimarginea</i> , <i>E oldfieldii</i> , <i>Dodonaea</i> , <i>Scaevola spinescens</i>	Outside Project	Moderately Old
5	324087	6582913	Gravel	7	5	20	5	<i>C. pauper</i> , <i>E oldfieldii</i> , <i>Senna</i> , <i>Dodonaea</i> , <i>Eucalyptus lesouefii</i>	Outside Project	Very Old
6	323405	6583080	Gravel	6	8	30	8	<i>Acacia quadrimarginea</i> , <i>E oldfieldii</i> , <i>A. burkittii</i> , <i>Santalum spicatum</i>	Outside Project	Old
7	323358	6582384	Gravel, loam	7	7	40	0	Mallee, <i>E oldfieldii</i> , <i>Dodonaea</i> , <i>Santalum spicatum</i>	Outside Project	Very Old
Tracks	323519	6583033	Sand	-	-	-	-	Eucalypt Woodland, dense gully	Outside Project	-
Sighting	323781	6582812	Gravel	-	-	-	-	Eucalypt Woodland, dense gully	Outside Project	-

Plate 1: Malleefowl Mound 1.



Plate 2: Malleefowl Mound 2.



Plate 3: Malleefowl Mound 3.



Plate 4: Malleefowl Mound 4.



Plate 5: Malleefowl Mound 5.



Plate 6: Malleefowl mound 6



Plate 7: Malleefowl Mound 7.



5.3 Locally Significant Birds

Several woodland bird species are recognized as declining in Western Australia (Saunders and Ingram, 1995, BirdLife Australia, 2016) and are listed in this report as locally significant. These species have lost considerable areas of habitat throughout the Wheatbelt and adjacent Goldfields as a result of large scale habitat clearance and the removal of mature Eucalypt trees. Listed species include the Regent Parrot, Southern Scrub-robin, Gilbert's Whistler, Chestnut Quail-thrush, Rufous Tree-creeper and Purple-gaped Honeyeater. The retention of these species in their natural abundances is of particular conservation significance as these species are now increasingly absent or rare over much of the Wheatbelt (Duncan et. al., 2006). Three locally significant species were recorded during the survey. These were:

- J Western Yellow Robin – recorded from dense gullies;
- J Chestnut Quail-Thrush – one party recorded from stony lower slopes of Emu Hill;
- J Gilbert's Whistler – recorded from dense gullies and stony slopes of Emu Hill;

5.4 Conservation Significant Fauna Expected within the Survey Area

Additional conservation significant fauna species have the potential to occur within the survey area. Most are likely to occur as irregular visitors or vagrants (e.g. Chuditch, Major Mitchell's Cockatoo, Fork-tailed Swift) and thus for which the site is of low importance, except where it may have value for connectivity. The project area (and surrounds) is likely to be important for 12 significant species which are expected to occur there in resident populations or may utilise the project area during foraging or breeding. These are:

- J Carpet Python – potential for resident population;
- J Peregrine Falcon – likely to be a regular visitor;
- J Shy Heathwren – potential for resident population;
- J Central Long-eared Bat – potential for resident population;
- J Western Rosella (inland ssp) – potential as a visitor although few nearby records;
- J Locally significant birds (Regent Parrot, Rufous Tree-creeper, Western Crested Shrike-Tit, Scarlet-chested Parrot, Southern Scrub-robin, Purple-gaped Honeyeater) - potential for resident populations; and
- J Rainbow Bee-eater – likely migrant.

5.5 Other Conservation Significant Fauna

Additional significant fauna species were detected on database or literature searches however are considered unlikely to occur within the survey area or occur there only as rare visitors or vagrants. This is due to the type and extent of habitats present and a reflection of the condition of vegetation present. This includes:

- J Chuditch - one record exists from Kambalda from 1974, however the nearest recent records come from Southern Cross (DPaW, 2017). The species has potential to occur as a vagrant as it is far ranging and so the potential exists for individuals to move through the area;

- J Slender-billed Thornbill - recorded from Coolgardie (BirdLife Australia, 2017), however due to a lack of suitable habitat, the species is unlikely to occur in the project area;
- J Fork-tailed Swift - an aerial species largely independent of terrestrial habitats;
- J Great Egret - favours freshwater wetlands absent from the survey area; and
- J Major Mitchell's Cockatoo - recorded from Coolgardie but few recent, local records suggest this species rarely occurs in the area.

5.6 Significant Invertebrates

No listed conservation significant invertebrates are known from the local area however three conservation significant invertebrate species have been recorded in the greater area (DPaW, 2017). These are the Arid Bronze Azure Butterfly (*Ogyris subterrestris petrina*), Inland Hairstreak (*Jalmenus aridus*) and the freshwater shrimp *Branchinella denticulata*.

The Arid Bronze Azure Butterfly is listed as Critically Endangered under the Wildlife Conservation Act and EPBC Act. It is only known from Barbalin Nature Reserve (10km west of Mukinbudin, in the Wheatbelt), however was formerly known from the Lake Douglas area (12 km south-west of Kalgoorlie). At Lake Douglas, the Arid Bronze Azure has been recorded from undulating stony rises supporting *Eucalyptus concinna*. While the species has not been recorded in the Lake Douglas area since 1993, it has the potential to persist in the wider area.

Surveying for the Arid Bronze Azure Butterfly and its associated ant, *Camponotus terrebrans*, did not locate either of these species. Over one night and two days, 100 Eucalypt trees (eg. *E. salubris*, *E. clelandii*, and *E. salmonophloia*) were inspected throughout the Bonnievale project area. The distinctive pale form of *Camponotus terrebrans* was not located, however, numerous ants were observed from a range of species. Notably, *Camponotus nigriceps*, *Camponotus gibbinotus* and *Crematogaster laeviceps chasei* were recorded from a range of trees. As the Arid Bronze Azure Butterfly is not known to occur in the area, and the Bonnievale area differs to the habitat observed at Lake Douglas (which is dominated by *E. concinna*), combined with the survey results (failing to record *C. terrebrans*), the Arid Bronze Azure is considered unlikely to occur within the Bonnievale Project Area.

The Inland Hairstreak is also only known from the Lake Douglas area associated with *Acacia tetragonophylla* and *Senna nemophila* (Braby, 2004). The freshwater shrimp *Branchinella denticulate* is only known from Gidgi Lake, 16km north of Kalgoorlie. The genus *Branchinella* encompasses a number of DPaW Priority listed species present in the region, restricted to salt lakes. It is unlikely to occur within the survey area.

Additionally, the Tree-stem Trapdoor Spider, *Aganippe castellum*, is listed as Priority 4 by DPaW. This species occurs on the mid to lower slopes of rocky ridges and the adjacent plains, where it builds a distinctive burrow against Eucalypts, Broom bush, Sheoaks and other shrubs (BCE database). The nearest records to Coolgardie come

from Koolyanobbing Range and Bungalbin Hill (over 150 km west of Kalgoorlie, DPaW, 2015 and J Turpin records), where the Tree-stem Trapdoor Spider appears to be widespread along the slopes of hills in the region. This species is not known from the Coolgardie area and no burrows were recorded during surveying.

5.7 EPBC Listed Fauna

When developments propose to undertake an action that has, will have or is likely to have a significant impact on a species listed under the EPBC Act (such as the Malleefowl) the proposed development is required to be referred to the Australian Government Department of the Environment. The Federal Environment Minister determines whether assessment is required under the EPBC Act (DOTE 2013). Guidelines for a referral involving EPBC listed species (Guidelines 1.1 EPBC Act) have been prepared (DOTE, 2013).

The Department of the Environment lists a significant impact as:
“an impact which is important, notable, or of consequence, having regard to its context or intensity” (DOTE, 2013).

Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts (DOTE, 2013). A significant impact is “likely” if the impact on the environment is a real (or not remote) chance or possibility. An action will require federal approval if the action has, will have, or is likely to have a significant impact on a species listed under the EPBC Act.

Critically Endangered and Endangered Species

An action is likely to have a significant impact on a Critically Endangered or Endangered species if there is a real chance or possibility that it will:

-) Reduce the area of occupancy of the species;
-) Lead to a long-term decrease in the size of a population;
-) Fragment an existing population into two or more populations;
-) Adversely affect habitat critical to the survival of a species;
-) Disrupt the breeding cycle of a population;
-) Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
-) Result in invasive species (that are harmful to a listed species) becoming established in the listed species habitat;
-) Introduce disease that may cause the species to decline; and/or
-) Interfere with the recovery of the species (DOTE, 2013).

No species listed as critically endangered or endangered were recorded or are expected to occur within the survey area.

Vulnerable Species

The same process applies for Vulnerable listed taxa however applies to important populations, rather than the species as a whole. An “important population” is a population that is necessary for a species long-term survival and recovery (DOTE, 2013). This may include populations identified as such in recovery plans, and/or that are:

-) Key source populations either for breeding or dispersal;
-) Populations that are necessary for maintaining genetic diversity; and/or
-) Populations that are near the limit of the species range (DOTE, 2013).

One species listed as Vulnerable, the Malleefowl, occurs in the local area and is discussed below.

Malleefowl Assessment

As the Malleefowl is a Matter of National Environmental Significance (Vulnerable under the EPBC Act), measures should include reducing or avoiding impacts to a local population. Under the Department of the Environment's Matters of National Significance – Significant Impact Guidelines, an action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of an important population of a species
- reduce the area of occupancy of an important population
- fragment an existing important population into two or more populations
- adversely affect habitat critical to the survival of a species
- disrupt the breeding cycle of an important population
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
- introduce disease that may cause the species to decline, or
- interfere substantially with the recovery of the species.

A Malleefowl population occurs in the local Bonnievale area, with one old mound recorded within the survey area, six mounds recorded nearby and the species observed foraging approximately 400m south of the survey area. As the species can move over several kilometres (Benshemesh, 1992), is known to breed in adjacent areas and Malleefowl can re-use old mounds (J. Benshemesh, pers. com.) there is the potential for the species to move through the Bonnievale area.

The Malleefowl mound recorded within the survey area was old and abandoned. Due to extensive erosion, vegetative regrowth and the degradation of surrounding habitats, the mound appears to have little conservation value. It is however, indicative of a formerly, more widespread population. The Bonnievale project area is comprised mostly of open Eucalypt Woodland and degraded areas associated with historical mining activities. The presence of the mound reveals the project area formerly supported a breeding population of Malleefowl, however the species does not currently breed in the area; and due to a lack of suitable habitat, most of the

project area remains unsuitable for breeding. Small areas of potentially suitable habitat (densely vegetated *Acacia quadrimarginea* and *A. burkittii* shrublands and Eucalypt Woodlands) occur on the southern margins of the project area (see Figure 2).

The Malleefowl does however, occur in stony habitats associated with Emu Hill (directly to the south of the project area - six mounds recorded and one bird observed, Figure 2) where it is likely to breed in the area. While no active mounds were recorded, several mounds in varying states of age and decay were noted within the area searched, which covered only a small proportion of the available habitat. Large areas of suitable habitat (Eucalypt Woodland with a dense understorey and dense Acacia shrublands) occur on the undulating slopes and gullies of Emu Hill and its surrounds (see Figure 2). As such, while the Malleefowl is unlikely to breed within the survey area, a breeding population is likely to occur in adjacent habitats and the species is likely to be an occasional foraging visitor to the Bonnievale project area.

While the development of the project is unlikely to result in a significant impact to the local population using the criteria listed above (EPBC Significant Impacts Guidelines), as the species is of conservation significance, efforts should be made to minimise impacts to the local population. This includes avoiding disturbance to breeding sites (mounds) as old mounds have the potential to be re-used. The assessment of Malleefowl with regard to the EPBC Significant Impact Criteria are summarised below (Table 11, see Figure 2).

Table 11: Malleefowl Impact Assessment

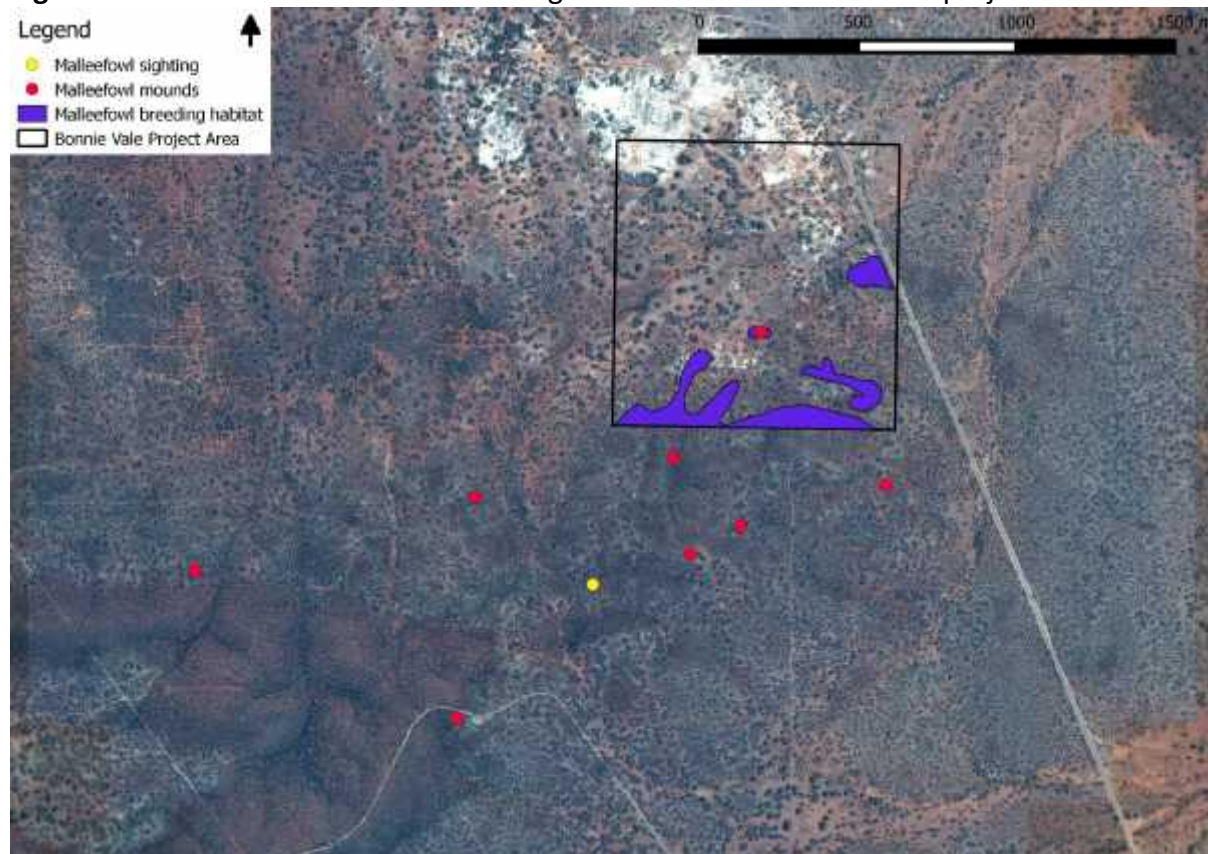
EPBC Criteria	Comment
Lead to a long-term decrease in the size of an important population of a species	The home ranges of individual Malleefowl can vary in size from 0.5 to 4.6 km ² , however can overlap considerably and so an overall breeding density of 1.1 pairs per square kilometre has been recorded (Benshemesh 1992; Booth 1987). The extent of suitable habitat within the survey area is less than 20 ha (see Figure 2) and therefore the survey area (and particularly proposed disturbance areas) may at most, form a component of a pairs foraging range. Therefore, the development of the project is unlikely to lead to a long-term decrease in the size of an important population of a species.
Reduce the area of occupancy of an important population	The home ranges of individual Malleefowl can vary in size from 0.5 to 4.6 km ² , however can overlap considerably and so an overall breeding density of 1.1 pairs per square kilometre has been recorded (Benshemesh 1992; Booth 1987). The extent of available habitat within the survey area is less than 20 ha and therefore the survey area (and particularly proposed disturbance areas) may at most, form a component of a pairs foraging range. Therefore, the development of the project is unlikely to reduce the area of occupancy of an important population.
Fragment an existing important population into two or more populations	The survey area lies on the margins of Malleefowl habitat. It is unlikely to fragment the local population.
Adversely affect habitat critical to the survival of a species	Habitat critical to the survival of the Malleefowl includes breeding sites (mounds). One Malleefowl mound was recorded within the survey area however was abandoned and highly eroded. More recently used mounds were recorded to the south of the project area. Some Malleefowl pairs have been recorded using the same mound for up to nine years while others relocate seasonally between a cluster of two, three or four mounds (Priddel and Wheeler, 2003). As such disturbances to mounds should be avoided.

EPBC Criteria	Comment
Disrupt the breeding cycle of an important population	Some Malleefowl pairs have been recorded using the same mound for up to nine years while others relocate seasonally between a cluster of two, three or four mounds (Priddel and Wheeler, 2003). No active mounds were recorded and most mounds observed had not been used for several years. No mounds of significance were recorded within the project area however some important mounds were recorded outside the project area on the slopes of Emu Hill. If disturbances to Malleefowl mounds can be avoided, the development is unlikely to disrupt the breeding cycle of the local population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The home ranges of individual Malleefowl can vary in size from 0.5 to 4.6 km ² , however can overlap considerably and so an overall breeding density of 1.1 pairs per square kilometre has been recorded (Benshemesh 1992; Booth 1987). The extent of available habitat within the survey area is less than 20 ha and therefore the survey area (and particularly proposed disturbance areas) may at most, form a component of a pairs foraging range. Additionally, much of the project area has suffered some degradation from previous mining and clearing activities. Therefore, the development of the project is unlikely to decrease the availability or quality of habitat to the extent that the species (local population) is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The Malleefowl is vulnerable to predation by feral cats and foxes and chick mortality is high. The species is also vulnerable to land degradation and competition by feral goats and rabbits. However due to the sites location and the presence of existing threats, the development of the project is unlikely to increase such threatening processes beyond that currently present.
Introduce disease that may cause the species to decline, or	Considered unlikely.
Interfere substantially with the recovery of the species.	In the greater area, most Malleefowl records are of old, inactive mounds indicating a potential population decline and that the species occurs in low densities. An extant population has been recorded in adjacent habitats and disturbances to these areas are likely to require management. However, as the project area supports minimal Malleefowl habitat, the development of the project is unlikely to interfere substantially with the recovery of the species.

The Malleefowl may forage widely and could be an occasional visitor to the lease area (as it is known from nearby areas) and as a result disturbances to all old mounds should be avoided where possible. Management strategies are recommended below to reduce the potential impacts of the project on the Malleefowl and other significant fauna species:

-)] Avoid disturbance to Malleefowl mounds;
-)] Avoid disturbance to Malleefowl habitat - disturbances to the dense shrublands associated with greenstone hills should be avoided where possible;
-)] Conduct a pre-clearance assessment prior to the clearance of Malleefowl habitat.
-)] Manage traffic to minimise the potential for roadkill; and
-)] Monitor Malleefowl population if present.

Figure 2. Malleefowl records and breeding habitat from the Bonnievale project area.



Note: breeding habitat is dense Acacia shrublands on the lower footslopes of Emu Hill.

Migratory Species

A similar process applies to EPBC listed Migratory species. An area of “important habitat” for a listed migratory species is:

- habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species; and/or
- habitat that is of critical importance to the species at particular life-cycle stages; and/or
- habitat utilised by a migratory species which is at the limit of the species range; and/or
- habitat within an area where the species is declining.

The survey area is not expected to contain ecologically significant numbers of listed Migratory species due to a lack of suitable habitat.

EPBC Summary

Actions considered to be at “low risk” of significant impact include those which avoid habitat removal, adopt and implement best practice mitigation and have a management plan in place to monitor significant populations (DOTE, 2013). To minimise impacts on the EPBC listed fauna, disturbances to significant fauna habitats including dense Acacia shrublands should be minimised and avoided where possible.

6. SUMMARY OF FAUNA VALUES

Fauna values within the Bonnievale project area include:

-) Fauna assemblage characteristics – those species recorded and expected to occur;
-) Species of conservation significance – those species listed under legislation or considered threatened or significant;
-) Fauna habitats – the significance of habitats present, particularly those that are rare, unusual and/or support significant fauna; and
-) Sites of significance - Refuge areas, refugia, important breeding areas.

A summary of the fauna values of the Bonnievale Project Area is detailed below.

Fauna assemblage

Terratree recorded 62 fauna species within the survey area. The assemblage expected is relatively intact, despite some previous disturbance and selective logging previously undertaken within the local area.

Species of conservation significance

A total of 24 species of conservation significance are expected to be present at least occasionally within the project area. The Malleefowl and three locally significant bird species were recorded during the field survey. The project area also has the potential to support populations of the Peregrine Falcon, Rainbow Bee-eater, Carpet Python, Shy Heathwren, Central Long-eared Bat and several locally significant bird species. Additional conservation significant fauna species are expected, however only as irregular visitors or vagrants (e.g. Western Rosella, Major Mitchell's Cockatoo, Chuditch).

The Malleefowl is of particular significance as it has a restricted range in the Coolgardie region (DPaW, 2017) and is declining (most Malleefowl records are of old, inactive mounds). As such, remaining populations are of high significance. The species was observed approximately 400m south of the survey area and several mounds were recorded on the stony lower slopes of Emu Hill. Several locally significant bird species occur or are likely to occur within the survey area. The Western Yellow Robin, Gilbert's Whistler and Chestnut Quail Thrush were recorded.

Significant Fauna Habitats

The densely-vegetated gullies associated with the lower slopes of Emu Hill support a significant and restricted fauna assemblage, including the Malleefowl and some locally significant birds. While most of the project area appears to have been historically logged, some large hollow-bearing trees are present and important for some fauna (containing breeding / roosting sites for parrots, bats, treecreepers, carpet python). Areas of dense vegetation are likely to be important for some birds such as the Shy Heathwren and Western Yellow-robin.

Sites of Significance

One old abandoned Malleefowl mound was recorded within the project area and seven mounds were recorded to the south, on the lower slopes of Emu Hill.

The survey area contains habitats that are widespread and extensive in the region. Large areas have also suffered from previous disturbance (clearing, logging and mining). Of the fauna habitats present at Bonnievale, the gullies within Emu Hill are significant but lie mostly outside the areas of proposed development. The Eucalypt Woodland is an area of high species richness and abundance, but the vertebrate assemblage does not appear unique or to contain species not found elsewhere in the area. Large, hollow-bearing Eucalypt trees occur, support conservation significant fauna and contain breeding or roosting sites (tree hollows) for a range of fauna. The lower slopes of Emu Hill contain several Malleefowl mounds.

Overall, impacts of the development and operation of the project upon the fauna assemblage are anticipated to be low. This is due to the site's location and constituents (contains some level of previous disturbance and mostly widespread fauna habitats). However, of particular significance may be impacts to the gullies within Emu Hill and mature Eucalypt trees. Management measures are listed in Table 12 and expanded on below.

Potential impacts to the federally listed Malleefowl are not expected to be significant under the EPBC Significant Impact criteria. However, as the species occurs in low densities in areas adjacent to the Bonnievale Project, and as the species forages widely, if additional areas are proposed to be developed then impacts to the local Malleefowl populations may require consideration. The Malleefowl may also be susceptible to roadkill.

Management strategies recommended to reduce potential impacts of the development to significant fauna species during development and operation include:

- J Avoid disturbance to Malleefowl mounds;
- J Report any sightings of Malleefowl.
- J Avoid disturbance to the dense shrublands within the gullies associated with Emu Hill;
- J Avoid disturbance to large mature, hollow bearing Eucalypt trees;
- J Limit disturbance footprint to minimise the cumulative clearing of the regionally significant Great Western Woodlands.

Table 12: Summary of potential impacts upon key fauna values

Fauna Value	Nature and Significance of Impacts		Recommended Action
	Potential Impacts	Significance	
Fauna assemblage	<ul style="list-style-type: none">) Increased mortality;) Loss of habitat; and) Fauna interaction 	Minor as impacts very localised in a regional context	<ul style="list-style-type: none">) Minimise impact footprint;) Conserve hollow-bearing trees
Fauna Habitats	Loss and degradation of habitat	<p>Most habitats are widespread in the region and some areas degraded.</p> <p>The small area of impact in relation to the surrounding landscape means that the loss of habitat associated with the project's development is unlikely to have long-term impacts upon fauna populations (in the region) and fragmentation is anticipated to be minimal.</p>	<ul style="list-style-type: none">) Minimise footprint;) Minimise disturbance to gullies within Emu Hill and mature Eucalypt trees
Significant fauna (especially Malleefowl)	<ul style="list-style-type: none">) Ongoing mortality;) Loss of habitat; and) Fauna interactions. 	Minor as impacts localised but consideration needed for Malleefowl if additional areas are to be disturbed.	<ul style="list-style-type: none">) Avoid disturbance to Malleefowl mounds;) Habitat preservation – retain / manage important areas;) Retain mature, hollow-bearing trees
Sites of Significance	Loss of habitat.	Minor providing disturbances to Malleefowl mounds outside project area are avoided.	<ul style="list-style-type: none">) Avoid disturbance to Malleefowl mounds

REFERENCES and BIBLIOGRAPHY

- Bamford Consulting Ecologists (2012). Fauna Assessment of the South Kalgoorlie Infrastructure Corridor. Unpublished report for Alacer Gold Corporation.
- Bamford Consulting Ecologists (2015). Cannon Project 2015 Fauna Assessment. Unpublished report for Metals X Limited.
- Bamford Consulting Ecologists (2016). Gunga West Project 2016 Fauna Assessment. Unpublished report for Metals X Limited.
- Barrett, G., Silcocks, A., Barry, S., Cunningham, R. and Poulter, R. (2003). *The new atlas of Australian birds*. Melbourne: Birds Australia.
- Beard, J.S. (1972). The Vegetation of the Kalgoorlie Area, Western Australia. 1:250,000 map and explanatory memoir, Vegmap Publications, Western Australia.
- Benshemesh, J. (2000). National Recovery Plan for Malleefowl. Department of Environment Water Heritage and the Arts.
- BirdLife Australia (2017). Birds Australia Database. www.birdsaustralia.com.au (accessed April 2017).
- Churchill, S. (2008). *Australian Bats*. Reed New Holland Press, Sydney.
- Cowan, M. (2001) Coolgardie 3 (COO3 – Eastern Goldfields subregion). In “A Biodiversity Audit of Western Australia”, Available from the Department of Environment and Conservation at:
<http://www.naturebase.net/content/view/960/1397/>
- Department of the Environment (2014). Key Threatening Processes. Department of Environment and Conservation (2009). Fauna Notes 24 – Western Rosella. Department of Environment and Conservation.
<http://www.environment.gov.au/cgi-bin/sprat/public/publicgetkeythreats.pl> (accessed May 2014).
- Department of Environmental Protection - DotE (2000). Bush Forever Volume 2. Government of Western Australia, Perth.
- Department of the Environment - DotE (2017). Protected Matters Database Search Tool.
- Department of Parks and Wildlife, Western Australia (DPaW) (2017). NatureMap Database. <http://naturemap.dec.wa.gov.au/default.aspx> (accessed April 2017).
- Department of Sustainability, Environment, Water, Population and Communities (2012b). Threatened Species Profiles. Available at:
http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=66699
- Department of Sustainability, Environment, Water, Population and Communities (2011). Key threatening processes under the EPBC Act.
<http://www.environment.gov.au/cgi-bin/sprat/public/publicgetkeythreats.pl>

- Doughty, P., Ellis, R.J. & Bray, R. (2016a). Checklist of the Amphibians of Western Australia. Department of Terrestrial Zoology, Western Australian Museum, Welshpool, Western Australia.
- Doughty, P., Ellis, R.J. & Bray, R. (2016b). Checklist of the Reptiles of Western Australia. Department of Terrestrial Zoology, Western Australian Museum, Welshpool, Western Australia.
- DSEWPaC. (2012a). Interim Biogeographic Regionalisation for Australia, Version 7. Map produced by ERIN for the National Reserve Systems Section, Australian Government Department of Sustainability, Environment, Water, Population and Communities, Canberra, May 2012.
- Duncan, S, Traill, B. J. & Watson, C. (2006). Vertebrate fauna of the Honman Ridge-Bremer Range district, Great Western Woodlands, Western Australia. Unpublished report. West Perth: The Wilderness Society.
- Environmental Protection Authority (EPA). (2002). Terrestrial Biological surveys as an Element of Biodiversity Protection. Position Statement No. 3. Environmental Protection Authority, Perth, Western Australia.
- Environmental Protection Authority (EPA). (2004). Guidance for the assessment of environmental factors: Terrestrial fauna surveys for environmental impact assessment in Western Australia. No. 56. Environmental Protection Authority, Perth, Western Australia.
- Environmental Protection Authority and Department of Environment and Conservation (2010) Technical Guide - Terrestrial Vertebrate Fauna surveys for Environmental Impact Assessment (eds B.M. Hyder, J. Dell and M.A. Cowan). Perth, Western Australia.
- Gamblin T., Williams M.R. and Williams A.A.E. (2010). The ant, the butterfly, the leafhopper and the bulldozer. *Landscape* 25(3):54-58.
- Garnett, S. and Crowley, G. (2000). The Action Plan for Australian Birds. Environment Australia and the Royal Australasian Ornithologists Union.
- Garnett, S., Szabo, J. and Dutson, G. (2011). *The Action Plan for Australian Birds 2010*.CSIRO Publishing.
- Harrington, R. (2002). The effects of artificial watering points on the distribution and abundance of avifauna in an arid and semi-arid mallee environment. PhD thesis, Department of Zoology, The University of Melbourne.
- Harvey, M. (2002). Short-range Endemism amongst the Australian fauna: examples from non-marine environments. *Invertebrate Systematics*, 16: 555-570.
- How, R. A., Cooper, N. K. and Bannister, J. L. (2009). Checklist of the Mammals of Western Australia. Department of Terrestrial Zoology, Western Australian Museum, Welshpool, Western Australia.
- Johnstone, R. E. and Darnell, J.C. (2016). Checklist of the Birds of Western Australia. Department of Terrestrial Zoology, Western Australian Museum, Welshpool, Western Australia.
- Johnstone, R.E. and Storr, G.M. (1998). Handbook of Western Australian Birds Vol 1 – Non-passerines (Emu to Dollarbird). Western Australian Museum, Perth.

- Johnstone, R.E. and Storr, G.M. (2004). *Handbook of Western Australian Birds*. Vol 2: Passerines (Blue-winged Pitta to Goldfinch). Western Australian Museum, Perth.
- Mace, G. and Stuart, S. (1994). Draft IUCN Red List Categories, Version 2.2. Species; Newsletter of the Species Survival Commission. IUCN - The World Conservation Union. No. 21-22: 13-24.
- Malleefowl Preservation Group (2013). Malleefowl Species Profile. <http://www.malleefowl.com.au>.
- Menkhorst, P. and Knight, F. (2004). *A Field Guide to the Mammals of Australia*. Oxford University Press, Melbourne.
- Priddel, D. & R. Wheeler (2003). Nesting activity and demography of an isolated population of Malleefowl, *Leipoa ocellata*. *Wildlife Research*. 30:451-464.
- Saunders, D. and Ingram, J. (1995). *Birds of south-western Australia. An atlas of changes in distribution and abundance of the wheatbelt fauna*. Surrey Beatty, Sydney.
- Soule, M. E., Mackey, B. G., Recher, H. F., Williams, J. E., Woinarski, J. C. Z., Driscoll, D., Dennison, W. C. and Jones, M. E. (2004). The role of connectivity in Australian conservation. *Pacific Conservation Biology* 10: 266-279.
- Storr, G.M., Smith, L.A. and Johnstone, R.E. (1983). *Lizards of Western Australia*. II. Dragons and Monitors. W.A. Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone, R.E. (1990). *Lizards of Western Australia*. III. Geckoes and Pygopodids. W.A. Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone, R.E. (1999). *Lizards of Western Australia*. I. Skinks. Revised Edition. W.A. Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone, R.E. (2002). *Snakes of Western Australia*. W.A. Museum, Perth.
- Thackway, R. and Cresswell, I.D. (1995). *An Interim Biogeographic Regionalisation for Australia: A framework for establishing the national system of reserves, Version 4.0*. Australian Nature Conservation Agency, Canberra.
- Travouillon, K. (2016). *Checklist of the Mammals of Western Australia*. Department of Terrestrial Zoology, Western Australian Museum, Welshpool, Western Australia.
- Tyler, M.J., Smith, L.A. and Johnstone, R.E. (2000). *Frogs of Western Australia*. W.A. Museum, Perth.
- Van Dyck, S. and Strahan, R. (Eds.) (2008). *Mammals of Australia*. 3rd Edition. Australian Museum, Sydney.
- Watson, A., Judd, S., Watson, J., Lam, A., and MacKenzie, D. (2008). *The Extraordinary Nature of the Great Western Woodlands*. The Wilderness Society. Available at: <http://www.wilderness.org.au/files/the-great-western-woodlands-report.pdf>
- Western Australian Museum - WAM (2016) *Checklists of the Fauna of Western Australia*. Unpublished checklist. Western Australian Museum, Perth.
- Wilson, S. and Swan, G. (2013). *A Complete Guide to Reptiles of Australia*. Fourth edition. New Holland Publishers (Australia), Sydney.

Appendix 1. Categories used in the assessment of conservation status.

IUCN categories (based on review by Mace and Stuart 1994) as used for the *Environment Protection and Biodiversity Conservation Act 1999* and the *Western Australian Wildlife Conservation Act 1950*.

Extinct	Taxa not definitely located in the wild during the past 50 years.
Extinct in the Wild (Ex)	Taxa known to survive only in captivity.
Critically Endangered (CR)	Taxa facing an extremely high risk of extinction in the wild in the immediate future.
Endangered (E)	Taxa facing a very high risk of extinction in the wild in the near future.
Vulnerable (V)	Taxa facing a high risk of extinction in the wild in the medium-term future.
Near Threatened	Taxa that risk becoming Vulnerable in the wild.
Conservation Dependent	Taxa whose survival depends upon ongoing conservation measures. Without these measures, a conservation dependent taxon would be classed as Vulnerable or more severely threatened.
Data Deficient (Insufficiently Known)	Taxa suspected of being Rare, Vulnerable or Endangered, but whose true status cannot be determined without more information.
Least Concern.	Taxa that are not Threatened.

Schedules used in the *WA Wildlife Conservation Act 1950*

Schedule 1 (S1)	Critically Endangered fauna.
Schedule 2 (S2)	Endangered fauna
Schedule 3 (S3)	Vulnerable Migratory species listed under international treaties.
Schedule 4 (S4)	Presumed extinct fauna
Schedule 5 (S5)	Migratory birds under international agreement
Schedule 6 (S6)	Conservation dependant fauna
Schedule 7 (S7)	Other specially protected fauna

WA Department of Environment and Conservation Priority species (species not listed under the *Wildlife Conservation Act 1950*, but for which there is some concern).

Priority 1 (P1)	Taxa with few, poorly known populations on threatened lands.
Priority 2 (P2)	Taxa with few, poorly known populations on conservation lands; or taxa with several, poorly known populations not on conservation lands.
Priority 3 (P3)	Taxa with several, poorly known populations, some on conservation lands.
Priority 4. (P4)	Taxa in need of monitoring. Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change.
Priority 5 (P5)	Taxa in need of monitoring. Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years (IUCN Conservation Dependent).

Appendix 2. Fauna expected to occur in the survey area (Table 2.1 to Table 2.4).

These lists are derived from the results of database and literature searches and from previous field surveys conducted in the Coolgardie - Kalgoorlie region. These are:

-) Species listed under fauna databases – DPaW Threatened Species Database (DPaW, 2017a), NatureMap (DPaW, 2017b), Birddata (BirdLife Australia, 2017), Atlas of Living Australia (ALA, 2017) or EPBC Protected Matters Search (DotE, 2017), or from the literature;
-) Local records (KEC database) and fauna recorded by J Turpin during previous fauna assessments in the local area including at:
 - Metals X Gunga West Project (7km south-west of Bonnievale) listed under “G”;
 - Alacer Gold Shirl Project (13km south-east of Bonnievale) listed under ‘S’;
 - Mt Marion (34km south-east of Bonnievale) listed as “Mt Ma” (2012) or “Mt Ma2” (2016);
 - Alacer Gold South Kalgoorlie powerline (30km east of Bonnievale) listed under “P”;
 - Alacer Gold South Kalgoorlie operations (45km south-east of Bonnievale) listed under “TSF”;
 - Alacer Gold Mount Martin Project (50km south-east of Bonnievale) listed under “Mt Mt”;
 - Metals X Cannon Project (57km east of Bonnievale) listed under “C”;
 - Excelsior Gold Bardoc Project (58km north-east of Bonnievale).
 - Red Hill, Kambalda (60km south-east of Bonnievale) listed under “K”;
 - Goldfields St Ives Operations, Lake Lefroy (60km south-east of Bonnievale) listed under “Si”;
-) Species recorded during the current survey at Bonnievale (listed under “Bonnie”);
-) Note conservation significant fauna are listed under CS; species listed as “R” were recorded outside the survey area but in the nearby region during surveying and species listed as “C” were recorded in Coolgardie.

Table 2.1. Frog species expected to occur in the survey area.

FROGS		CS	SI	B	TSF	Mt Ma	Mt Ma2	Mt Mt	P	S	C	K	G	Bonnie
Myobatrachidae														
Kunapalri Frog	<i>Neobatrachus kunapalari</i>		X	X			X							
Humming Frog	<i>Neobatrachus pelobatooides</i>													
Shoemaker Frog	<i>Neobatrachus sutor</i>													

FROGS		CS	SI	B	TSF	Mt Ma	Mt Ma2	Mt Mt	P	S	C	K	G	Bonnie
Goldfields Bull Frog	<i>Neobatrachus wilsmorei</i>													
Western Toadlet	<i>Pseudophryne occidentalis</i>		X	X										
Total Number of Species Expected: 5			2	2	0	0	1	0	0	0	0	0	0	0

Table 2.2. Reptile species recorded or expected to occur in the survey area.

REPTILES		CS	SI	B	TSF	Mt Ma	Mt Ma2	Mt Mt	P	S	C	K	G	Bonnie
AGAMIDAE														
Mulga Dragon	<i>Caimanops amphiboluroides</i>													
Crested Dragon	<i>Ctenophorus cristatus</i>	X		X	X	X	X	X	X	X		X		
Mallee Dragon	<i>Ctenophorus fordii</i>	X												
Western Netted Dragon	<i>Ctenophorus reticulatus</i>	X							X					X
Claypan Dragon	<i>Ctenophorus salinarum</i>	X										X		
Lozenge-marked Dragon	<i>Ctenophorus scutulatus</i>	X	X											
Thorny Devil	<i>Moloch horridus</i>	X										X		
Bearded Dragon	<i>Pogona minor</i>	X												
Pebble Dragon	<i>Tympanocryptis cephalus</i>	X									X			
DIPLODACTYLIDAE														
Clawless Gecko	<i>Crenadactylus ocellatus</i>	X												
Western Stone Gecko	<i>Diplodactylus granariensis</i>	X					X					X		
Beautiful Gecko	<i>Diplodactylus pulcher</i>	X										X		
Main's Ground Gecko	<i>Lucasium maini</i>	X										X		
Beaded Gecko	<i>Lucasium damaeum</i>													
Reticulated Velvet Gecko	<i>Hesperoedura reticulata</i>	X					X							
Beaked Gecko	<i>Rhynchoedura ornata</i>						X							
Thorn -tailed Gecko	<i>Strophurus assimilis</i>	X												
Jewelled Gecko	<i>Strophurus elderi</i>	X												
Ring-tailed Gecko	<i>Strophurus strophurus</i>													
CARPHODACTYLIDAE														
Pale Knob-tailed Gecko	<i>Nephrurus laevissimus</i>	X												
Barking Gecko	<i>Nephrurus milii</i>	X	X			X	X					X		
Midline Knob-tail	<i>Nephrurus vertebralis</i>													
GEKKONIDAE														
Marbled Gecko	<i>Christinus marmoratus</i>	X												
Purplish Dtella	<i>Gehyra purpurascens</i>	X												
Tree Dtella	<i>Gehyra variegata</i>	X				X	X			X		X	X	
Bynoe's Gecko	<i>Heteronotia binoei</i>	X	X				X	X	X	X		X		X
PYGOPODIDAE														

REPTILES		CS	SI	B	TSF	Mt Ma	Mt Ma2	Mt Mt	P	S	C	K	G	Bonnie
Marble-faced Delma	<i>Delma australis</i>		X											
Unbanded Dema	<i>Delma butleri</i>		X											
Fraser's Delma	<i>Delma fraseri</i>		X											
Burton's Legless-Lizard	<i>Lialis burtonis</i>		X											
Common Scaly-foot	<i>Pygopus lepidopodus</i>		X											
Western Scaly-foot	<i>Pygopus nigriceps</i>													
SCINCIDAE														
A skink	<i>Cryptoblepharus australis</i>													
A skink	<i>Cryptoblepharus buechananii</i>		X											
Southern Mallee Skink	<i>Ctenotus atlas</i>		X											
Leonhardi's Ctenotus	<i>Ctenotus leonhardii</i>		X											
Barred Wedge-snouted Ctenotus	<i>Ctenotus schomburgkii</i>		X											
Rock Ctenotus	<i>Ctenotus severus</i>													
Spotted Ctenotus	<i>Ctenotus uber</i>		X						X					X
Spinifex Slender Blue-tongue	<i>Cyclodomorphus melanops</i>		X											
Pygmy Spiny-tailed Skink	<i>Egernia depressa</i>			X				X	X					X
Goldfields Crevice Skink	<i>Egernia formosa</i>		X	X	X		X			X				
Desert Skink	<i>Egernia inornata</i>		X											
Woodland Crevice Skink	<i>Egernia richardi</i>													
Night Skink	<i>Egernia striata</i>													
Broad-banded Sandswimmer	<i>Eremiascincus richardsonii</i>		X											
Southern Five-toed Mulch Skink	<i>Hemiergis initialis</i>		X											
Four-toed Mulch Skink	<i>Hemiergis peronii</i>													
South-west Four-toed Lerista	<i>Lerista distinguenda</i>		X											
King's Lerista	<i>Lerista kingi</i>													
Goldfields Robust Lerista	<i>Lerista picturata</i>		X											
Common Mulch Lerista	<i>Lerista timda</i>													
Bull-headed Skink	<i>Liopholis multiscutata</i>		X											
Common Dwarf Skink	<i>Menetia greyii</i>		X											
Saltbush Flecked Skink	<i>Morethia adelaidensis</i>		X											
Woodland Dark Fleck Skink	<i>Morethia butleri</i>		X											
Woodland Flecked Skink	<i>Morethia obscura</i>		X											
Western Blue-tongue	<i>Tiliqua occipitalis</i>		X											
Bobtail	<i>Tiliqua rugosa</i>		X			X		X		X	X	X	X	X
VARANIDAE														
Pygmy Mulga Monitor	<i>Varanus caudolineatus</i>													
Sand Monitor	<i>Varanus gouldii</i>		X	X	X	X	X	X	X	X	X	X		
Racehorse Monitor	<i>Varanus tristis tristis</i>							X						
TYPHLOPIDAE														

REPTILES		CS	SI	B	TSF	Mt Ma	Mt Ma2	Mt Mt	P	S	C	K	G	Bonnie
Southern Blind Snake	<i>Anilius australis</i>		X											
Dark-spined Blind Snake	<i>Anilius bicolor</i>		X											
Prong-snouted Blind Snake	<i>Anilius bituberculatus</i>		X											
Hook-Snouted Blind Snake	<i>Anilius hamatus</i>													
Common Beaked Blind Snake	<i>Anilius waitii</i>													
BOIDAE														
Stimson's Python	<i>Antaresia stimsoni</i>													
Carpet Python	<i>Morelia spilota imbricata</i>	1	X											
ELAPIDAE														
Desert Death Adder	<i>Acanthopis pyrrhus</i>													
Narrow-banded Shovel-nosed Snake	<i>Brachyuropis fasciolata</i>		X											
Southern Shovel-nosed Snake	<i>Brachyuropis semifasciata</i>		X											
Yellow-faced Whipsnake	<i>Demansia psammophis</i>		X											
Bardick	<i>Echiopsis curta</i>													
Moon Snake	<i>Furina ornata</i>													
Black-naped Snake	<i>Neelaps bimaculatus</i>													
Gould's Snake	<i>Parasuta gouldii</i>		X											
Monk Snake	<i>Parasuta monachus</i>		X											
Black-backed Hooded Snake	<i>Parasuta nigriceps</i>													
Mulga Snake	<i>Pseudechis australis</i>		X											
Dugite	<i>Pseudonaja affinis</i>													
Ringed Brown Snake	<i>Pseudonaja modesta</i>		X											
Western Brown Snake	<i>Pseudonaja mengdeni</i>		X									X		
Jan's Banded Snake	<i>Simoselaps bertholdi</i>		X											
Rosen's Snake	<i>Suta fasciata</i>													
Total Number of Species Expected: 85														
Total Recorded during BCE Surveys: 15			59	6	6	3	9	5	3	6	3	12	2	5

Table 2.3. Bird species recorded or expected to occur in the survey area.

Birds		CS	SI	B	TSF	Mt Ma	Mt Ma 2	Mt	P	S	K	G	C	Bonnie
CASUARIIDAE														
<i>Dromaius novaehollandiae</i>	Emu		X	X		X	X		X	X		X	X	X
PHASIANIDAE														
<i>Coturnix pectoralis</i>	Stubble Quail													
MEGAPODIIDAE														
<i>Leipoa ocellata</i>	Malleefowl	1	X				X	X			X	X	X	X
ANATIDAE														
<i>Cygnus atratus</i>	Black Swan									X				
<i>Tadorna tadornoides</i>	Australian Shelduck									X				
<i>Chenonetta jubata</i>	Australian Wood Duck									X				
<i>Anas superciliosa</i>	Pacific Black Duck									X				
<i>Anas rhynchotis</i>	Australasian Shoveler													
<i>Malacorhynchus membranaceus</i>	Pink-eared Duck									X				
<i>Anas gracilis</i>	Grey Teal									X				
<i>Anas castanea</i>	Chestnut Teal													
<i>Aythya australis</i>	Hardhead													
<i>Stictonetta naevosa</i>	Freckled Duck													
<i>Biziura lobata</i>	Musk Duck													
PODICIPEDIDAE														
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe			X	X					X				
<i>Poliiocephalus</i>	Hoary-headed Grebe													
COLUMBIDAE														
<i>Phaps chalcoptera</i>	Common Bronzewing		X	X			X				X	X	X	X
<i>Ocyphaps lophotes</i>	Crested Pigeon		X	X						X	X		X	C
<i>Geopelia cuneata</i>	Diamond Dove				X									
PODARGIDAE														
<i>Podargus strigoides</i>	Tawny Frogmouth			X	X	X	X		X	X		X	X	
EUROSTOPODIDAE														
<i>Eurostopodus argus</i>	Spotted Nightjar						X							
AEGOTHELIDAE														
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar		X			X					X			
APODIDAE														
<i>Apus pacificus</i>	Fork-tailed Swift	1												
ANHINGIDAE														
<i>Microcarbo melanoleucos</i>	Little Pied Cormorant													

Birds		CS	SI	B	TSF	Mt Ma	Mt Ma 2	Mt	P	S	K	G	C	Bonnie
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant													
ARDEIDAE														
<i>Egretta novaehollandiae</i>	White-faced Heron			X						X				C
<i>Ardea pacifica</i>	White-necked Heron													
<i>Ardea modesta</i>	Eastern Great Egret	1												
PLATALEIDAE														
<i>Threskiornis spinicollis</i>	Straw-necked Ibis													
<i>Platalea flavipes</i>	Yellow-billed Spoonbill													
ACCIPITRIDAE														
<i>Elanus axillaris</i>	Black-shouldered Kite													
<i>Lophoictinia isura</i>	Square-tailed Kite	L												
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard													
<i>Haliastur sphenurus</i>	Whistling Kite													
<i>Milvus migrans</i>	Black Kite													
<i>Accipiter fasciatus</i>	Brown Goshawk		X	X									X	
<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk													
<i>Circus assimilis</i>	Spotted Harrier													
<i>Aquila audax</i>	Wedge-tailed Eagle		X	X					X			X	X	X
<i>Hieraaetus morphnoides</i>	Little Eagle										X			
FALCONIDAE														
<i>Falco cenchroides</i>	Nankeen Kestrel			X							X			
<i>Falco berigora</i>	Brown Falcon		X	X	X		X			X	X		X	
<i>Falco longipennis</i>	Australian Hobby													
<i>Falco peregrinus</i>	Peregrine Falcon	1												
RALLIDAE														
<i>Fulica atra</i>	Eurasian Coot													
<i>Rallus philippensis</i>	Buff-banded Rail													
<i>Porzana pusilla</i>	Baillon's Crane													
<i>Porzana tabuensis</i>	Spotless Crane													
<i>Porzana fluminea</i>	Australian Crane									X				
<i>Tribonyx ventralis</i>	Black-tailed Native-hen													
RECURVIROSTRIDAE														
<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet													
<i>Himantopus</i>	Black-winged Stilt									X				
<i>Cladorhynchus leucocephalus</i>	Banded Stilt									X				

Birds		CS	SI	B	TSF	Mt Ma	Mt Ma 2	Mt	P	S	K	G	C	Bonnie
OTIDIDAE														
<i>Ardeotis australis</i>	Australian Bustard	L												
BURHINIDAE														
<i>Burhinus grallarius</i>	Bush Stone-curlew	L												
CHARADRIIDAE														
<i>Charadrius ruficapillus</i>	Red-capped Plover													
<i>Elseynornis melanops</i>	Black-fronted Dotterel				X									
<i>Erythrogonys cinctus</i>	Red-kneed Dotterel													
<i>Thinornis rubricollis</i>	Hooded Plover	2												
<i>Charadrius australis</i>	Inland Dotterel													
<i>Vanellus tricolor</i>	Banded Lapwing													
SCOLOPACIDAE														
<i>Tringa nebularia</i>	Common Greenshank	1												
<i>Tringa glareola</i>	Wood Sandpiper	1												
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	1												
<i>Calidris ferruginea</i>	Curlew Sandpiper	1												
<i>Calidris ruficollis</i>	Red-necked Stint	1												
TURNICIDAE														
<i>Turnix velox</i>	Little Button-quail						R			X				
CACATUIDAE														
<i>Eolophus roseicapillus</i>	Galah										X			
<i>Cacatua sanguinea</i>	Little Corella													
<i>Nymphicus hollandicus</i>	Cockatiel													
<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	1												
PSITTACIDAE														
<i>Glossopsitta porphyrocephala</i>	Purple-crowned Lorikeet	L	X	X		X	X				X	X	X	X
<i>Platycercus icterotis</i>	Western Rosella	1												
<i>Polytelis anthopeplus</i>	Regent Parrot	L	X											
<i>Barnardius zonarius</i>	Australian Ringneck		X	X	X	X	X	X	X	X	X	X	X	X
<i>Psephotus varius</i>	Mulga Parrot		X	X			X					X	X	R
<i>Melopsittacus undulatus</i>	Budgerigar		X								X			
<i>Neophema splendida</i>	Scarlet-chested Parrot	L	X											
CUCULIDAE														
<i>Chalcites basalis</i>	Horsfield's Bronze-Cuckoo		X		X						X		X	
<i>Chalcites osculans</i>	Black-eared Cuckoo						X				X		X	X
<i>Cacomantis pallidus</i>	Pallid Cuckoo													
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo													

Birds		CS	SI	B	TSF	Mt Ma	Mt Ma 2	Mt	P	S	K	G	C	Bonnie
STRIGIDAE														
<i>Ninox novaeseelandiae</i>	Southern Boobook													
TYTONIDAE														
<i>Tyto alba</i>	Eastern Barn Owl													
HALCYONIDAE														
<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher					X								
<i>Todiramphus sanctus</i>	Sacred Kingfisher				X									
MEROPIDAE														
<i>Merops ornatus</i>	Rainbow Bee-eater	1	X		X	X	X		X	X	X			
CLIMACTERIDAE														
<i>Climacteris affinis</i>	White-browed Treecreeper	L											X	
<i>Climacteris rufa</i>	Rufous Treecreeper	L	X			X	X						X	
MALURIDAE														
<i>Malurus splendens</i>	Splendid Fairy-wren			X				X	X	X			X	X
<i>Malurus leucopterus</i>	White-winged Fairy-wren		X	X				X	X	X	X			
<i>Malurus lamberti</i>	Variegated Fairy-wren													
<i>Malurus pulcherrimus</i>	Blue-breasted Fairy-wren					X	X	X	X	X	X	X		X
ACANTHIZIDAE														
<i>Sericornis frontalis</i>	White-browed Scrubwren													
<i>Hylacola cauta whitlocki</i>	Shy Heathwren	L	X											
<i>Calamanthus campestris</i>	Rufous Fieldwren													
<i>Pyrrholaemus brunneus</i>	Redthroat		X	X	X	X	X	X	X	X	X	X	X	X
<i>Smicronis brevirostris</i>	Weebill		X	X	X	X	X	X	X	X	X	X	X	X
<i>Gerygone fusca</i>	Western Gerygone													
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill			X	X		X		X	X	X		X	X
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill		X	X	X	X	X	X	X	X	X	X	X	X
<i>Acanthiza robustirostris</i>	Slaty-backed Thornbill										X			
<i>Acanthiza apicalis</i>	Inland Thornbill		X	X	X	X	X	X	X		X	X	X	X
<i>Acanthiza iredalei</i>	Slender billed Thornbill	L												
<i>Aphelocephala leucopsis</i>	Southern Whiteface												X	
PARDALOTIDAE														
<i>Pardalotus punctatus</i>	Spotted Pardalote					X								X
<i>Pardalotus striatus</i>	Striated Pardalote		X	X	X	X	X	X	X	X	X	X	X	X
MELIPHAGIDAE														
<i>Certhionyx variegatus</i>	Pied Honeyeater													
<i>Lichenostomus virescens</i>	Singing Honeyeater		X	X	X	X		X	X		X	X	X	X

Birds		CS	SI	B	TSF	Mt Ma	Mt Ma 2	Mt	P	S	K	G	C	Bonnie
<i>Lichenostomus leucotis</i>	White-eared Honeyeater			X	X	X	X	X	X	X	X	X	X	X
<i>Lichenostomus cratitius</i>	Purple-gaped Honeyeater	L												
<i>Lichenostomus ornatus</i>	Yellow-plumed Honeyeater	L	X	X	X	X	X	X	X	X	X	X	x	X
<i>Lichenostomus plumulus</i>	Grey-fronted Honeyeater			X										
<i>Purnella albifrons</i>	White-fronted Honeyeater		X	X		X	X	X		X	X		X	X
<i>Manorina flavigula</i>	Yellow-throated Miner		X	X	X	X	X				X		X	X
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater		X	X	X	X	X	X	X	X	X		X	X
<i>Anthochaera carunculata</i>	Red Wattlebird		X	X	X	X	X	X	X	X	X	X	X	X
<i>Epthianura albifrons</i>	White-fronted Cat									X				
<i>Epthianura tricolor</i>	Crimson Chat													
<i>Epthianura aurifrons</i>	Orange Chat													
<i>Sugomel niger</i>	Black Honeyeater													
<i>Lichmera indistincta</i>	Brown Honeyeater		X	X	X	X	X	X	X		X	X	X	X
<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater		X	X	X	X	X	X	X		X	X	X	X
<i>Phylidonyris nigra</i>	White-cheeked Honeyeater													
POMATOSTOMIDAE														
<i>Pomatostomus superciliosus</i>	White-browed Babbler			X	X	X	X	X		X	X	X	X	X
PSOPHODIDAE														
<i>Cinclosoma castanotus</i>	Chestnut Quail-thrush	L			X	X	X	X	X	X	X	X	x	X
NEOSITTIDAE														
<i>Daphoenositta chrysoptera</i>	Varied Sittella		X		X	X	X		X	X	X	X	X	X
CAMPEPHAGIDAE														
<i>Coracina maxima</i>	Ground Cuckoo-shrike													
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike		X	X	X	X	X	X		X	X		X	X
<i>Lalage sueurii</i>	White-winged Triller									X				
PACHYCEPHALIDAE														
<i>Pachycephala inornata</i>	Gilbert's Whistler	L		X	X	X	X			X	X		X	X
<i>Pachycephala rufiventris</i>	Rufous Whistler			X			X	X	X		X	X	X	X
<i>Pachycephala pectoralis</i>	Golden Whistler	L					X							R
<i>Colluricincla harmonica</i>	Grey Shrike-thrush		X	X	X	X	X		X	X	X	X	X	X
<i>Oreoica gutturalis</i>	Crested Bellbird		X	X	X	X	X	X	X	X	X	X	X	X
ARTAMIDAE														
<i>Artamus personatus</i>	Masked Woodswallow		X						X		X			
<i>Artamus cinereus</i>	Black-faced Woodswallow			X		X					X			
<i>Artamus cyanopterus</i>	Dusky Woodswallow		X			X	X					X	X	
<i>Artamus minor</i>	Little Woodswallow													

Birds		CS	SI	B	TSF	Mt Ma	Mt Ma 2	Mt	P	S	K	G	C	Bonnie
<i>Cracticus torquatus</i>	Grey Butcherbird		X	X	X	X	X				X	X	X	X
<i>Cracticus nigrogularis</i>	Pied Butcherbird				X	X			X			X	X	X
<i>Cracticus tibicen</i>	Australian Magpie		X	X				X	X	X	X		X	X
<i>Strepera versicolor</i>	Grey Currawong		X	X		X	X	X	X	X	X	X	X	X
RHIPIDURIDAE														
<i>Rhipidura albiscapa</i>	Grey Fantail													X
<i>Rhipidura leucophrys</i>	Willie Wagtail		X		X	X	X	X	X		X	X	X	X
CORVIDAE														
<i>Corvus bennetti</i>	Little Crow										X		X	X
<i>Corvus orru</i>	Torresian Crow													
<i>Corvus coronoides</i>	Australian Raven		X	X	X	X	X		X	X	X	X	X	X
MONARCHIDAE														
<i>Grallina cyanoleuca</i>	Magpie-lark				X									C
PETROICIDAE														
<i>Petroica goodenovii</i>	Red-capped Robin		X	X		X		X	X		X		X	X
<i>Melanodryas cucullata</i>	Hooded Robin													
<i>Microeca fascians</i>	Jacky Winter			X	X	X	X	X				X	X	X
<i>Eopsaltria griseogularis</i>	Western Yellow Robin	L					X			X	X	X	X	X
<i>Drymodes brunneopygia</i>	Southern Scrub-robin	L					R							
ZOSTEROPIDAE														
<i>Zosterops lateralis</i>	Silvereye		X						X					
MEGALURIDAE														
<i>Cincloramphus mathewsi</i>	Rufous Songlark													
<i>Cincloramphus cruralis</i>	Brown Songlark													
HIRUNDINIDAE														
<i>Cheramoeca leucosterna</i>	White-backed Swallow		X		X						X	X		X
<i>Hirundo neoxena</i>	Welcome Swallow				X	X	X	X			X	X		X
<i>Petrochelidon ariel</i>	Fairy Martin									X				
<i>Petrochelidon nigricans</i>	Tree Martin		X		X	X	X				X	X	X	
NECTARINIIDAE														
<i>Dicaeum hirundinaceum</i>	Mistletoebird		X	X			X		X	X	X		X	X
ESTRILDIDAE														
<i>Taeniopygia guttata</i>	Zebra Finch													
MOTACILLIDAE														
<i>Anthus novaeseelandiae</i>	Australasian Pipit		X		X					X	X			
Total Number of Species Expected: 164			49	45	40	42	47	29	35	48	55	38	53	47

Table 2.4. Mammal species recorded or expected to occur in the survey area.

MAMMALS		CS	SI	B	TSF	Mt Ma	Mt Ma2	Mt Mt	P	S	C	K	G	Bonnie
Tachyglossidae														
<i>Tachyglossus aculeatus</i>	Echidna		X	X	X	X	X	X	X	X	X	X	X	X
Dasyuridae														
<i>Ningauai ridei</i>	Ride's Ningauai		X											
<i>Ningauai yvonneae</i>	Mallee Ningauai		X											
<i>Antechinomys laniger</i>	Kultarr	L												
<i>Pseudantechinus woolleyae</i>	Woolley's Pseudantechinus													
<i>Sminthopsis crassicaudata</i>	Fat-tailed Dunnart		X											
<i>Sminthopsis dolichura</i>	Little Long-tailed Dunnart		X										X	
<i>Sminthopsis gilberti</i>	Gilbert's Dunnart													
Burramyidae														
<i>Cercartetus concinnus</i>	Western Pygmy Possum		X											
Macropodidae														
<i>Macropus fuliginosus</i>	Western Grey Kangaroo		X	X	X	X	X	X	X	X	X	X	X	X
<i>Macropus robustus</i>	Euro		X				X					X	X	X
<i>Macropus rufus</i>	Red Kangaroo		X											
Molossidae														
<i>Mormopterus sp. 3</i>	Inland Freetail Bat		X											
<i>Mormopterus sp. 4</i>	Southern Freetail Bat					X		X	X					X
<i>Tadarida australis</i>	White-striped Freetail Bat		X		X	X		X	X	X				X
Vespertilionidae														
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat		X		X	X		X	X	X				X
<i>Chalinolobus morio</i>	Chocolate Wattled Bat					X			X					
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat													
<i>Nyctophilus timoriensis</i>	Greater Long-eared Bat	CS2												
<i>Scotorepens balstoni</i>	Inland Broad-nosed Bat							X						
<i>Vespadelus regulus</i>	Southern Forest Bat					X				X				X
<i>Vespadelus baverstocki</i>	Inland forest bat				X	X		X						
Muridae														
<i>Notomys alexis</i>	Spinifex Hopping Mouse													
<i>Notomys mitchelli</i>	Mitchell's Hopping Mouse		X									X		
<i>Pseudomys bolami</i>	Bolam's Mouse		X											
<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse		X											

MAMMALS		CS	SI	B	TSF	Mt Ma	Mt Ma2	Mt Mt	P	S	C	K	G	Bonnie
INTRODUCED MAMMALS														
<i>Canis lupus</i>	Dingo		X							X				X
<i>Vulpes vulpes</i>	European Red Fox			X						X			X	
<i>Felis catus</i>	Feral Cat		X	X			X			X		X	X	X
<i>Oryctolagus cuniculus</i>	Rabbit		X	X	X	X	X	X	X	X	X	X	X	X
<i>Mus musculus</i>	House Mouse		X		X			X	X	X				
<i>Capra hircus</i>	Goat			X	X	X	X	X	X	X	X	X	X	
<i>Equus caballus</i>	Horse											X		
<i>Camelus dromedarius</i>	Dromedary Camel													
<i>Bos taurus</i>	Cattle					X		X	X	X				
<i>Ovis aries</i>	Sheep													
Total Number of Native Species Expected: 26			16	2	5	8	3	7	6	6	2	4	4	7
Total Number of Introduced Species Expected: 10			4	4	3	3	3	4	4	7	2	4	4	3

Appendix 3. Habitat Photographs

Three major fauna habitats were identified during the survey. The following plates depict those fauna habitats recorded from the survey area (see table below).

LANDFORM	VEGETATION
Undulating loam and stony plains	Eucalypt Woodland and Mallee dominated by <i>E. salubris</i> , <i>E. lesouefii</i> and <i>E. salmonophloia</i> with an open understorey including <i>Eremophila scoparia</i> , <i>Santalum spicatum</i> and sparsely occurring chenopods.
Greenstone Hills	Shrublands dominated by <i>A. quadrimarginea</i> with <i>A. tetragonophylla</i> , <i>A. burkitii</i> , <i>Scaevola spinescens</i> and <i>Eremophila</i> species (e.g. <i>E. oldfieldii</i>). Occasional smaller stands of <i>Eucalyptus</i> Woodland occur.
Lower stony slopes	Sheaok (<i>Casuarina pauper</i>) Woodland with a variable understorey occurs on the lower slopes and foothills of Emu Hill.

Habitat 1: Eucalypt Woodland and Mallee on loam or stony plains.



Habitat 2: Acacia shrublands on Greenstone Hills.



Habitat 3: Sheoak Woodland on lower stony slopes.





Coolgardie Gold Project
Basic Terrestrial Fauna Survey Report
Prepared for Focus Minerals Limited
May 2023

Limitations

Scope of services

This report (“the report”) has been prepared by Western Ecological Pty Ltd (WE) in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and WE. In some circumstances, a range of factors such as time, budget, access and/or site disturbance constraints may have limited the scope of services. This report is strictly limited to the matters stated in it and is not to be read as extending, by implication, to any other matter in connection with the matters addressed in it.

Reliance on data

In preparing the report, WE have relied upon data and other information provided by the Client and other individuals and organisations, most of which are referred to in the report (“the data”). Except as otherwise expressly stated in the report, WE have not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report (“conclusions”) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. WE have also not attempted to determine whether any material matter has been omitted from the data. WE will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented, or otherwise not fully disclosed to WE. The making of any assumption does not imply that WE have made any enquiry to verify the correctness of that assumption.

The report is based on conditions encountered and information received at the time of preparation of this report or the time that site investigations were carried out. WE disclaim responsibility for any changes that may have occurred after this time. This report and any legal issues arising from it are governed by and construed in accordance with the law of Western Australia as at the date of this report.

Report Version	Revision No.	Purpose	Author / Reviewer	Submitted to Client	
				Form	Date
Draft Report	1	For client review	Western Ecological / Focus Minerals	Electronic	30/05//2023
Final Report	2	Final Submission	Western Ecological / Focus Minerals	Electronic	06/06//2023

Executive Summary

Focus Minerals Limited (Focus) commissioned Western Ecological (WE) to undertake a Basic fauna survey in the Coolgardie area, as part of their Coolgardie Gold Operations (CGO). The project is near the town of Coolgardie, approximately 35 km west of Kalgoorlie in Western Australia.

Western Ecological understands that Focus plans to conduct exploration activities in and around the Kangaroo Hill Timber Reserve (KHTR) (approx. 1000 ha) and in identified analogue sites (approx. 17 ha) around the CGO. Other sections that require surveying include the Bonnie Vale area (two sites, approx. 140 ha).

The outcome of the survey undertaken by WE and the information supplied in this report will be used to inform the environmental assessment and approvals process.

The desktop assessment involved searches of the DBCA Threatened Fauna Database, NatureMap, the EPBC Protected Matters Search Tool (EPBC PMST) and the Atlas of Living Australia (ALA). Results of the databases searches returned the following:

- DBCA – 103 records in total, of which there were 13 conservation significant vertebrate fauna species. These were comprised of 11 bird species and two mammal species.
- NatureMap – 312 vertebrate fauna species (6 amphibian species, 88 reptile species, 182 bird species and 36 mammal species).
- EPBC PMST - 12 threatened species, 7 migratory species.
- ALA - 190 vertebrate fauna species (5 amphibian species, 42 reptile species, 130 bird species and 13 mammal species).

A total of 13 conservation significant vertebrate species were identified during the desktop review of the database searches. These were comprised of 24 bird species and four mammal species (three of which were introduced). All species recorded were considered to be common and widespread.

A field survey was undertaken in from 4-11th April 2023 and a total of 34 fauna species were recorded. A total of 65 habitat assessments were undertaken during the field survey and a total of four broad fauna habitats types were recorded. These four habitats were Mallee Eucalyptus Woodland, Salmon Gum Woodland, Acacia Shrubland and Casuarina Shrubland. The most widespread habitat across the survey area was Mallee Eucalyptus Woodland, consisting of 61.3% of the survey area.

The primary conservation significant species to consider during the survey was the Malleefowl. Potential suitable breeding habitat can be found in some areas of Mallee Eucalypt Woodland and Casuarina Shrubland which comprised 62.2% of the survey area. During the survey, no birds and no mounds or evidence of Malleefowl was recorded.

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1. Introduction

1.1 Background

Focus Minerals Limited (Focus) commissioned Western Ecological (WE) to undertake a Basic fauna survey in the Coolgardie area approximately 35 km west of Kalgoorlie in Western Australia.

Western Ecological understands that Focus plans to conduct exploration activities in and around the Kangaroo Hill Timber Reserve (KHTR) (approximately 1000 ha) and in identified analogue sites (approximately 17 ha) around the Coolgardie Gold Operations (CGO). An additional section in the Bonnie Vale area (approximately 140 ha) to the north of Coolgardie is also being explored. The total survey area is 1,205 ha and can be seen in Figure 1.

Focus requested a basic fauna survey be undertaken in these areas to determine the presence of conservation significant fauna species. The results of the survey will support the environmental approvals process for the project.

1.2 Scope

The scope to be undertaken was as follows:

- Basic fauna survey
- Document the above in a technical fauna report.

1.3 Objective

The objective of the fauna survey was to define the fauna values in the survey area, to support future project planning, and inform environmental approvals.

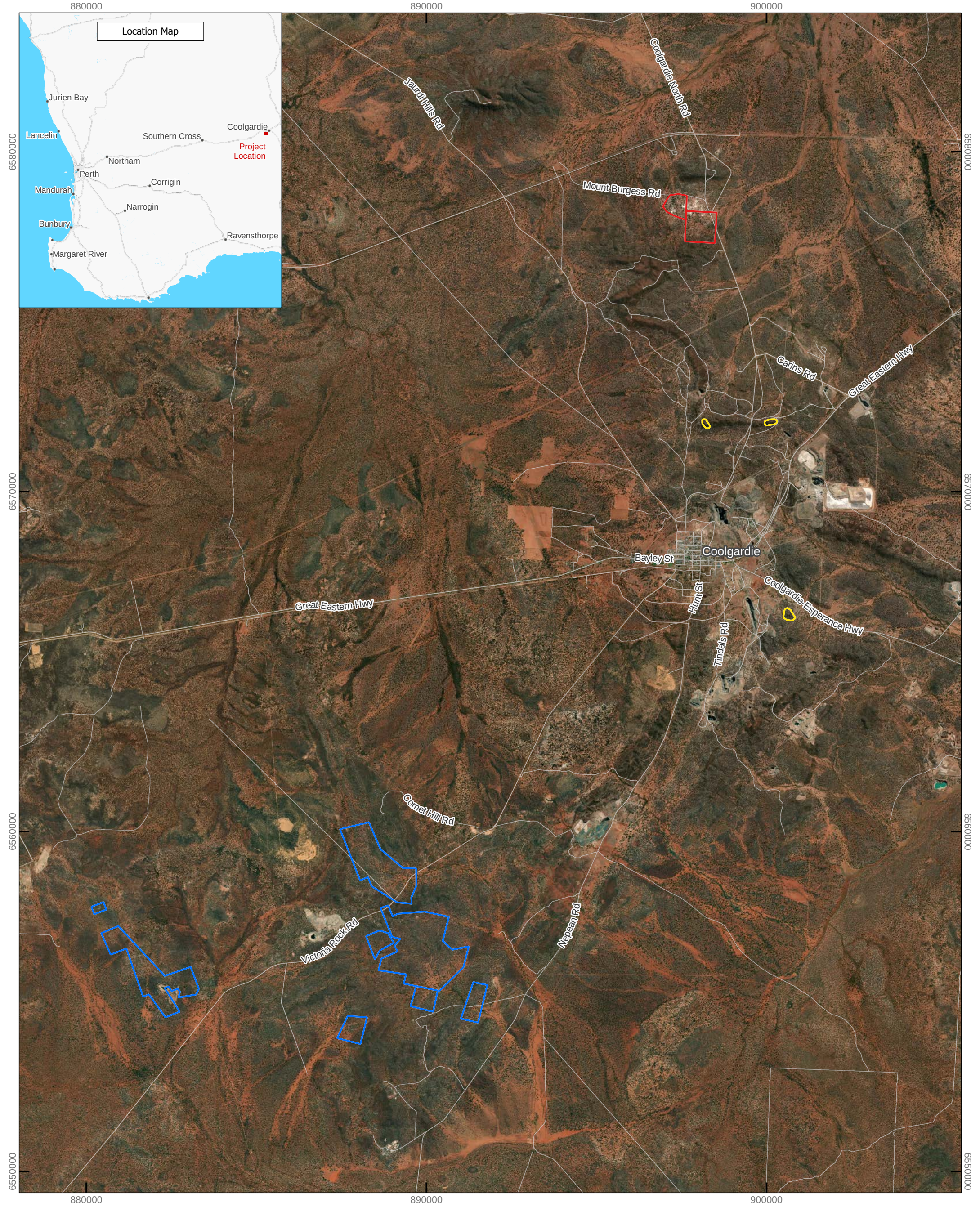
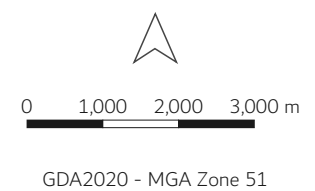


Figure 1: Project Location



- Legend**
- Survey Boundary
 - Kangaroo Hill Timber Reserve
 - Bonnievale
 - Analogue Sites



1.4 Legislative Context

Fauna in Western Australia (WA) is protected formally and informally by various legislative and non-legislative measures, which are as follows:

- Legislative Protection:
 - *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
 - *Western Australian Biodiversity Conservation Act 2016* (BC Act).
- Non-legislative measures:
 - WA Department of Biodiversity, Conservation and Attractions (DBCA) Priority lists
 - Recognition of locally significant populations by DBCA.

A short description of each is given below. Other definitions, including species conservation categories, are provided in Appendix 1.

EPBC Act

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) aims to protect matters of national environmental significance, which are detailed in Appendix 1. Under the EPBC Act, the Commonwealth Department of Department of Climate Change, Energy, the Environment and Water (DCCEEW) lists protected species and Threatened Ecological Communities (TECs) by criteria set out in the Act. Species are conservation significant if they are listed as Threatened (i.e., Critically Endangered, Endangered and Vulnerable) or Migratory.

Bird species protected as Migratory under the EPBC Act include those listed under international migratory bird agreements relating to the protection of birds, which migrate between Australia and other countries, for which Australia has agreed. This includes the Japan-Australia Migratory Bird Agreement (JAMBA), the China-Australia Migratory Bird Agreement (CAMBA), the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA) and the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention).

Some marine fauna or terrestrial fauna that use marine habitats are listed as Marine under the EPBC Act. These species are only considered conservation significant when a proposed development occurs in a Commonwealth marine area (i.e., any Commonwealth Waters or Commonwealth Marine Protected Area). Outside of such areas, the EPBC Act does not consider these species to be matters of national environmental significance, so are not protected under the Act.

BC Act

The *Biodiversity Conservation Act 2016* (BC Act) replaced both the *Wildlife Conservation Act 1950* and the *Sandalwood Act 1929* and came into effect on 1 January 2019. The aim of the new Act is to conserve and protect biodiversity and to promote the ecologically sustainable use of biodiversity components in the State and will bring more activities within the scope of biodiversity laws.

Taxa listed as Threatened in the category of critically endangered, endangered, or vulnerable under section 19 (1a, 1b, and 1c), or is a rediscovered species to be regarded as threatened species under section 26 (2) of the BC Act. Other categories include extinct or extinct in the wild and they are listed under section 23 (1) of the BC Act (Appendix 1).

If species meet 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, they are covered under section 13 (1) of the BC Act and are called specially protected species. Species that are listed as threatened species (critically endangered, endangered, or vulnerable) or extinct species under the BC Act can't also be listed as Specially Protected species (see Appendix 1 for a more detailed description of each threat category).

Threatened Ecological Communities (TECs) are also covered under the BC Act and are placed into three categories of critically endangered, endangered, or vulnerable under section 27 (1a, 1b, and 1c) of the BC Act depending on their threat status.

DBCA Priority Species and Communities

DBCA lists species that are possibly threatened but that do not meet criteria for listing under the BC Act, or are otherwise data deficient, and adds them 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. Consideration 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 (see Appendix 1 for more detail of the priority codes).

The DBCA also has a list of Priority Ecological Communities (PECs) that have scant information available to be considered a TEC, or which are rare but not currently threatened. Ecological communities that do not meet survey criteria or that are not sufficiently defined are added to the PEC list under priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community, and evaluation of conservation status, so that consideration can be given to their declaration as a TEC. Ecological communities that are adequately known, and are rare but not threatened or meet criteria for near threatened, or that have been recently removed from the threatened list, are placed in priority 4. These ecological communities require regular monitoring. Conservation dependent ecological communities are placed in priority 5.

Informal Recognition of Threatened Fauna

Certain populations or communities of fauna may be of local significance or interest because of their patterns of distribution and abundance. For example, fauna may be locally significant because they are range extensions to the previously known distribution or are newly discovered species (and have the potential to be of conservation significance). In addition, many species are in decline as a result of threatening processes (land clearing, grazing, and changed fire regimes) and relict populations of such species assume local importance for DBCA. It is not uncommon for DBCA to make comment on these species of interest.

2. Existing Environment

2.1 Bioregions

The Biogeographic Regionalisation of Australia (IBRA7) divides Australia into 89 bioregions based on major biological, geographical and geological attributes. These bioregions are subdivided into 419 subregions as part of a refinement of the IBRA framework (DCCEEW 2020). The survey area sits within the Coolgardie 3 subregion (COO3 – Eastern Goldfields subregion) which forms part of the Coolgardie Bioregion, of which there are three subregions.

The climate is Arid to Semi-arid with 200-300 mm of rainfall, sometimes in summer but usually in winter. Coolgardie 3 lies on the Yilgarn Craton's 'Eastern Goldfields Terrains'. The relief is limited and consists 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 (Cowan 2001). 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).

The vegetation consists of Mallees, Acacia thickets and shrub heaths 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 Acacias. Land use consists primarily of primarily of Crown reserves, grazing, conservation and mining (Cowan 2001).

2.2 Climate

The nearest Bureau of Meteorology (BoM) weather station, with up to date (2022/23) data is Kalgoorlie – Boulder Airport (Station No. 012038) which is approximately 33 km east of the survey area. A weather station was present at Coolgardie; however, it has incomplete rainfall records, particularly from 2010 onwards. Further to this temperature data is only available from 1897 to 1953 (BoM 2023).

The annual long-term average (1939 – 2022) rainfall is 264 mm, with the lowest average monthly rainfall being 13.6 mm in September, while the highest average monthly rainfall is 31.9 mm in February (BoM 2023). The mean annual monthly temperature maximum recorded at the Kalgoorlie – Boulder Airport weather station is 25.4°C and minimum is 11.8°C. On average the warmest month of the year is January with a mean maximum temperature of 33.6°C. July is the coolest month with a mean minimum temperature of 5.1°C.

In the 12 months prior to the survey (April 2022 – March 2023), the mean maximum temperature was 25.2°C and the minimum was 12.1°C. These temperatures are relatively consistent with the long-term average. The total rainfall in the 12 months prior to the survey however, was 206 mm which is 58 mm less than the annual long-term average total. In this 12-month period, the largest rainfall occurred in August (rather than February, which has the highest long-term average (Figure 2)).

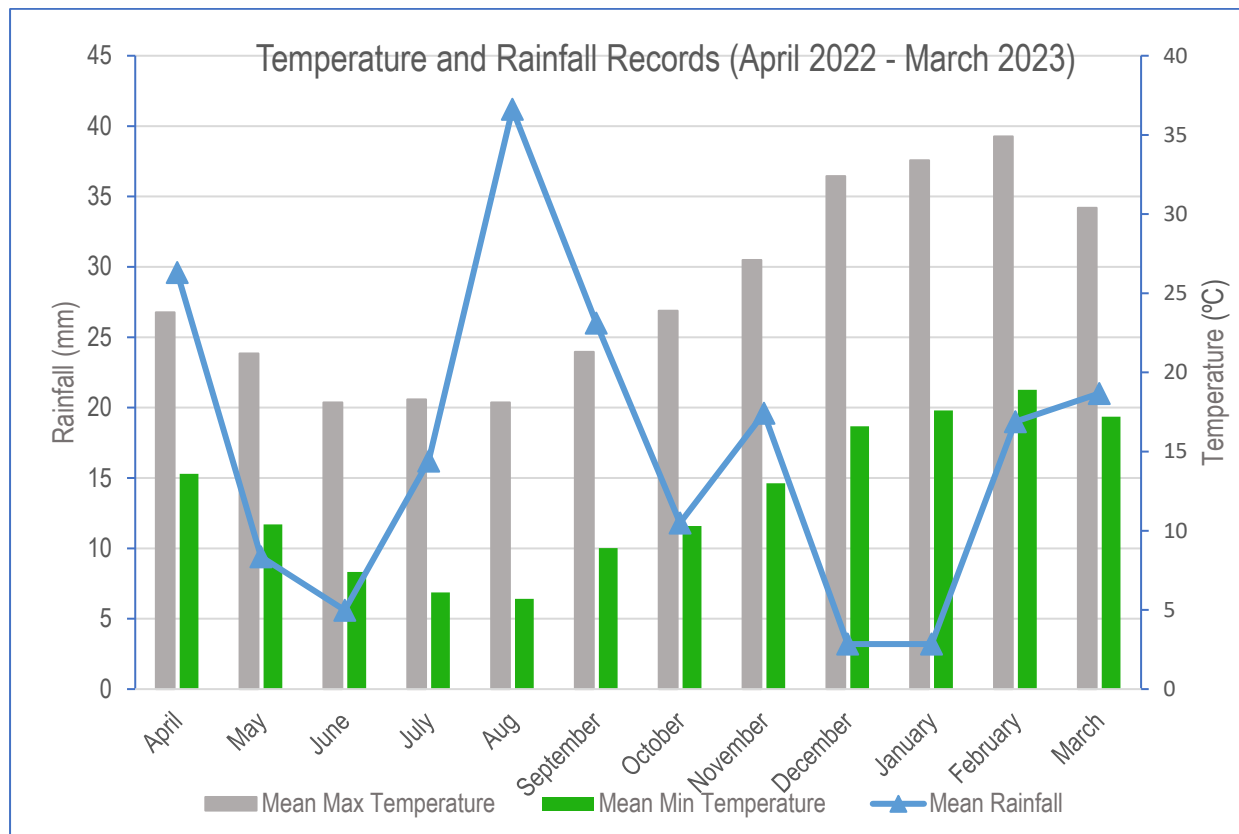


Figure 2. Climate Graph. Mean temperatures and rainfall (from April 2022 – March 2023) data per month from Kalgoorlie-Boulder Airport Station (BoM 2023).

2.3 Previous Surveys

A number of fauna surveys that have been undertaken in the vicinity of the survey area have been summarised (Table 1). Reports were reviewed for information relevant to the survey area and the conservation significant species recorded.

Table 1: Summary of previous fauna surveys undertaken for the vicinity of the survey area.

Reference	Survey Type	Survey Date	Proximity to survey area	Methods	Broad Habitats Described	Conservation Significant Species Recorded
Coolgardie Gold Project, Basic Fauna Survey. (Western Ecological 2021)	Basic Terrestrial Fauna Survey	Feb 2021	Less than 1 km (in some areas)	Basic fauna survey (habitat assessment and opportunistic observations) and targeted assessment	Mallee Eucalyptus Woodland Salmon Gum Woodland Acacia Shrubland Drainage Line	None
Bonnievale Level 1 Fauna Assessment (Kingfisher Environmental Consulting 2017)	Basic Terrestrial Fauna Survey	May 2017	Less than 500 m	Basic fauna survey. Targeted searches. Camera traps. Acoustic bat detectors	Mallee Eucalyptus Woodland Acacia Shrubland Allocasuarina Shrubland	Malleefowl individual and mounds. (Seven old/inactive mounds)

Reference	Survey Type	Survey Date	Proximity to survey area	Methods	Broad Habitats Described	Conservation Significant Species Recorded
Mt Marion Fauna Assessment: Hamptons Lease Area 53, L15/353, M15/999 and East E15/1599 (Bamford Consulting Ecologists 2022)	Basic and targeted fauna survey	Jan 2022	Approx. 25 km to the south-east	Basic fauna survey. Targeted searches and camera traps.	Mixed Eucalypt Woodland Acacia Shrubland Dense Mallee and Eucalypt woodland	Malleefowl (mounds)
Spectrum Ecology and Spatial (2022) Binduli South Project Terrestrial Fauna and SRE Assessment	Basic fauna survey	2022	Approx. 20 km to the north-east	Basic fauna survey (habitat assessment and opportunistic observations)	Mixed Eucalypt Woodland Acacia Shrubland Allocasuarina Shrubland Chenopod Shrubland	None
Detailed and Targeted Fauna Survey By-product Storage Site. Prepared for Lynas Kalgoorlie (Onshore Environmental 2021)	Detailed fauna survey	Feb 2021	Approx 40 km to the north-east	Trapping programme Targeted searches Spotlighting Audio units	Eucalypt Woodland Shrublands	None
Mineral Resources Limited Mount Marion Lithium Project Malleefowl Survey (Bamford Consulting Ecologists 2020)	Targeted Malleefowl survey	Jan 2020	Approx. 25 km to the south-east	Targeted searches	Eucalyptus Woodland Mallee Woodland Allocasuarina Shrubland Acacia Shrubland	None
Terrestrial fauna survey for the St Ives Gold Mine Beyond 2018 Project (Phoenix Environmental 2018)	Basic Vertebrate Survey	2018	Approx 55 km to the south-east	Basic fauna survey (habitat assessment and opportunistic observations)	Salt Lake Woodlands Shrublands	Malleefowl Fork-tailed Swift
Level 1 Vertebrate Fauna Risk Assessment for Lot 500 Kalgoorlie West (Terrestrial Ecosystems 2018)	Basic Fauna Survey	2018	Approx. 20 km to the east	Basic fauna survey (habitat assessment and opportunistic observations)	Open Eucalypt Woodland	None

3. Methods

3.1 Requirements for Fauna Surveys

The fauna survey was completed in accordance with the following Environmental Protection Authority (EPA) and DCCEEW requirements for the environmental surveying and reporting of fauna surveys in WA, where relevant and practical, and as documented in:

- EPA Technical Guidance: Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA 2020)
- EPA Statement of Environmental Principles, Factors and Objectives (EPA 2018)
- EPA Environmental Factor Guideline: Terrestrial Fauna (EPA 2016)
- Survey Guidelines for Australia's Threatened Birds. EPBC Act survey guidelines 6.2 (2010) (DSEWPaC)
- Survey Guidelines for Australia's Threatened Mammals. EPBC Act survey guidelines 6.5 (2011) (DSEWPaC)
- Survey Guidelines for Australia's Threatened Reptiles. EPBC Act survey guidelines 6.6 (2011) (DSEWPaC)
- Survey Guidelines for Australia's Threatened Frogs. EPBC Act survey guidelines 6.3 (2010) (DSEWPaC)
- National Recovery Plan for Malleefowl (*Leipoa ocellata*) Department for Environment and Heritage (J. Benshemesh 2007).
- Threatened Species Scientific Committee. Conservation Advice, where provided for species listed under the EPBC Act (DCCEEW)
- DBCA standard fauna operating procedures (where relevant).

3.2 Desktop Assessment

Searches of the DBCA Threatened Fauna Database, NatureMap, EPBC Protected Matters Search Tool (EPBC PMST) and the Atlas of Living Australia (ALA) (all with a 50 km buffer applied) were undertaken to identify fauna species of conservation significance potentially occurring in the survey area (DBCA 2023a, DBCA 2023b DCCEEW 2023, ALA 2023) (Appendix 2). These searches were centred on the following co-ordinates 324654.22 E / 6573318.20 S.

3.3 Field Survey

The field survey was undertaken over eight days (including travel) from the 4th – 11th April 2023 by two qualified Zoologists (Dr Ron Firth and Laura Stevens). As per the scope and proposal, the following survey methods were undertaken.

3.3.1 Habitat Assessment

Habitat assessments were undertaken to assess their potential to support species of conservation significance and the quality of habitat they provide to a wider suite of fauna. Fauna habitat assessments were undertaken to define and delineate the main broad fauna habitat types present. The habitat assessments were documented systematically for each habitat type on standardised field sheets. The habitat assessments consisted of the following:

- location of the broad habitat type within the survey area (GPS co-ordinate) and its relative percentage
- habitat condition was assessed at each assessment site as 'completely degraded' through to 'pristine', based on the scale given in Keighery (1994)
- landscape position
- dominant vegetation and structure (e.g., number of vegetation strata)
- hollow-bearing trees and dead stags (e.g., average size and abundance of hollows)
- description of any rock and rocky outcrops
- logs (e.g., abundance and size)
- substrate (e.g., leaf litter)
- wetlands, creeks, rivers, dams and other water bodies
- description of any observed nests and roosts (if present)

- subterranean roosts (e.g., caves, disused mineshafts and/or adits)
- associated fauna species observed using the habitat
- disturbance (e.g., cattle grazing, fire)
- photo showing a typical example of the broad habitat type.

A total of 65 habitat assessments were undertaken. The location of the habitat assessments can be seen in Appendix 3.

3.3.2 Active Fauna Searches

Fauna were actively searched for in the survey area. Active searches were undertaken for twenty minutes at locations throughout the survey area, in addition to the habitat assessment locations. The active searches included looking through leaf litter, (particularly under Eucalyptus trees, where a deep layer of leaf litter can form), overturning rocks and looking under decorticated bark (where present).

3.3.3 Bird Surveys

Systematic bird surveys were undertaken in all habitats in the survey area for 20 minutes in a 1-ha quadrat. They were undertaken during typical peak periods of activity when birds are calling and moving about, which is typically in the 3-4 hours of sunrise. We also used call playback in an attempt to locate cryptic and or conservation significant species where possible.

3.3.4 Opportunistic Searches

Fauna were recorded opportunistically during the survey. This involved looking through leaf litter (particularly under the Eucalyptus trees, where a layer of leaf litter had sometimes formed), overturning rocks and looking under decorticated bark (where present). Other recordings included visual sightings of active fauna such as reptiles and birds, signs of species presence such as burrows and scats of mammals and reptiles, and aural observations of amphibian and bird species. Observation (visual or heard) of species considered of conservation significance were recorded by means of a hand-held GPS if present.

3.3.5 Malleefowl Assessment

The one species of conservation significance considered during the field survey was the Malleefowl (*Leipoa ocellata*). The Malleefowl was given the focus for several reasons. The survey area is within the known distribution of the species, potential habitat is present in the region and records of the Malleefowl were returned from each of the database searches undertaken. In addition, previous fauna reports in the vicinity of the survey area recorded birds, mounds and suitable habitat.

Areas with potentially suitable habitat were walked on foot and assessed for evidence of Malleefowl activity such as:

- Malleefowl tracks
- Malleefowl nesting mounds including status (inactive/ active) and activity according to the following criteria:
 - Nest in preparation – eggs not laid (evidence of litter trail)
 - Mound is in progress/ maintenance – eggs assumed to be laid
 - Evidence of chicks leaving nest – chicks fledging site / shell fragments
 - Decommissioned – spreading and returning of mound soil
- Malleefowl individual sightings and assessment of age (chick/ adult)
- Opportunistic observations of Malleefowl evidence (tracks, mounds and or individual sightings) within the survey area.

3.3.6 Taxonomy

For species identified in the desktop assessment, where there is doubt to their true taxonomy (through subsequent name changes or taxonomic reviews), an effort was made to determine the current scientific name for each taxon. In some cases, old scientific names were presented where correct nomenclature could not be determined due to name changes. Some taxon names may be followed by 'sp.', meaning that the species name was not given in the data source or the identification is in doubt. Where there are previously recorded taxa such as this that have the potential to be a conservation significant species, they are discussed specifically in the results and discussion sections.

Taxonomy and nomenclature in this report follows the accepted listing of published terrestrial vertebrate species, primarily the West Australian Museum (2022). In addition, the following are also considered; the listing for reptiles is consistent with Chapple



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et al. (2019), Wilson & Swan (2017) and (to a lesser extent) Cogger (2014); bird listings are consistent with Christidis & Boles (2008) and mammal listings are consistent with Woinarski *et al.* (2014).

4 Results

4.1 Survey Limitations

Survey constraints are often difficult to predict, as is the extent to which they influence survey effort. Survey limitations and constraints of the fauna survey are outlined below in Table 2.

Table 2: Limitations and constraints associated with the survey.

Variable	Impact on Survey Outcome
Access	The survey area (approximately 1,205 ha) was accessible and traversed by vehicle and by foot. It is important to note however, that there were areas where access was limited, with few access tracks. In particular, this was the case in the larger areas of KHTR.
Experience	The personnel who undertook the survey were practitioners suitably qualified in their respective fields with relevant experience as specified by the EPA Technical Guidance: Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA 2020). The personnel were as follows: <ul style="list-style-type: none"> • Dr Ron Firth (Principal Ecologist) • Laura Stevens (Principal Zoologist).
Timing, weather, season	The survey was conducted as a Basic fauna survey and therefore primarily about defining and describing habitats present. Timing, weather and season, therefore, are not deemed a prime consideration. The survey was undertaken from 4 th – 11 th April 2023 (including travel). There were therefore no limitations to the survey due to timing, weather or season.
Scope	The survey consisted of a Basic fauna survey. During the field survey, the survey area was assessed to define the habitats and fauna values in the survey area.
Completeness	A total of: <ul style="list-style-type: none"> • 1,205 ha was assessed as part of the Basic fauna survey • 65 habitat assessment were undertaken • 34 fauna species were recorded • Four broad fauna habitat types were described
Disturbance	Disturbance from mining and exploration (historic and recent) was evident in a number of locations in the survey area.

4.2 Database Results

Results of the databases searches can be seen in Appendix 2 and consisted of the following:

- DBCA – 103 records in total, of which there were 13 conservation significant vertebrate fauna species. These were comprised of 11 bird and two mammal species.
- NatureMap – 312 vertebrate fauna species (6 amphibian species, 88 reptile species, 182 bird species and 36 mammal species).
- EPBC PMST - 12 threatened species, 7 migratory species.
- ALA - 190 vertebrate fauna species (5 amphibian species, 42 reptile species, 130 bird species and 13 mammal species).

The DBCA Threatened Fauna Database returned a total of 13 conservation significant fauna species within a 50 km radius of the survey area. The results of which can be seen in Figure 3 (a and b). Figure 3a shows the records within the entire 50 km

radius, while Figure 3b more clearly shows the records that are closest to the survey area, and therefore more relevant to the survey and fauna habitats present.

No Conservation Significant fauna were recorded in the survey area. The closest records to the survey area are four records of waterbirds (Common Greenshank and Common Sandpiper), all recorded at Coolgardie Gorge Wetland, which is approximately 350 m to the east of the survey area (at its closest point). The following 24 closest records are all Malleefowl records, from between 400 m and 5 km from the survey area. These records will be covered in more detail in the discussion in section 5.1.

Shorebirds and Waterbirds

A total of nine waterbird species were returned in the database. These were a combination of waders/shorebirds and migratory birds. These wetland avifauna such as wading birds, including Sandpipers, Stints and Sanderlings inhabit estuaries, mudflats, saltmarshes, sandflats and beaches, with shallow water edges, where they feed on invertebrates such as worms, molluscs, insects and crustaceans (Garnett *et al.* 2011; Garnett & Baker 2021). Suitable habitat for these shorebird and waterbird species is not present in the survey area, therefore (with a small number of exceptions) they have been omitted from any further discussion.

Now regionally extinct

A number of species in the database searches were also known to be historical records of species now locally extinct, for example) the Numbat (*Myrmecobius fasciatus*) (one record) and Bilby (*Macrotis lagotis*) (two records), both of which were returned from the DBCA Threatened fauna database, however these three records were all historic. As such these species have also been omitted from further discussion.

Database errors and anomalies

Occasionally there are errors and/or anomalies in the database searches that are sourced from the various government departments, for example, the Grey Wagtail (*Motacilla cinerea*), which is a rare visitor (Johnstone & Storr 1998) and the Grey Falcon (*Falco hypoleucos*), whose distribution is to the east of the survey area (Slater *et al.* 2017). These species have been omitted from any further discussion.

It is important to note, that the EPBC PMST is not entirely based on point records, but also on broader information, including bioclimatic distribution models, whereas the DBCA threatened fauna database and NatureMap is. Consequently, the results of the EPBC PMST are in some cases less accurate, particularly at a local scale (e.g., the Western Quoll [*Dasyurus geoffroii*] and Night Parrot [*Pezoporus occidentalis*]). As a result, the EPBC PMST can include species that do not occur in the survey area because, for example, there is no habitat available, or they are now known to be locally extinct. These species have therefore been omitted from any further discussion.

In addition, many fauna are not distributed evenly across the landscape, are more abundant in some places than others, and consequently more detectable (Currie 2007). Furthermore, some small, common ground-dwelling reptile and mammal species tend to be habitat specific, and many bird species can occur as regular migrants, occasional visitors, or vagrants. Therefore, all these species have been excluded from any further discussion.

Conservation Significant Fauna

With the aforementioned shorebirds, waterbirds, locally/regionally extinct and database errors species removed, a total of five conservation significant species retrieved from the database searches are considered in this report. Of these five conservation significant species, no species were recorded during the assessment, one species is considered Likely to occur, and four are considered Unlikely to occur in the survey area (Table 3). Each of these species will be discussed in section 5.1 of the discussion below.

The Likelihood of each species is based on the following criteria, (whilst also considering the number and validity of DBCA records for each species):

- Recorded: Recorded during the field survey or site reconnaissance
- Likely: Suitable habitat is present in the survey area and the survey area is in the species' known distribution
- Possible: Limited or no suitable habitat is present in survey area but is nearby. The species has good dispersal abilities and is known from the general area

- Unlikely: No suitable habitat is present in survey area but is nearby, the species has poor dispersal abilities, but is known from the general area; or suitable habitat is present, however the survey area is outside of the species' known distribution.

Table 3: Conservation significant fauna potentially occurring in the survey area.

EN = Listed as Endangered under the EBPC Act and BC Act, VU = Listed as Vulnerable under the EBPC Act and BC Act, MI = Listed as Migratory under the EBPC Act and BC Act, and Ma = Listed as Vulnerable under the EBPC Act and BC Act

Common name	Species name	Conservation Status (EPBC Act)	Conservation Status (WA BC Act)	Likelihood
Birds				
Malleefowl	<i>Leipoa ocellata</i>	Vu	Vu	Likely
Common Greenshank	<i>Tringa nebularia</i>	MiMa	MiMa	Unlikely
Sharp-tailed Sandpiper	<i>Calidris acuminata</i>	MiMa	MiMa	Unlikely
Common Sandpiper	<i>Actitis hypoleucos</i>	MiMa	MiMa	Unlikely
Carnaby's Black Cockatoo	<i>Zanda latirostris</i>	En	En	Unlikely

4.3 Field Assessment Results

A total of 34 fauna species were recorded in the survey area. All fauna species recorded are considered relatively common and widespread. Species recorded and the habitat in which they were observed can be seen in Table 4.

4.3.1 Fauna Assemblage

Amphibians

There were a very a limited number of wetland areas and drainage areas in the broader vicinity of the survey area, however, no wetland habitat was present in the survey area itself. No water was present during the survey and no amphibian species were recorded.

Reptiles

During the field survey, six reptile species were recorded. The Tree Dtella (*Gehyra variegata*), Bynoe's Gecko (*Heteronotia binoei*) and Shingleback (*Tiliqua rugosa*) were all recorded in active fauna searches. The species were recorded under bark, dead wood and leaf litter in several locations. The Bicycle Dragon (*Ctenophorus cristatus*) was recorded in Mallee Eucalyptus Woodland habitat on one occasion. The Sand Goanna (*Varanus gouldii*) was identified by diggings and tracks and one Ctenotus species was observed running between areas of vegetation cover, however it was not able to be identified to species level.

Birds

During the field survey, 24 bird species were recorded. All bird species recorded are considered relatively common and widespread.

Mammals

During the field survey four mammal species were recorded. The Western Grey Kangaroo (*Macropus fuliginosus*) was the only native species. The other (introduced) species were the European Rabbit (*Oryctolagus cuniculus*) Cattle (*Bos taurus*) and either Horse or Donkey scats (*Equus* sp.).

Table 4: Species recorded in the survey area (and fauna habitat in which they were observed).

Common Name	Species Name	Salmon Gum Woodland	Mallee Eucalyptus Woodland	Acacia Shrubland	Casuarina Shrubland
Australian Magpie	<i>Gymnorhina tibicen</i>	✓	✓		
Australian Raven	<i>Corvus coronoides</i>	✓	✓		
Australian Ringneck	<i>Barnardius zonarius</i>	✓	✓	✓	✓
Bicycle Dragon	<i>Ctenophorus cristatus</i>		✓		
Bynoe's Gecko	<i>Heteronotia binoei</i>	✓	✓		
Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>	✓	✓	✓	
Brown Honeyeater	<i>Lichmera indistincta</i>		✓	✓	
Cattle	<i>Bos taurus</i>	✓	✓		
Chestnut Quail-thrush	<i>Cinclosoma castanotus</i>		✓		
Common Bronzewing	<i>Phaps chalcoptera</i>		✓	✓	
Crested Bellbird	<i>Oreoica gutturalis</i>	✓	✓		
Crimson Chat	<i>Epthianura tricolor</i>		✓		
<i>Ctenotus</i> sp.	<i>Ctenotus</i> sp.			✓	
Dusky Woodswallow	<i>Artamus cyanopterus</i>	✓			
European Rabbit (warrens)	<i>Oryctolagus cuniculus</i>		✓		
Grey Butcherbird	<i>Cracticus torquatus</i>	✓	✓		
Grey Currawong	<i>Strepera versicolor</i>	✓			
Grey Shrike-thrush	<i>Colluricincla harmonica</i>	✓	✓	✓	✓
Hooded Robin	<i>Melanodryas cucullata</i>		✓		
Horse/Donkey (scats)	<i>Equus</i> sp.	✓	✓		
Mulga Parrot	<i>Psephotus varius</i>		✓		
Purple-crowned Lorikeet	<i>Parvipsitta porphyrocephala</i>	✓	✓	✓	
Red Wattlebird	<i>Anthochaera carunculata</i>	✓	✓	✓	✓
Rufous Whistler	<i>Pachycephala rufiventris</i>		✓		
Sand Goanna (diggings and tracks)	<i>Varanus gouldii</i>	✓	✓		
Shingleback	<i>Tiliqua rugosa</i>	✓	✓	✓	✓
Spiny-cheeked Honeyeater	<i>Acanthagenys rufogularis</i>	✓	✓	✓	
Splendid Fairy-wren	<i>Malurus splendens</i>		✓	✓	
Tree Dtella	<i>Gehyra variegata</i>	✓			
Wedge-tailed Eagle	<i>Aquila audax</i>		✓		
Weebill	<i>Smicromis brevirostris</i>	✓	✓	✓	
Western Grey Kangaroo	<i>Macropus fuliginosus</i>	✓	✓	✓	✓
Western Yellow Robin	<i>Eopsaltria griseogularis</i>		✓		
White-eared Honeyeater	<i>Lichenostomus leucotis</i>	✓	✓		

4.4 Fauna Habitat

A total of 65 habitat assessments were undertaken during the field survey, the details of which can be seen in Appendix 3 and Figure 4. A total of four fauna habitat types were recorded in the survey area and are as follows:

- Mallee Eucalyptus Woodland
- Salmon Gum Woodland
- Acacia Shrubland
- Casuarina Shrubland

The remaining areas were classed as degraded and included areas previously cleared for mining activities and roads etc. Fauna habitat type and size can be seen in Table 4 and Figure 4. Examples of the fauna habitat types can be seen in Plates 1 – 4.

Table 4: Fauna habitat type, size and percentage amount.

Fauna Habitat	Size (Ha)	% of survey area
Mallee Eucalyptus Woodland	738	61.3
Salmon Gum Woodland	399	33.1
Acacia Shrubland	38	3.2
Casuarina Shrubland	12	0.9
Degraded	18	1.5
Total	1,205	100



Plate 1: Mallee Eucalyptus Woodland.

Mallee Eucalyptus Woodland consisted of mixed mallee eucalypts including *E. graffithsii*, *E. torquate*, *E. clelandiorum* and *E. campaspe*, over scattered tall shrubs, over *Eremophila* sp. and *Senna* sp. on stony slopes.



Plate 2: Salmon Gum Woodland.

Salmon Gum Woodland habitat consisted of scattered *E. salmonophloia* trees over a ground cover of scattered low shrubs and herbs, on sandy flats.



Plate 3: Acacia Shrubland

Acacia Shrubland habitat consisted of mixed Acacia shrubs, over mixed low shrubs and grasses on sandy soils.



Plate 4: Casuarina Shrubland

Casuarina Shrubland habitat consisted of *C. pauper* (Sheoak) trees, over mixed shrubs, herbs and grasses on stony slopes.

4.5 Malleefowl Assessment

No Birds, mounds or tracks were recorded in the survey area during this assessment, while walking the survey area on foot and while driving tracks.

5 Discussion

5.1 Fauna of Conservation Significance

A total of five conservation significant species retrieved from the database searches are considered as either Likely or Unlikely to occur in the survey area. Of these five conservation significant species, none were recorded during the survey. The five species and their likelihood to occur in the survey area are discussed below.

5.1.1 Species considered Likely to occur in the survey area

One conservation significant species is considered Likely to occur in the survey area, the Malleefowl.

Malleefowl (*Leipoa ocellata*)

The Malleefowl (*Leipoa ocellata*) is listed as Vulnerable under the EBPC Act and the BC Act. In the past century, the range of the Malleefowl has contracted, particularly in arid areas and at the periphery of its former range (Benshemesh 2007). In Australia, clearing for agriculture has eliminated and fragmented much of the Malleefowl habitat, resulting in localised extinctions and fragmented populations (Garnett *et al.* 2011; Garnett & Baker 2021). In WA since 1981, the range of the Malleefowl has been estimated to have contracted by between 28 and 30% (Benshemesh 2007; Parsons *et al.* 2008).

Historically, the species was originally common and widespread in semiarid zones, mainly in scrubs of mallee and other low eucalypts on sandy and lateritic soils; also, acacia scrubs on heavy red soils, especially north and east of the mulga-eucalypt line. The Malleefowl is now generally rare to uncommon and patchily distributed due to habitat loss.

The survey area is large and many parts of it were inaccessible (due to a lack of tracks and difficulty to get around etc.), however, habitats were sampled to assess potential Malleefowl breeding habitat.

All degraded and cleared areas are considered unsuitable for Malleefowl breeding. The Salmon Gum Woodland and the more open Acacia Shrubland are also considered too sparse for Malleefowl to breed in. These fauna habitats in general, lack a dense mid-storey, making it too open for Malleefowl to breed in. Malleefowl may however use this habitat to forage in.

Malleefowl have a relatively large home range that can be up to 4 km² in low rainfall areas (Booth 1987). They prefer habitat with a dense canopy and an open ground layer in which they can construct their mounds (Benshemesh 2007). Benshemesh (1992) also found that dense canopy cover was the most important feature associated with high breeding densities at sites in Victoria.

Some sections of the Mallee Eucalyptus Woodland and Casuarina Shrubland habitats are therefore considered potentially suitable breeding habitat. These habitats were sampled and assessed. Areas where there is a relatively dense canopy cover, along with a relatively dense mid-storey, open ground layer and suitable substrate to build mounds, are considered suitable for Malleefowl breeding.

Studies have shown that a wide range of food shrubs, rather than an abundance of any one species is probably important for Malleefowl during for example droughts (Harlen & Priddel 1996). This is supported by other studies showing that Malleefowl are more abundant in areas where shrubs are more diverse (Woinarski 1989). There was a shrub layer in some sections of the Mallee Eucalyptus Woodland and Casuarina Shrubland habitat of the survey area, and so these areas are considered as potentially suitable foraging habitat.

Fire history is also important with Malleefowl preferring old growth (i.e., long unburnt) Mallee. Fire has a major influence on the structure and floristic composition of habitats that Malleefowl occupy. The effect of fire on Malleefowl is severe, and breeding in burnt areas is usually reduced for at least 30 years (Benshemesh 2007). There was little evidence of fire in the survey area, which may also influence habitat suitability and therefore use for this species in the survey area.

The survey area was relatively extensive (1,205 ha or 12 km²) and mapping potential foraging and breeding habitat is difficult at a fine enough scale that reflects the variation in vegetation that may influence habitat suitability for Malleefowl. This would require significantly more field time than was undertaken for this assessment.

The DBCA threatened fauna database returned 65 records of the Malleefowl within 50 km of the survey area. The most recent record is from 2019, approximately 12 km from the survey area. The closest record is 402 m from the survey area and is from 2011. Numerous records of the Malleefowl from the DBCA database, as well as records of birds, mounds and suitable habitat from previous surveys and suitable habitat recorded in this survey results in the species being considered as Likely to occur in the survey area.

5.1.2 Species considered Unlikely to occur in the survey area

A total of four species are considered Unlikely to occur in the survey area, the Common Greenshank, Common Sandpiper, Sharp-tailed sandpiper, and Carnaby's Black Cockatoo.

Common Greenshank (*Tringa nebularia*)

The Common Greenshank (*Tringa nebularia*) is listed as Migratory (Mi) under the EPBC Act and the BC Act. The Common Greenshank is a noisy, large, heavy greenshank that is a common to uncommon migrant from Asia to coastal mudflats, estuaries, salt marshes, mangroves, lakes and swamps throughout Australia (Slater *et al.* 2017).

The DBCA threatened fauna database returned three records of the Common Greenshank in the vicinity of the survey area. The most recent of which is from 2013 approximately 350 m to the east of the survey area from the Coolgardie Gorge Wetland. Although this record is close to the survey area, this wetland habitat is not present in the survey area and so does not provide habitat for this wading species. The Common Greenshank is therefore considered Unlikely to occur in the survey area.

Sharp-tailed Sandpiper (*Calidris acuminata*)

The Sharp-tailed Sandpiper (*Calidris acuminata*) is listed as Migratory (Mi) under the EPBC Act and the BC Act. The Sharp-tailed Sandpiper is a medium-sized sandpiper with boldly mottled upperparts, rufous crown, green legs and finely streaked breast. The species is a common migrant from Siberia to coastal, sub-coastal and inland wetlands throughout Australia (Slater *et al.* 2017).

The DBCA threatened fauna database returned six records of the Sharp-tailed Sandpiper in proximity of the survey area. Only one of these records is less than twenty years old (2006) from Young River Station which is approximately 25 km to the north-west of the survey area. A lack of recent records, a lack of nearby records and a lack of suitable habitat in the way of wetlands results in the Sharp-tailed Sandpiper being considered Unlikely to occur in the survey area.

Common Sandpiper (*Actitis hypoleucos*)

The Common Sandpiper (*Actitis hypoleucos*) is listed as Migratory (Mi) under the EPBC Act and the BC Act. The Common Sandpiper is a nervous, constantly teetering Sandpiper, with prominent eye-ring smudge on the side of the breast, faintly barred wing-coverts, long tail and short green legs. The species is most likely on the shores of estuaries and rivers and is a common summer visitor to rocky shores, mudflats, lakes and sewage farms throughout Australia (Slater *et al.* 2017).

The DBCA threatened fauna database returned three records of the Common Sandpiper in the vicinity of the survey area. The most recent of which is from 2014 approximately 290 m to the east of the survey area from the Coolgardie Gorge Wetland. Although this record is close to the survey area, this wetland habitat is not present in the survey area and so there is no habitat for this wading species. The Common Sandpiper is therefore considered Unlikely to occur in the survey area.

Carnaby's Black Cockatoo (*Zanda latirostris*)

Carnaby's Black Cockatoo (*Zandalatirostris*) is listed as Endangered (En) under the EPBC Act and the BC Act. Carnaby's Black Cockatoo is endemic to south-west WA and is distributed from the Murchison River to Esperance and inland to Coorow, Kellerberrin and Lake Cronin (Cale 2003). The species was once common, but the population has declined significantly in the last half century and is now locally extinct in some areas (Johnstone & Storr 1998; Shah 2006). In the last 45 years (prior to Cale 2003) the species has suffered a 50% reduction in its abundance (Cale 2003). Since then, trend analyses of the Great Cocky Counts 2010 – 2019 identified strong indications that the population of Carnaby's Black-Cockatoo inhabiting the Perth-Peel Coastal Plain continues to decline and despite a recent stabilisation (2016 -- 2018) of the local population, the trend since 2010 shows a 35% decline of Carnaby's Black Cockatoo (BirdLife 2020).

Salmon Gum, a known breeding and roosting tree for Carnaby's Black Cockatoo, was recorded in the survey area. The survey area, however, is approximately 250 km further to the east of its currently known distribution. In addition, the DBCA threatened fauna database returned just four records of Carnaby's Black Cockatoo, all of which were from 2016-2018, from between 30 - 36 km from the survey area. A lack of records and the location of the survey area being outside of the species' known range, result in Carnaby's Black Cockatoo being considered Unlikely to occur in the survey area.

4.2 Fauna Habitat

Mallee Eucalyptus Woodland

Mallee Eucalyptus Woodland comprised 61.3% (738 ha) of the survey area. This habitat consisted of a number of mallee eucalypts, including *E. graffithsii*, *E. torquate*, *E. clelandiorum* and *E. campaspe*, over scattered tall shrubs, over mixed low shrubs including *Eremophila* sp. and *Senna* sp. on stony slopes.

The mallee eucalyptus and mid-storey shrubs provide structure and habitat for several small birds, including the Grey Shrike-thrush, Crested Bellbird and various Honeyeater species, all of which were recorded in this habitat. The ground-storey shrubs and areas of leaf-litter provided shelter required by small burrowing species, particularly reptile species.

With reference to Malleefowl, some areas of the Mallee Eucalyptus Woodland, vegetation is too sparse, however in other areas suitable habitat is present. Some areas of the Mallee Eucalyptus Woodland have a relatively dense canopy cover, a mid-storey of mixed shrubs, open groundcover and substrate that is considered suitable for building mounds.

Salmon Gum Woodland

Salmon Gum Woodland comprised 33.1% (399 ha) of the survey area. This habitat consisted of stands of remnant Salmon Gum Woodland (with limited vegetation structure), on sandy flats. Much of the Salmon Gum Woodland lacked mid-storey vegetation and contained limited ground cover. The large Salmon Gums provide habitat for several bird species, for example the Australian Ringneck, which breeds in hollows and some areas of leaf-litter provided habitat for small mammals and reptile species.

Salmon Gum Woodland is considered unsuitable for Malleefowl breeding. In general, vegetation is too sparse and lacks the vegetation structure required by the species. In addition, Salmon Gum Woodland was on the sandy flats, which may be prone to flooding during high rainfall events.

Acacia Shrubland

Acacia Shrubland habitat comprised 3.2% (38 ha) of the survey area. This habitat consisted of a mix of Acacia species including *A. ramulosa*, over *Allocasuarina* tall shrubs, on sandy flats. This habitat provides shelter for small bird species, including Fair-wrens, with some vegetation in the ground-storey and some leaf-litter present, providing habitat for small mammals and reptiles.

Acacia Shrubland is also considered unsuitable for Malleefowl breeding. In some areas, Acacia Shrubland is on steep hills, which are considered too steep for Malleefowl to build mounds on. In addition, Acacia Shrubland is generally too sparse and lacks the vegetation structure required by the species for breeding.

Casuarina Shrubland

Casuarina Shrubland habitat comprised 0.9% (12 ha) of the survey area. This habitat consisted of a mix of *Casuarina pauper* shrubs, over mixed low shrubs and herbs, on stony slopes and foothills. This habitat provides shelter for small bird species, with some vegetation in the ground-storey and some leaf-litter present, providing habitat for small mammals and reptiles.

Regarding Malleefowl, some areas of Casuarina Shrubland provides canopy considered dense enough, a mid-storey of mixed shrubs, open groundcover and substrate that is suitable for building mounds and so provides potential Malleefowl breeding habitat.

6 References

- Atlas of Living Australia (ALA). 2023
- Birdlife Australia (2020). Great Cocky Count 2019.
- Benshemesh, J. (2007). National Recovery Plan for Malleefowl, Department for Environment and Heritage, South Australia.
- Benshemesh, J. (1992). The conservation ecology of Malleefowl, with particular regard to fire. Pages 1-224. Monash University, Clayton.
- Bureau of Meteorology (BOM). (2023). Commonwealth of Australia. Climate Data online.
- Booth, D. T. (1987). Home range and hatching success of Malleefowl, *Leipoa ocellata* Gould (Megapodiidae), in Murray mallee near Renmark, S.A. Australian Wildlife Research 14, 95-104.
- Cale, B. (2003). Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) Recovery Plan 2000-2009. Western Australian Wildlife Management Program No. 36. Perth, Department of Conservation and Land Management Western Australian Threatened Species and Communities Unit.
- Christidis, L., & Boles, W.E. (2008). Systematics and Taxonomy of Australian Birds. Victoria: CSIRO Publishing.
- Cogger, H. (2014). Reptiles and Amphibians of Australia. CSIRO Publishing.
- Cowan, M. (2001). 'Coolgardie 3 (COO3 – Eastern Goldfields subregion),' in A biodiversity audit of Western Australia's 53 Biogeographical Subregions in 2002, Department of Conservation and Land Management, Perth, pp. 156 – 169.
- Currie, D. J. (2007). Disentangling the roles of environment and space in ecology. Journal of Biogeography 34, 2009–2011.
- Department of Biodiversity, Conservation and Attractions (DBCA). (2023a). Threatened Fauna Search.
- Department of Biodiversity, Conservation and Attractions (DBCA). (2023b). NatureMap - Mapping Western Australia's Biodiversity, [Online], Government of Western Australia.
- Department of Climate Change, Energy, the Environment and Water (DCCEEW). (2023). EPBC Act Protected Matters Search Tool, [Online], Australian Government.
- Department of Climate Change, Energy, the Environment and Water (DCCEEW). (2020). The Biogeographic Regionalisation of Australia (IBRA). Commonwealth of Australia.
- Garnett, S.T., Szabo, J. K., & Dutson, G. (2011). The action plan for Australian birds 2010. CSIRO Publishing
- Garnett, S. T., & Baker, G. B. (Eds) (2021). The Action Plan for Australian Birds 2020. CSIRO Publishing, Melbourne
- Harlen, R., & D. Priddel. (1996). Potential food resources available to malleefowl *Leipoa ocellata* in marginal mallee lands during drought. Australian Journal of Ecology 21, 418-428.
- Johnstone, R.E. & Storr, G. M. (1998). Handbook of Western Australian Birds. Volume 1 - Non-Passerines (Emu to Dollarbird). Oxford University Press.
- Parsons, B. C., Short, J. C., & Roberts, J. D. (2008). Contraction in the range of Malleefowl (*Leipoa ocellata*) in Western Australia: a comparative assessment using presence-only and presence-absence datasets. Emu, vol. 108, pp. 221-231.
- Shah, B. (2006). Conservation of Carnaby's Black Cockatoo on the Swan Coastal Plain, WA. Perth: Birds Australia.
- Slater, P., Slater, P., & Slater, Raoul. (2017). The Slater Field Guide to Australian Birds. Second Edition.
- West Australian (WA) Museum. (2020). Checklist of the Terrestrial Fauna of Western Australia. Government of Western Australia.
- Wilson, S. & Swan, G. (2017). A Complete Guide to Reptiles of Australia. Fifth Edition. New Holland: Sydney, NSW.



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Woinarski, J. C.Z. Burbidge, A. A., & Harrison, P. L. (2014). The action plan for Australian Mammals 2012. CSIRO Publishing.

Woinarski, J. C. Z. (1989). The vertebrate fauna of Broombush *Melaleuca uncinata* vegetation in north-western Victoria, with reference to effects of broombush harvesting. *Australian Wildlife Research* 16, 217-238

Figures

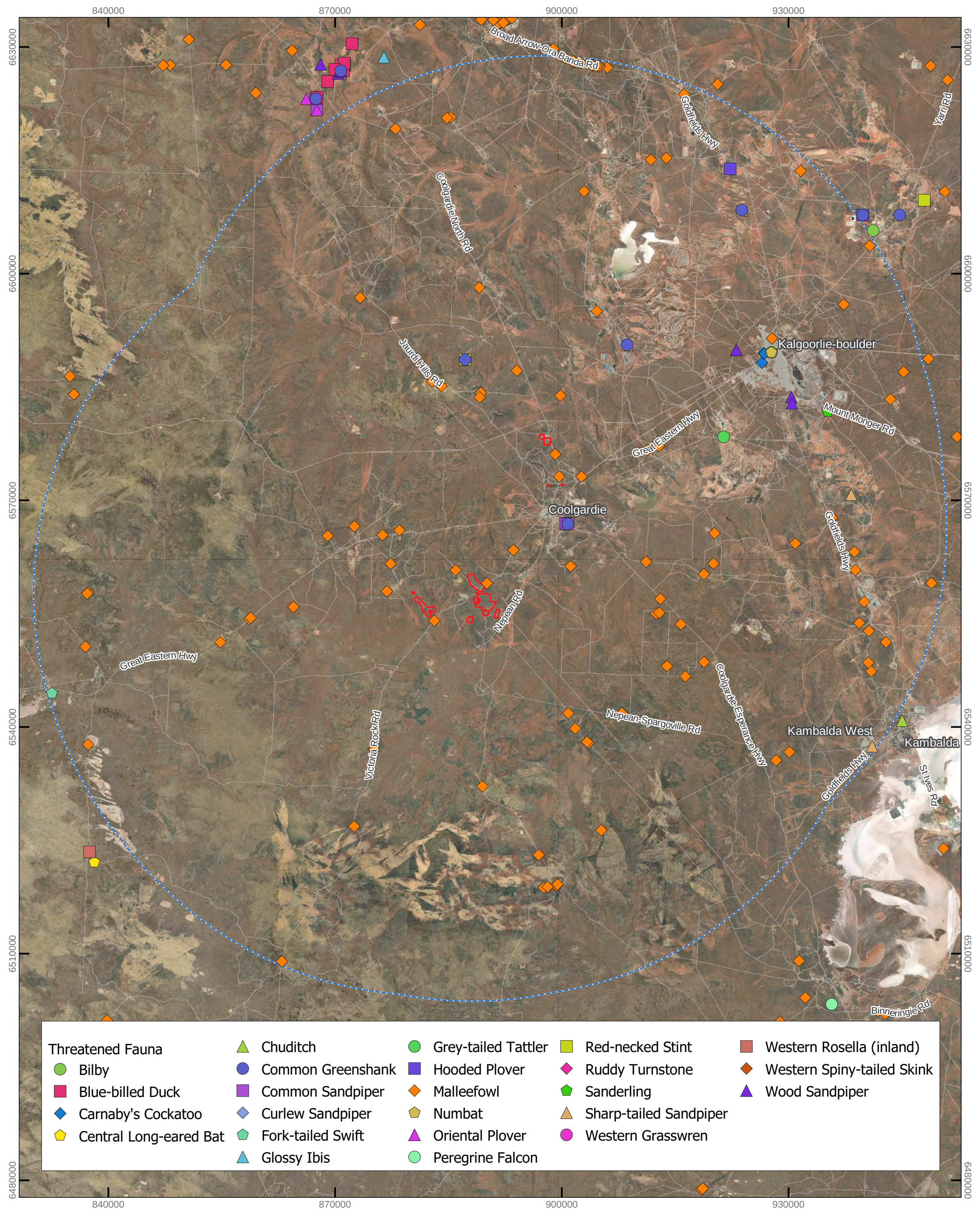


Figure 3a: Conservation Significant Fauna (DBCFA Threatened Fauna Database [50 km Radius])

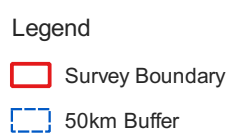
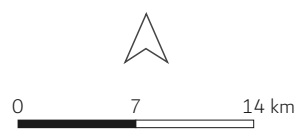
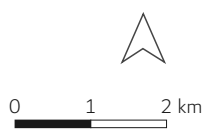




Figure 3b: Conservation Significant Fauna (DBCFA Threatened Fauna Database)

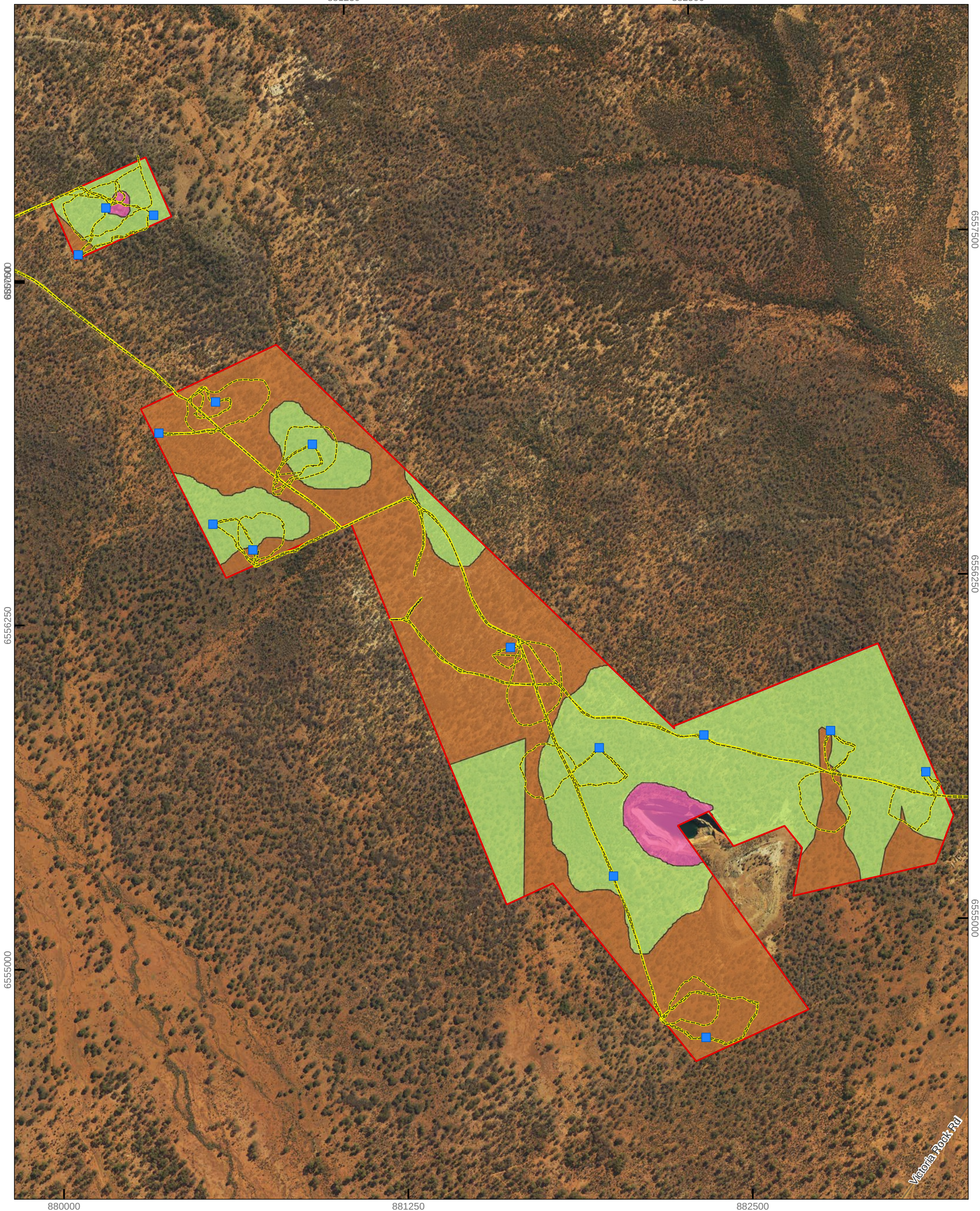


GDA2020 - MGA Zone 51

Legend

- Survey Boundary
- Common Sandpiper
- Threatened Fauna**
- Common Greenshank
- Malleefowl





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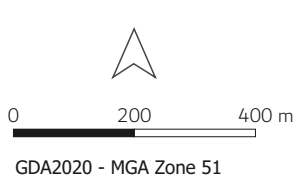
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Figure 4: Fauna Habitat and Fauna Assessment Locations



Legend	
■	Habitat Assessment
—	Track
 	Survey Boundary
Fauna Habitat	
 	Mallee Eucalyptus Woodland
 	Salmon Gum Woodland
 	Degraded



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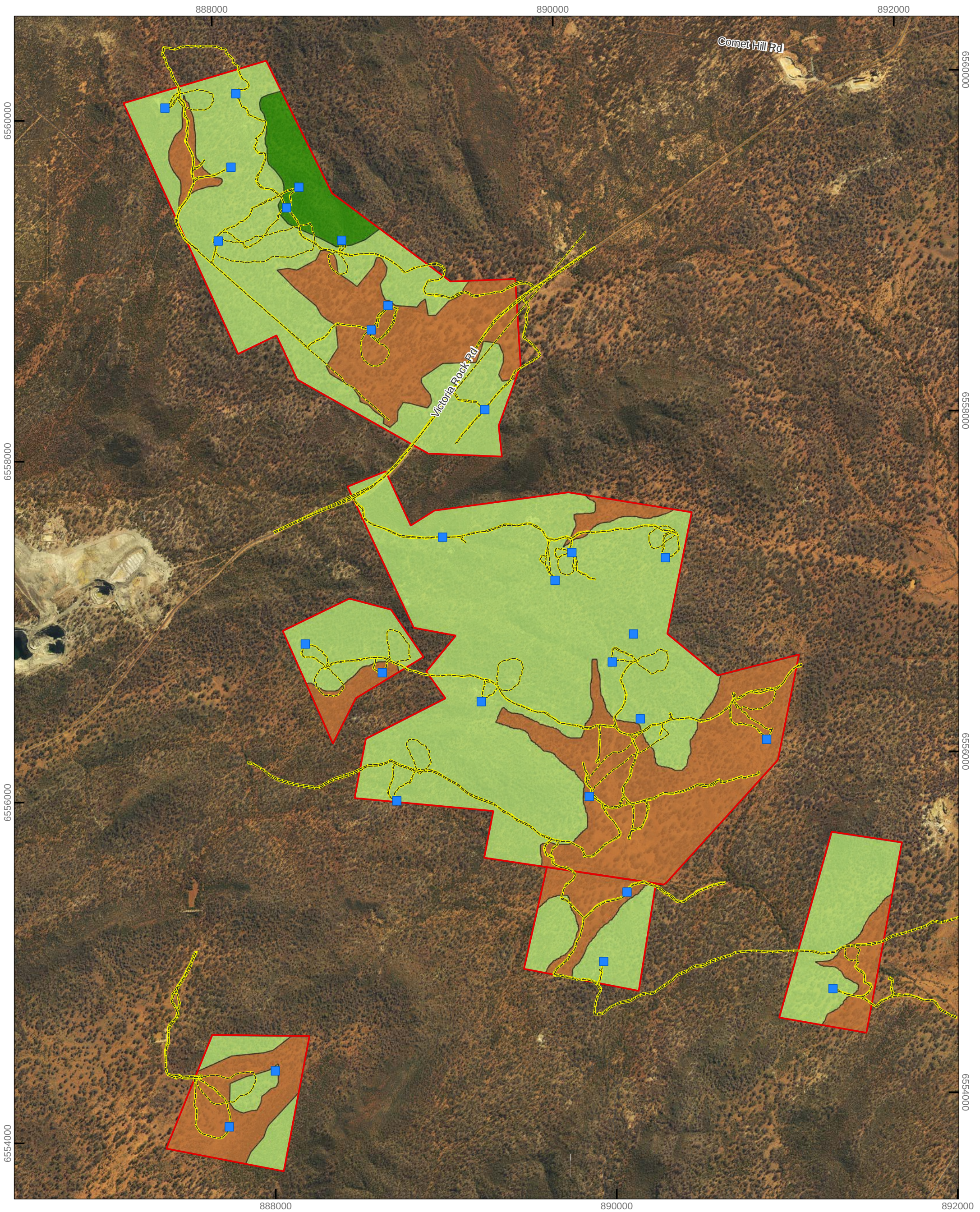
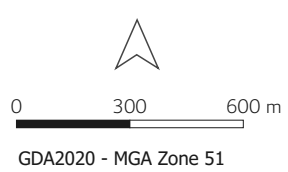


Figure 4: Fauna Habitat and Fauna Assessment Locations



Legend

- Habitat Assessment
- Track
- Survey Boundary

Fauna Habitat

- Acacia Shrubland
- Mallee Eucalyptus Woodland
- Salmon Gum Woodland



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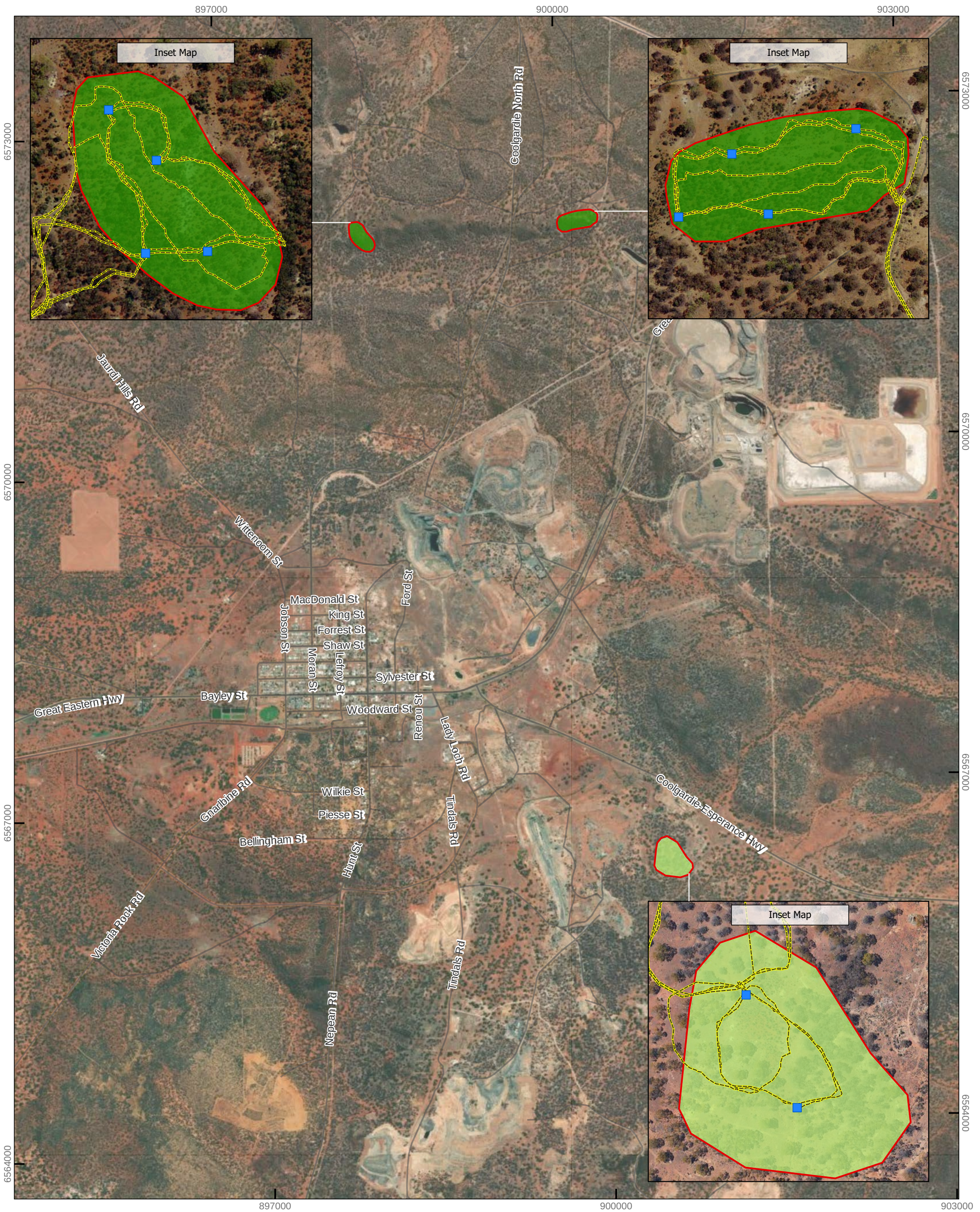
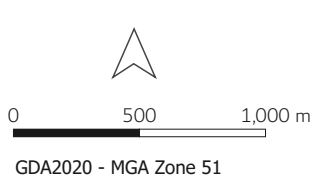


Figure 4: Fauna Habitat and Fauna Assessment Locations



Legend

- | | |
|---|--|
| <ul style="list-style-type: none"> ■ Habitat Assessment Track Survey Boundary | <p>Fauna Habitat</p> <ul style="list-style-type: none"> Acacia Shrubland Mallee Eucalyptus Woodland |
|---|--|



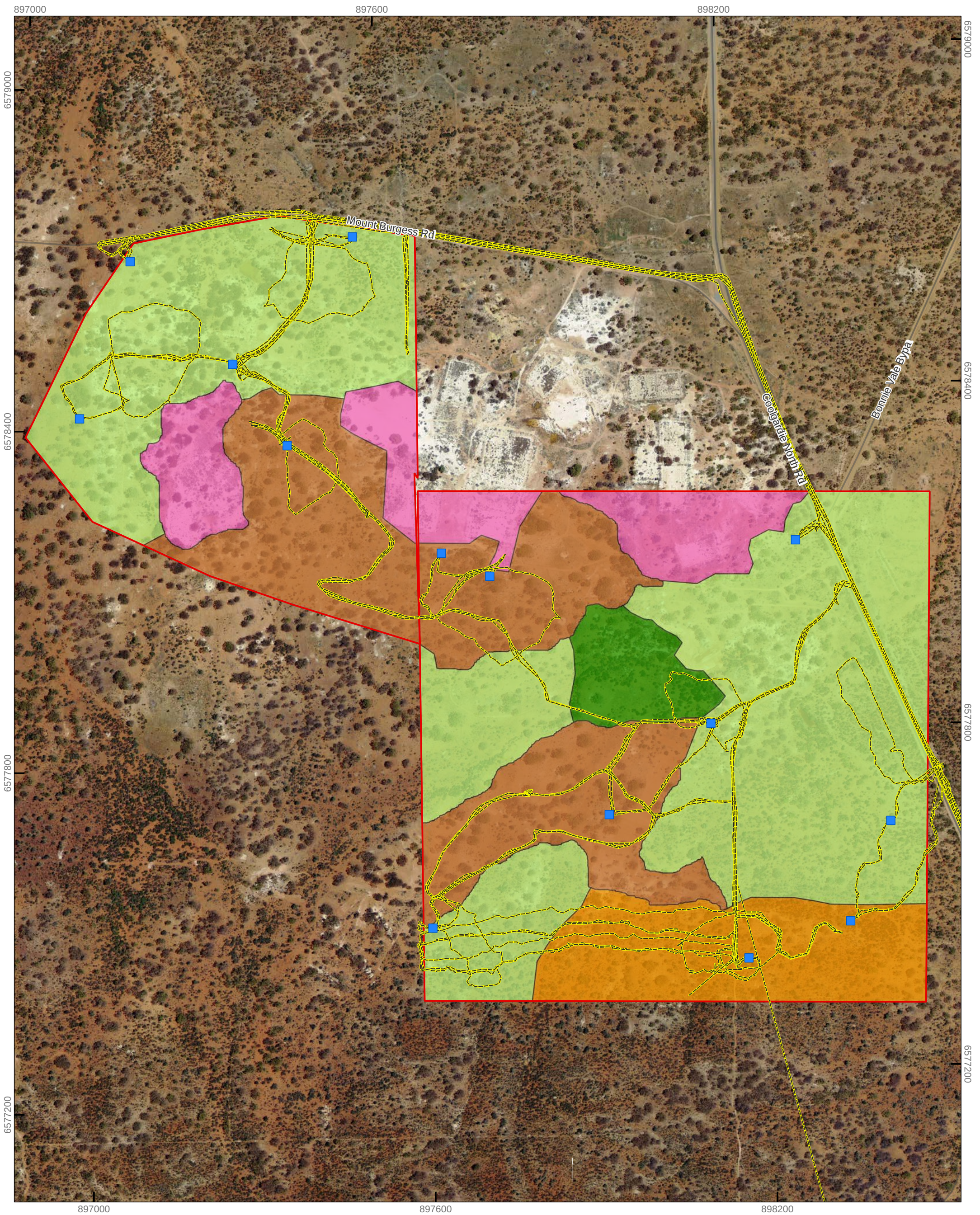
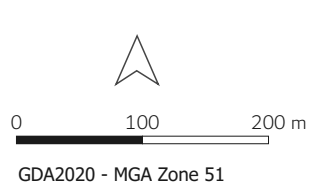


Figure 4: Fauna Habitat and Fauna Assessment Locations



Legend

- Habitat Assessment
- Track
- Survey Boundary

Fauna Habitat

- Acacia Shrubland
- Casuarina Shrubland
- Mallee Eucalyptus Woodland
- Salmon Gum Woodland
- Degraded



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Appendices

Appendix 1: Conservation Categories

Categories of Threatened Fauna Species under the EPBC Act

Conservation Code	Description
Ex	Extinct Taxa which at a particular time if, at the time, there is no reasonable doubt that the last member of the species has died.
ExW	Extinct in the Wild Taxa which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	Critically Endangered Taxa which at a particular time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
En	Endangered Taxa which is not critically endangered and it is facing a very high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
Vu	Vulnerable Taxa which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

Source: Environment Protection and Biodiversity Conservation Act 1999.

Categories of Threatened Flora and Fauna Species under the BC Act



Department of **Biodiversity,
Conservation and Attractions**

CONSERVATION CODES

For Western Australian Flora and Fauna

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.

EN Endangered species

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

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

VU Vulnerable species

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

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

Extinct species

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

EX Extinct species

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

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

EW Extinct in the wild species

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

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

Specially protected species

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

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

MI Migratory species

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

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

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

CD Species of special conservation interest (conservation dependent fauna)

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

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

OS Other specially protected species

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

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

P Priority species

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

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

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

1 Priority 1: Poorly-known species

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

2 Priority 2: Poorly-known species

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

3 Priority 3: Poorly-known species

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

4 Priority 4: Rare, Near Threatened and other species in need of monitoring

(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.

(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.

(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

¹The definition of flora includes algae, fungi and lichens

²Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).



Appendix 2: Fauna Database Searches

DBCA Threatened Fauna Database

COMMON NAME	CLASS	WA LISTING	WA status	EPBC status	YEAR	LOCALITY	SITE	LONG_GDA	LAT_GDA
Common Sandpiper	BIRD	Specially Protected - migratory	MI	MI	2014	coolgardie gorge	coolgardie gorge	121.1922	-30.9639
Common Sandpiper	BIRD	Specially Protected - migratory	MI	MI	2011	The Gorge (Coolgardie0	The Gorge (Coolgardie0	121.1922	-30.9631
Common Sandpiper	BIRD	Specially Protected - migratory	MI	MI	2013	Coolgardie Gorge wetland	Coolgardie Gorge wetland	121.195	-30.9636
Sharp-tailed sandpiper	BIRD	Specially Protected - migratory	MI	MI	1980	KARLKURLA	KARLKURLA	121.4181	-30.7487
Sharp-tailed sandpiper	BIRD	Specially Protected - migratory	MI	MI	1980	FEYSVILLE	FEYSVILLE	121.5848	-30.9154
Sharp-tailed sandpiper	BIRD	Specially Protected - migratory	MI	MI	2001	Kopai Lake	Kopai Lake	121.2672	-30.7478
Sharp-tailed sandpiper	BIRD	Specially Protected - migratory	MI	MI	2001	Kopai Lake	Kopai Lake	121.2672	-30.7478
Sharp-tailed sandpiper	BIRD	Specially Protected - migratory	MI	MI	1981	KARLKURLA	KARLKURLA	121.4181	-30.7487
Sharp-tailed sandpiper	BIRD	Specially Protected - migratory	MI	MI	2006	Young River Station Lake	Young River Station Lake	121.0447	-30.7725
Sanderling	BIRD	Specially Protected - migratory	MI	MI	2016	Hannan Lake	Hannan Lake	121.5476	-30.8176
curlew sandpiper	BIRD	Threatened - Critically endangered	CR	MI	2006	Young River Station Lake	Young River Station Lake	121.0447	-30.7725
Red-necked stint	BIRD	Specially Protected - migratory	MI	MI	2006	Young River Station Lake	Young River Station Lake	121.0447	-30.7725
Carnaby's cockatoo	BIRD	Threatened - Endangered	EN	EN	2018	Sommerville	Southern corner of Hay St and Hutton St	121.4541	-30.7628
Carnaby's cockatoo	BIRD	Threatened - Endangered	EN	EN	2016	367 Collins	367 Collins	121.456	-30.7512
Carnaby's cockatoo	BIRD	Threatened - Endangered	EN	EN	2016	Cape Lilac on alley	Cape Lilac on alley	121.4561	-30.7514
Carnaby's cockatoo	BIRD	Threatened - Endangered	EN	EN	2017	Piccadilly St West	Piccadilly St West	121.4574	-30.7519
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2019	Mungari	Mungari turnoff from Great Eastern HWY heading South	121.30051	-30.872284
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2018	Karramindie	1.7km S of Karramindie State Forest on Hampton Location 53	121.398	-30.968
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2018	Londonberry	Old woodland track running SW away from Scahill Timber Reserve	121.2054	-31.1891
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2018	Londonderry	3.5km S of Scahill Timber Reserve, Londonderry	121.2331049	-31.22229846
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2017	Goldfields Woodlands Conservation P	5km N of Victoria Rock, on Coolgardie Vic Rock Rd, in Goldfields Woodlands CP	120.9380525	-31.24083453
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2017	Londonderry	Scahill Rimber Reserve, on track south of reserve	121.21599	-31.20692
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2017	Londonderry	Scahill Rimber Reserve, on track south of reserve	121.2349	-31.2238
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2017	Karramindie	Karramindie State Forest No. 8	121.3983551	-31.0041971
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2017	Karramindie	50m E of the S/W corner gate of Karramindie State Forest, where the gully crosses the track	121.3856808	-31.01733691
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2016	Coolgardie	Coolgardie North Rd, approx. 5km N of Coolgardie	121.1805031	-30.90759935
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2016	Coolgardie	Coolgardie North Rd, approx. 7km N of Coolgardie, near Bonnievale	121.1738985	-30.88129979
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2016	Yallari Timber Reserve	Yallari Timber Reserve, central N-S track	121.3396003	-31.12840004
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2015	Feysville	Brown Hill on Woolubar Station, Kambalda Rd, Boulder WA	121.5101954	-30.97633273
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2015	Coolgardie	Between Burra Rocks Rd and Coolgardie-Esperance Rd, approx. 5km S of Coolgardie	121.2008892	-31.01393708
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2014	Burra Rock	Burra Rock, Directly west of campsite, south of old east-west track	121.1989932	-31.39491429
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2013	Bullabulling	~10km east if Bullabulling (40km east of Coolgardie) on Great Eastern Highway	120.9623811	-30.97860376
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2013	Feysville	Out the front of Pevnatty Crib room on active haul road. A highly disturbed area.	121.5947743	-31.00514925
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2013	Scahill Timber reserve	Scahill Timber reserve	121.2797272	-31.18666623
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2013	Burra Rock Conservation Reserve	Carpark at Burra Rock. Mound found within adjacent bush habitat.	121.1975205	-31.39548895
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2013	Feysville	Woolibar Station, just south of where Woolibar creek crosses the Goldfields Highway.	121.5596018	-30.94387297
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2013	Coolgardie	7km south of Coolgardie on the Victoria Rock Road	121.121131	-30.99719
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2013	Goldfields- Kalgoorlie/Coolgardie	Great Eastern Highway	121.2113	-30.9067
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2012	Coolgardie	Just off cave hill road in Widgiemooltha close to one of Focus Minerals small operations.	121.2574977	-31.3269487
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2012	Coolgardie	Borefields on Focus owned mine lease, near bore 8	121.1779036	-30.81110794
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2012	FEYSVILLE	Kalgoorlie Region, Goldfields, Jubilee mine	121.5923	-30.9834
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2011		Yallari Timber Reserve	121.3655792	-31.13985556
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2011		Yallari Timber Reserve	121.3907596	-31.1219586
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2011			121.0860781	-31.03788659
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2011	Londonderry	Burra Rock camping ground	121.1806	-31.3981
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2010		Vic Rock Road	120.9143284	-31.33327672
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2010	Londonberry	Burra Rock Nature Reserve, next to camping area	121.1997	-31.3934
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2010	Kambalda	5km along pipeline access road off Cave Rocks mine haul rd	121.5138889	-31.225
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2010	Bullabulling	Great Eastern Hwy, 130km E of Southern Cross, near unnamed gravel road	120.7608959	-31.08899931
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2009	Mount Burges	North of Mount Burges	121.0681051	-30.81130332
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2009	Bullabulling	Bullabulling, road from Bullabulling to Stewart	120.8636708	-30.98827482
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2009		on road from Bullabulling to Stuart sighting, off Great Eastern Highway	120.8636708	-30.98827482
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2009		north of Mt Burgess	121.060324	-30.68600181
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2009	Coolgardie	Juardi Hills Rd, 100m north of crest	121.0136012	-30.80519283
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2009	Londonderry	about 3km south of Burra Rock Reserve along Burra Rock Road	121.1719	-31.3593
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2008	Bullabulling	Bullabulling pastoral lease, 10km west of the Bullabulling Pub and 2 kms south of the highway	120.8196106	-31.07430229
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2008	Kambalda		121.4960545	-31.23542216
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2008	Coolgardie	Great Eastern Hwy, 40.5km west of Coolgardie	120.7591667	-31.09055556
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2007	Bullabulling	Bullabulling	120.951963	-31.01881458
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2007	Coolgardie	Victoria Rock Rd, about 15km south of Coolgardie	121.0151	-31.0848
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2007	Coolgardie	Burra Rock Road, 11.2km north of DEC Burra Rock Reserve boundary sign	121.0904	-31.28
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2006	Bullabulling	Bullabulling	120.9480707	-31.05183963
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2006	Coolgardie	23.2km south of T intersection of Coolgardie Norseman Rd	121.3565673	-31.07792693
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2004	KANOWNA	50 km nth of kalgoorlie on main hwy nth of Mt Veters homestead	121.2	-30.56666667
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2002	KARRAMINDIE	grt eastern hwy 1 km kal side of mungarie industrial area	121.3166667	-30.86666667
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	2000	Mount Burges	access road to Kundana Mining Lease - ""30km NW (10km W & 22km N) of Kalgoorlie""	121.2237816	-30.70903591
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	1996	Coolgardie	4WD Holland Track, 200km NE of Mt Holland (cannot find Holland Track)	121.3053	-31.0052
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	1995	Londonderry	Yerilla Sandalwood Reserve	121.326725	-31.04871101
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	1995	LONDONDERRY	Yallari Timber Reserve	121.3218333	-31.0665

malleefowl	BIRD	Threatened - Vulnerable	VU	VU	1995	LONDONDERRY	Yerilla Sandalwood Reserve	121.3261111	-31.06527778
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	1994	Bullabulling	one active nest at Bullabulling No. 8 Pumping station.	120.9000035	-30.9758004
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	1994	BULLABULLING	22 kms west of Coolgardie	120.9392148	-30.984965
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	1991	BULLABULLING	Kangaroo Hills Timber Reserve	121.0422222	-31.02361111
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	1988	MOUNT BURGES	Eight Mile Rock dam	121	-30.8
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	1988	MOUNT BURGES	WMC sand pit Jaurdi Hills Rd	121.0666667	-30.81666667
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	1985	Jaurdie Hills	Jaurdie Hills	120.897002	-30.70299829
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	1965	MOUNT BURGES	12 miles North of Coolgardie	121.1167	-30.7833
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	1947	LAMINGTON	PO Kalgoorlie	121.4667	-30.7333
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	1910	LAMINGTON	Kalgoorlie	121.4667	-30.7333
malleefowl	BIRD	Threatened - Vulnerable	VU	VU	0	Burra Rock Conservation Reserve		121.186	-31.3968
Malleefowl	BIRD	Threatened - Vulnerable	VU	VU	0		Kalgoorlie	121.4669	-30.75
Bilby, dalgyte, ninu	MAMMAL	Threatened - Vulnerable	VU	VU	0		TOWNSITE	121.4667	-30.75
Bilby, dalgyte, ninu	MAMMAL	Threatened - Vulnerable	VU	VU	0			121.4667	-30.75
Numbat, walpurti	MAMMAL	Threatened - Endangered	EN	EN	0			121.4667	-30.75
Glossy ibis	BIRD	Specially Protected - migratory	MI	MI	1981	KARLKURLA	KARLKURLA	121.4181	-30.7487
Grey-tailed tattler	BIRD	Migratory and Priority	MI and P4	MI	2017	Lake Douglas	Lake Douglas	121.4054	-30.8529
Wood sandpiper	BIRD	Specially Protected - migratory	MI	MI	1980	KARLKURLA	KARLKURLA	121.4181	-30.7487
Wood sandpiper	BIRD	Specially Protected - migratory	MI	MI	2005	Kalgoorlie Sewerage overflow ponds	Kalgoorlie Sewerage overflow ponds	121.4967	-30.8023
Wood sandpiper	BIRD	Specially Protected - migratory	MI	MI	2005	Kalgoorlie Sewerage outlet	Kalgoorlie Sewerage outlet	121.4978	-30.8095
Common greenshank	BIRD	Specially Protected - migratory	MI	MI	2013	Coolgardie Gorge wetland	Coolgardie Gorge wetland	121.195	-30.9636
Common greenshank	BIRD	Specially Protected - migratory	MI	MI	2001	Kopai Lake	Kopai Lake	121.2672	-30.7478
Common greenshank	BIRD	Specially Protected - migratory	MI	MI	2006	Young River Station Lake	Young River Station Lake	121.0447	-30.7725

NatureMap Fauna Database

Animalia	IND COUNT	SP COUNT		IND COUNT	SP COUNT
AMPHIBIAN	107	6			
<i>Litoria moorei</i>	1		<i>Birds Continued</i>		
<i>Neobatrachus kunapalari</i>	25		<i>Pyrrholaemus brunneus</i>	69	
<i>Neobatrachus pelobatoides</i>	3		<i>Recurvirostra novaehollandiae</i>	4	
<i>Neobatrachus sutor</i>	44		<i>Rhipidura albiscapa</i>	10	
<i>Neobatrachus wilsmorei</i>	1		<i>Rhipidura fuliginosa</i>	1	
<i>Pseudophryne occidentalis</i>	33		<i>Rhipidura leucophrys</i>	143	
BIRD	6258	182	<i>Sericornis frontalis</i>	1	
<i>Acanthagenys rufogularis</i>	235		<i>Smicromnis brevirostris</i>	383	
<i>Acanthiza apicalis</i>	88		<i>Stictonetta naevosa</i>	1	
<i>Acanthiza chrysorrhoa</i>	85		<i>Strepera versicolor</i>	189	
<i>Acanthiza robustirostris</i>	1		<i>Streptopelia senegalensis</i>	63	
<i>Acanthiza uropygialis</i>	73		<i>Sugomel niger</i>	6	
<i>Accipiter cirrocephalus</i>	7		<i>Tachybaptus novaehollandiae</i>	24	
<i>Accipiter fasciatus</i>	11		<i>Tadorna tadornoides</i>	41	
<i>Actitis hypoleucos</i>	3		<i>Taeniopygia guttata</i>	12	
<i>Aegotheles cristatus</i>	10		<i>Threskiornis spinicollis</i>	7	
<i>Anas gracilis</i>	56		<i>Todiramphus pyrrhopygia</i>	1	
<i>Anas platyrhynchos</i>	1		<i>Todiramphus pyrrhopygius</i>	5	
<i>Anas rhynchos</i>	5		<i>Todiramphus sanctus</i>	2	
<i>Anas superciliosa</i>	61		<i>Tribonyx ventralis</i>	5	
<i>Anhinga novaehollandiae</i>	2		<i>Tringa brevipes</i>	1	
<i>Anthochaera carunculata</i>	309		<i>Tringa glareola</i>	2	
<i>Anthus australis</i>	1		<i>Tringa nebularia</i>	3	
<i>Anthus australis australis</i>	2		<i>Turnix velox</i>	1	
<i>Aphelocephala leucopsis</i>	7		<i>Tyto alba delicatula</i>	2	
<i>Aphelocephala leucopsis castaneiventris</i>	2		<i>Vanellus tricolor</i>	2	
<i>Aquila audax</i>	19		<i>Zosterops lateralis</i>	29	
<i>Ardea modesta</i>	1		MAMMAL	522	36
<i>Ardea pacifica</i>	15		<i>Bos taurus</i>	2	
<i>Ardeotis australis</i>	3		<i>Canis lupus</i>	1	
<i>Artamus cinereus</i>	13		<i>Canis lupus dingo</i>	4	
<i>Artamus cyanopterus</i>	25		<i>Capra hircus</i>	1	
<i>Artamus personatus</i>	4		<i>Cercartetus concinnus</i>	48	
<i>Aythya australis</i>	11		<i>Chalinolobus gouldii</i>	24	
<i>Barnardius zonarius</i>	57		<i>Chalinolobus morio</i>	69	
<i>Biziura lobata</i>	14		<i>Felis catus</i>	17	
<i>Cacatua roseicapilla</i>	2		<i>Macropus fuliginosus</i>	24	
<i>Cacatua sanguinea</i>	8		<i>Macropus robustus erubescens</i>	1	
<i>Cacomantis flabelliformis</i>	7		<i>Macropus rufus</i>	3	

<i>Cacomantis pallidus</i>	11	<i>Macrotis lagotis</i>	2
<i>Calamanthus cautus</i>	2	<i>Mormopterus planiceps</i>	24
<i>Calidris acuminata</i>	3	<i>Mormopterus sp.</i>	5
<i>Calidris alba (Crocethia alba)</i>	1	<i>Mus musculus</i>	63
<i>Calidris ferruginea</i>	1	<i>Myrmecobius fasciatus</i>	1
<i>Calidris ruficollis</i>	1	<i>Ningauy yvonneae</i>	9
<i>Calyptorhynchus latirostris</i>	3	<i>Notomys mitchellii</i>	7
<i>Certhionyx variegatus</i>	2	<i>Nyctophilus geoffroyi</i>	12
<i>Charadrius ruficapillus</i>	2	<i>Nyctophilus timoriensis timoriensis</i>	1
<i>Chenonetta jubata</i>	12	<i>Oryctolagus cuniculus</i>	61
<i>Cheramoeca leucosterna</i>	12	<i>Ovis aries</i>	2
<i>Cheramoeca leucosternus</i>	4	<i>Pseudomys bolami</i>	24
<i>Chroicocephalus novaehollandiae</i>	2	<i>Pseudomys hermannsburgensis</i>	11
<i>Chrysococcyx basalis</i>	11	<i>Scotorepens balstoni</i>	10
<i>Chrysococcyx osculans</i>	1	<i>Sminthopsis crassicaudata</i>	25
<i>Cincloramphus cruralis</i>	5	<i>Sminthopsis dolichura</i>	24
<i>Cincloramphus mathewsi</i>	4	<i>Sminthopsis gilberti</i>	2
<i>Cinclosoma castanotus</i>	31	<i>Sminthopsis ooldea</i>	1
<i>Circus assimilis</i>	2	<i>Sminthopsis sp.</i>	4
<i>Cladorhynchus leucocephalus</i>	1	<i>Tachyglossus aculeatus</i>	8
<i>Climacteris rufa</i>	9	<i>Tadarida australis</i>	13
<i>Colluricincla harmonica</i>	119	<i>Taphozous hilli</i>	2
<i>Columba livia</i>	26	<i>Vespadelus baverstocki</i>	4
<i>Coracina maxima</i>	2	<i>Vespadelus finlaysoni</i>	3
<i>Coracina novaehollandiae</i>	104	<i>Vespadelus regulus</i>	10
<i>Corvus bennetti</i>	22	REPTILE	909
<i>Corvus coronoides</i>	296	<i>Acanthophis pyrrhus</i>	1
<i>Corvus orru</i>	3	<i>Brachyuropis fasciolata</i>	2
<i>Coturnix pectoralis</i>	1	<i>Brachyuropis fasciolatus fasciolatus</i>	1
<i>Cracticus nigrogularis</i>	110	<i>Brachyuropis semifasciatus</i>	3
<i>Cracticus tibicen</i>	111	<i>Chelodina colliei</i>	1
<i>Cracticus torquatus</i>	98	<i>Crenadactylus ocellatus ocellatus</i>	3
<i>Cuculus pallidus</i>	1	<i>Cryptoblepharus buchananii</i>	7
<i>Cygnus atratus</i>	24	<i>Cryptoblepharus plagioccephalus</i>	5
<i>Daphoenositta chrysoptera</i>	5	<i>Ctenophorus caudicinctus</i>	2
<i>Daphoenositta chrysoptera pileata</i>	3	<i>Ctenophorus cristatus</i>	25
<i>Dicaeum hirundinaceum</i>	32	<i>Ctenophorus fordi</i>	19
<i>Dromaius novaehollandiae</i>	58	<i>Ctenophorus isolepis citrinus</i>	10
<i>Drymodes brunneopygia</i>	4	<i>Ctenophorus nuchalis</i>	4
<i>Egretta novaehollandiae</i>	9	<i>Ctenophorus ornatus</i>	2
<i>Elanus axillaris</i>	11	<i>Ctenophorus reticulatus</i>	32
<i>Elanus caeruleus</i>	1	<i>Ctenophorus salinarum</i>	17
<i>Elanus caeruleus axillaris</i>	2	<i>Ctenophorus scutulatus</i>	11
<i>Elsayornis melanops</i>	14	<i>Ctenotus atlas</i>	10

<i>Eolophus roseicapillus</i>	22	<i>Ctenotus leonhardii</i>	5
<i>Eopsaltria australis griseogularis</i>	5	<i>Ctenotus schomburgkii</i>	2
<i>Eopsaltria griseogularis</i>	10	<i>Ctenotus uber</i>	19
<i>Epthianura albifrons</i>	16	<i>Ctenotus uber uber</i>	10
<i>Epthianura tricolor</i>	1	<i>Cyclodomorphus melanops elongatus</i>	3
<i>Erythrogonys cinctus</i>	3	<i>Delma australis</i>	8
<i>Eurostopodus argus</i>	3	<i>Demansia psammophis</i>	2
<i>Falco berigora</i>	23	<i>Demansia psammophis psammophis</i>	3
<i>Falco berigora berigora</i>	2	<i>Diplodactylus granariensis</i>	28
<i>Falco cenchroides</i>	15	<i>Diplodactylus granariensis granariensis</i>	22
<i>Falco longipennis</i>	17	<i>Diplodactylus maini</i>	47
<i>Fulica atra</i>	21	<i>Diplodactylus pulcher</i>	40
<i>Gerygone fusca</i>	7	<i>Egernia depressa</i>	7
<i>Glossopsitta porphyrocephala</i>	87	<i>Egernia formosa</i>	14
<i>Glyciphila melanops</i>	1	<i>Egernia richardi</i>	1
<i>Grallina cyanoleuca</i>	148	<i>Eremiascincus richardsonii</i>	7
<i>Haliastur sphenurus</i>	3	<i>Furina ornata</i>	1
<i>Hamirostra melanosternon</i>	1	<i>Gehyra purpurascens</i>	7
<i>Hieraaetus morphnoides</i>	4	<i>Gehyra variegata</i>	39
<i>Himantopus himantopus</i>	10	<i>Hemidactylus frenatus</i>	3
<i>Himantopus himantopus leucocephalus</i>	1	<i>Hemiergus initialis initialis</i>	14
<i>Hirundo neoxena</i>	61	<i>Hesperoedura reticulata</i>	5
<i>Hirundo nigricans</i>	7	<i>Heteronotia binoei</i>	59
<i>Hylacola cauta whitlocki</i>	1	<i>Lerista kingi</i>	3
<i>Lalage tricolor</i>	1	<i>Lerista muelleri</i>	1
<i>Leipoa ocellata</i>	59	<i>Lerista picturata</i>	17
<i>Lichenostomus cratitius</i>	4	<i>Lerista stictopleura</i>	2
<i>Lichenostomus leucotis</i>	170	<i>Lerista timida</i>	21
<i>Lichenostomus leucotis novaenorciae</i>	1	<i>Lialis burtonis</i>	1
<i>Lichenostomus ornatus</i>	156	<i>Liopholis inornata</i>	7
<i>Lichenostomus plumulus</i>	17	<i>Lucasium maini</i>	28
<i>Lichenostomus virescens</i>	281	<i>Menetia greyii</i>	27
<i>Lichmera indistincta</i>	295	<i>Moloch horridus</i>	15
<i>Lophoictinia isura</i>	1	<i>Morelia spilota imbricata</i>	4
<i>Malacorhynchus membranaceus</i>	14	<i>Morethia adelaidensis</i>	10
<i>Malurus leucopterus</i>	47	<i>Morethia butleri</i>	6
<i>Malurus pulcherrimus</i>	17	<i>Neelaps bimaculatus</i>	4
<i>Malurus splendens</i>	60	<i>Nephrurus milii</i>	4
<i>Manorina flavigula</i>	130	<i>Nephrurus vertebralis</i>	1
<i>Melithreptus brevirostris</i>	62	<i>Oedura reticulata</i>	6
<i>Melopsittacus undulatus</i>	1	<i>Parasuta gouldii</i>	6
<i>Merops ornatus</i>	51	<i>Parasuta monachus</i>	8
<i>Microcarbo melanoleucos</i>	2	<i>Pogona minor minor</i>	16
<i>Microeca fascinans</i>	47	<i>Pseudechis australis</i>	4

<i>Microeca fascinans assimilis</i>	3	<i>Pseudonaja affinis affinis</i>	1
<i>Ninox novaeseelandiae</i>	19	<i>Pseudonaja mengdeni</i>	32
<i>Nycticorax caledonicus hilli</i>	1	<i>Pseudonaja modesta</i>	13
<i>Nymphicus hollandicus</i>	1	<i>Pseudonaja nuchalis</i>	1
<i>Ocyphaps lophotes</i>	89	<i>Pygopus lepidopodus</i>	2
<i>Oreoica gutturalis</i>	165	<i>Pygopus nigriceps</i>	2
<i>Oreoica gutturalis gutturalis</i>	5	<i>Ramphotyphlops australis</i>	9
<i>Pachycephala inornata</i>	27	<i>Ramphotyphlops bicolor</i>	4
<i>Pachycephala pectoralis</i>	11	<i>Ramphotyphlops bituberculatus</i>	15
<i>Pachycephala rufiventris</i>	38	<i>Ramphotyphlops hamatus</i>	1
<i>Pardalotus punctatus</i>	5	<i>Ramphotyphlops waitii</i>	1
<i>Pardalotus striatus</i>	243	<i>Rhynchoedura ornata</i>	15
<i>Pardalotus striatus westraliensis</i>	4	<i>Simoselaps bertholdi</i>	12
<i>Petrochelidon ariel</i>	2	<i>Strophurus assimilis</i>	7
<i>Petrochelidon nigricans</i>	30	<i>Strophurus elderi</i>	5
<i>Petroica cucullata</i>	1	<i>Strophurus sp.</i>	1
<i>Petroica goodenovii</i>	56	<i>Suta fasciata</i>	7
<i>Phalacrocorax sulcirostris</i>	10	<i>Tiliqua occipitalis</i>	2
<i>Phaps chalcoptera</i>	46	<i>Tiliqua rugosa</i>	19
<i>Phaps elegans</i>	1	<i>Tiliqua rugosa rugosa</i>	2
<i>Phylidonyris albifrons</i>	13	<i>Tympanocryptis cephalus</i>	13
<i>Phylidonyris niger</i>	1	<i>Tympanocryptis lineata</i>	1
<i>Platalea flavipes</i>	3	<i>Underwoodisaurus milii</i>	24
<i>Platycercus icterotis</i>	4	<i>Varanus caudolineatus</i>	7
<i>Platycercus varius</i>	10	<i>Varanus gouldii</i>	17
<i>Platycercus zonarius</i>	45	<i>Varanus tristis</i>	4
<i>Platycercus zonarius zonarius</i>	2		
<i>Podargus strigoides</i>	13		
<i>Poliocephalus poliocephalus</i>	31		
<i>Polytelis anthopeplus</i>	3		
<i>Polytelis anthopeplus westralis</i>	1		
<i>Pomatostomus superciliosus</i>	81		
<i>Pomatostomus superciliosus ashbyi</i>	2		
<i>Porzana fluminea</i>	1		
<i>Ptilotula ornatus</i>	2		
<i>Ptilotula plumulus</i>	2		
<i>Purnella albifrons</i>	81		



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: 04-May-2023

[Summary](#)

[Details](#)

[Matters of NES](#)

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[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:	12
Listed Migratory Species:	7

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Lands:	81
Commonwealth Heritage Places:	None
Listed Marine Species:	11
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	12
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	7
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

National Heritage Places [\[Resource Information \]](#)

Name	State	Legal Status	Buffer Status
Historic			
Goldfields Water Supply Scheme, Western Australia	WA	Listed place	In feature area

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
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BIRD

Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area	In feature area
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Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
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Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
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Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area	In feature area
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Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area	In feature area
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INSECT

Ogyris subterrestris petrina Arid Bronze Azure [77743]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
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MAMMAL

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

PLANT

Calectasia pignattiana Stilted Tinsel Lily [82018]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Gastrolobium graniticum Granite Poison [14872]	Endangered	Species or species habitat known to occur within area	In feature area
Ricinocarpos brevis [82879]	Endangered	Species or species habitat may occur within area	In buffer area only
Tecticornia flabelliformis Bead Glasswort [82664]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat may occur within area	In buffer area only

Listed Migratory Species

[[Resource Information](#)]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
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 buffer area only

Other Matters Protected by the EPBC Act

Commonwealth Lands [\[Resource Information \]](#)

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

Commonwealth Land Name	State	Buffer Status
Defence		
Defence - AIRTC KALGOORLIE [50110]	WA	In buffer area only
Defence - AIRTC KALGOORLIE [50111]	WA	In buffer area only
Defence - KALGOORLIE RIFLE RANGE [50156]	WA	In buffer area only
Defence - KALGOORLIE TRAINING DEPOT [50199]	WA	In buffer area only
Defence - KALGOORLIE TRAINING DEPOT [50198]	WA	In buffer area only
Unknown		
Commonwealth Land - [51779]	WA	In buffer area only
Commonwealth Land - [51060]	WA	In buffer area only
Commonwealth Land - [51792]	WA	In buffer area only
Commonwealth Land - [51780]	WA	In buffer area only
Commonwealth Land - [51773]	WA	In buffer area only
Commonwealth Land - [51953]	WA	In buffer area only
Commonwealth Land - [51949]	WA	In buffer area only
Commonwealth Land - [51776]	WA	In buffer area only
Commonwealth Land - [51784]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [52233]	WA	In buffer area only
Commonwealth Land - [52230]	WA	In buffer area only
Commonwealth Land - [51765]	WA	In buffer area only
Commonwealth Land - [51760]	WA	In buffer area only
Commonwealth Land - [51761]	WA	In buffer area only
Commonwealth Land - [51950]	WA	In buffer area only
Commonwealth Land - [51763]	WA	In buffer area only
Commonwealth Land - [51960]	WA	In buffer area only
Commonwealth Land - [51961]	WA	In buffer area only
Commonwealth Land - [52211]	WA	In buffer area only
Commonwealth Land - [51785]	WA	In buffer area only
Commonwealth Land - [52184]	WA	In buffer area only
Commonwealth Land - [51782]	WA	In buffer area only
Commonwealth Land - [51985]	WA	In buffer area only
Commonwealth Land - [51769]	WA	In buffer area only
Commonwealth Land - [51794]	WA	In buffer area only
Commonwealth Land - [50331]	WA	In buffer area only
Commonwealth Land - [51795]	WA	In buffer area only
Commonwealth Land - [50332]	WA	In buffer area only
Commonwealth Land - [51791]	WA	In buffer area only
Commonwealth Land - [51783]	WA	In buffer area only
Commonwealth Land - [51793]	WA	In buffer area only
Commonwealth Land - [51790]	WA	In buffer area only
Commonwealth Land - [51430]	WA	In buffer area only
Commonwealth Land - [50329]	WA	In buffer area only
Commonwealth Land - [50335]	WA	In buffer area only
Commonwealth Land - [50334]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [50337]	WA	In buffer area only
Commonwealth Land - [50336]	WA	In buffer area only
Commonwealth Land - [51772]	WA	In buffer area only
Commonwealth Land - [51061]	WA	In buffer area only
Commonwealth Land - [52241]	WA	In buffer area only
Commonwealth Land - [51770]	WA	In buffer area only
Commonwealth Land - [51781]	WA	In buffer area only
Commonwealth Land - [51786]	WA	In buffer area only
Commonwealth Land - [51963]	WA	In buffer area only
Commonwealth Land - [51406]	WA	In buffer area only
Commonwealth Land - [51764]	WA	In buffer area only
Commonwealth Land - [51762]	WA	In buffer area only
Commonwealth Land - [50310]	WA	In buffer area only
Commonwealth Land - [51766]	WA	In buffer area only
Commonwealth Land - [51962]	WA	In buffer area only
Commonwealth Land - [51789]	WA	In buffer area only
Commonwealth Land - [51788]	WA	In buffer area only
Commonwealth Land - [51059]	WA	In buffer area only
Commonwealth Land - [51778]	WA	In buffer area only
Commonwealth Land - [51767]	WA	In buffer area only
Commonwealth Land - [51777]	WA	In buffer area only
Commonwealth Land - [51952]	WA	In buffer area only
Commonwealth Land - [51951]	WA	In buffer area only
Commonwealth Land - [50333]	WA	In buffer area only
Commonwealth Land - [51787]	WA	In buffer area only
Commonwealth Land - [52183]	WA	In buffer area only
Commonwealth Land - [51771]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [51768]	WA	In buffer area only
Commonwealth Land - [51775]	WA	In buffer area only
Commonwealth Land - [51759]	WA	In buffer area only
Commonwealth Land - [51758]	WA	In buffer area only
Commonwealth Land - [51063]	WA	In buffer area only
Commonwealth Land - [51062]	WA	In buffer area only
Commonwealth Land - [51959]	WA	In buffer area only
Commonwealth Land - [51958]	WA	In buffer area only
Commonwealth Land - [51955]	WA	In buffer area only
Commonwealth Land - [51956]	WA	In buffer area only
Commonwealth Land - [51957]	WA	In buffer area only
Commonwealth Land - [51774]	WA	In buffer area only
Commonwealth Land - [51954]	WA	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis			
Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area

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

Extra Information

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

Protected Area Name	Reserve Type	State	Buffer Status
Kalgoorlie Arboretum	5(1)(h) Reserve	WA	In buffer area only
Kambalda	Nature Reserve	WA	In buffer area only
Kangaroo Hills Timber Reserve	5(1)(g) Reserve	WA	In feature area
Kurrawang	Nature Reserve	WA	In buffer area only
Lakeside Timber Reserve	5(1)(g) Reserve	WA	In buffer area only
Scahill Timber Reserve	5(1)(g) Reserve	WA	In buffer area only
Victoria Rock	Nature Reserve	WA	In buffer area only
Yallari Timber Reserve	5(1)(h) Reserve	WA	In buffer area only

EPBC Act Referrals [\[Resource Information \]](#)

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Goldfields Water Supply Scheme Project	2019/8547	Controlled Action	Post-Approval	In feature area
Nava-1 Cable System	2001/510	Controlled Action	Completed	In buffer area only
Not controlled action				
Focus, Greenfields and Carins Intersection Upgrade, Great Eastern Highway, WA	2014/7171	Not Controlled Action	Completed	In buffer area only
Gold Mining Developments on Lake Lefroy	2010/5402	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Lynas Kalgoorlie Rare Earths Processing Facility	2020/8719	Not Controlled Action	Completed	In buffer area only
Sale of Post Office, Hannan Street	2006/3084	Not Controlled Action	Completed	In buffer area only

Caveat

1 PURPOSE

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

The report contains the mapped locations of:

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

2 DISCLAIMER

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

Where data 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.

Atlas of Living Australia Database

Order	Family	Genus	Vernacular Name	Class	Totals
Anura	Limnodynastidae	Neobatrachus	Humming Frog	Amphibia	5
Anura	Limnodynastidae	Neobatrachus	Kunapalari Frog	Amphibia	
Anura	Hylidae	Litoria	Motorbike Frog	Amphibia	
Anura	Myobatrachidae	Pseudophryne	Orange-crowned Toadlet	Amphibia	
Anura	Limnodynastidae	Neobatrachus	Shoemaker Frog	Amphibia	
Psittaciformes	Psittacidae	Polytelis	Alexandra's Parrot	Aves	130
Pelecaniformes	Anhingidae	Anhinga	Arrgarrg	Aves	
Anseriformes	Anatidae	Spatula	Australasian Shoveler	Aves	
Anseriformes	Anatidae	Anas	Australasian Shoveler	Aves	
Falconiformes	Falconidae	Falco	Australian Hobby	Aves	
Podicipediformes	Podicipedidae	Tachybaptus	Australian Little Grebe	Aves	
Passeriformes	Artamidae	Gymnorhina	Australian Magpie	Aves	
Apodiformes	Aegothelidae	Aegotheles	Australian Owllet-nightjar	Aves	
Passeriformes	Motacillidae	Anthus	Australian Pipit	Aves	
Passeriformes	Corvidae	Corvus	Australian Raven	Aves	
Psittaciformes	Psittacidae	Barnardius	Australian Ringneck	Aves	
Anseriformes	Anatidae	Chenonetta	Australian Wood Duckmaned Goose	Aves	
Charadriiformes	Charadriidae	Vanellus	Banded Lapwing	Aves	
Passeriformes	Meliphagidae	Sugomel	Black Honeyeater	Aves	
Anseriformes	Anatidae	Cygnus	Black Swan	Aves	
Cuculiformes	Cuculidae	Chalcites	Black-eared Cuckoo	Aves	
Passeriformes	Campephagidae	Coracina	Black-faced Cuckoo-shrike	Aves	
Passeriformes	Artamidae	Artamus	Black-faced Woodswallow	Aves	
Charadriiformes	Charadriidae	Elseyornis	Black-fronted Dotterel	Aves	
Accipitriformes	Accipitridae	Elanus	Black-shouldered Kite	Aves	
Gruiformes	Rallidae	Tribonyx	Black-tailed Native Hen	Aves	
Anseriformes	Anatidae	Oxyura	Blue-billed Duck	Aves	
Passeriformes	Maluridae	Malurus	Blue-breasted Fairy-wren	Aves	
Passeriformes	Meliphagidae	Lichmera	Brown Honeyeater	Aves	
Passeriformes	Locustellidae	Cincloramphus	Brown Songlark	Aves	
Passeriformes	Acanthizidae	Smicronis	Brown Weebill	Aves	
Anseriformes	Anatidae	Aythya	Brownhead	Aves	
Passeriformes	Meliphagidae	Melithreptus	Brown-headed Honeyeater	Aves	
Psittaciformes	Psittacidae	Melopsittacus	Budgerigar	Aves	
Passeriformes	Cinclosomatidae	Cinclosoma	Chestnut Quailthrush (chestnut-backed)	Aves	
Anseriformes	Anatidae	Tadorna	Chestnut Sheldrake	Aves	
Passeriformes	Acanthizidae	Acanthiza	Chestnut-rumped Tit	Aves	
Falconiformes	Falconidae	Falco	Chicken Hawk	Aves	
Columbiformes	Columbidae	Phaps	Common Bronzewing	Aves	
Charadriiformes	Scolopacidae	Actitis	Common Sandpiper	Aves	
Passeriformes	Oreocidae	Oreoica	Crested Bellbird	Aves	
Columbiformes	Columbidae	Ocyphaps	Crested Pigeon	Aves	
Passeriformes	Meliphagidae	Epthianura	Crimson Chat	Aves	
Falconiformes	Falconidae	Falco	Duck Hawk	Aves	
Passeriformes	Artamidae	Artamus	Dusky Woodswallow	Aves	
Ciconiiformes	Ardeidae	Casmerodius	Eastern Great Egret	Aves	
Struthioniformes	Casuariidae	Dromaius	Emu	Aves	
Gruiformes	Rallidae	Fulica	Eurasian Coot	Aves	
Passeriformes	Hirundinidae	Petrochelidon	Fairy Martin	Aves	
Passeriformes	Acanthizidae	Gerygone	Fuscous Warbler	Aves	
Psittaciformes	Cacatuidae	Eolophus	Galah	Aves	
Passeriformes	Pachycephalidae	Pachycephala	Gilbert's Whistler	Aves	
Charadriiformes	Scolopacidae	Tringa	Greenshank	Aves	
Passeriformes	Artamidae	Cracticus	Grey Butcherbird	Aves	
Passeriformes	Artamidae	Strepera	Grey Currawong	Aves	

Passeriformes	Pachycephalidae	Colluricincla	Grey Shrike-thrush	Aves	
Accipitriformes	Accipitridae	Accipiter	Grey-headed Goshawk	Aves	
Podicipediformes	Podicipedidae	Poliiocephalus	Hoary-headed Dabchick	Aves	
Cuculiformes	Cuculidae	Chalcites	Horsfield's Bronze-cuckoo	Aves	
Passeriformes	Petroicidae	Microeca	Jacky Winter	Aves	
Ciconiiformes	Threskiornithidae	Threskiornis	Letter Bird	Aves	
Pelecaniformes	Phalacrocoracidae	Phalacrocorax	Little Black Cormorant	Aves	
Psittaciformes	Cacatuidae	Cacatua	Little Corella	Aves	
Pelecaniformes	Phalacrocoracidae	Microcarbo	Little Cormorant	Aves	
Passeriformes	Corvidae	Corvus	Little Crow	Aves	
Accipitriformes	Accipitridae	Hieraaetus	Little Eagle	Aves	
Passeriformes	Monarchidae	Grallina	Magpie-lark	Aves	
Psittaciformes	Cacatuidae	Lophochroa	Major Mitchell's Cockatoo	Aves	
Anseriformes	Anatidae	Anas	Mallard	Aves	
Galliformes	Megapodiidae	Leipoa	Malleefowl	Aves	
Passeriformes	Artamidae	Artamus	Masked Woodswallow	Aves	
Ciconiiformes	Ardeidae	Egretta	Matuka	Aves	
Passeriformes	Dicaeidae	Dicaeum	Mistletoebird	Aves	
Psittaciformes	Psittacidae	Psephotus	Mulga Parrot	Aves	
Anseriformes	Anatidae	Biziura	Musk Duck	Aves	
Anseriformes	Anatidae	Anas	Oceanic Teal	Aves	
Cuculiformes	Cuculidae	Heteroscenes	Pallid Cuckoo	Aves	
Anseriformes	Anatidae	Anas	Parera	Aves	
Passeriformes	Artamidae	Cracticus	Pied Butcherbird	Aves	
Charadriiformes	Recurvirostridae	Himantopus	Pied Stilt	Aves	
Anseriformes	Anatidae	Malacorhynchus	Pink-eared Duck	Aves	
Gruiformes	Otididae	Ardeotis	Plain Turkey	Aves	
Psittaciformes	Psittacidae	Parvipsitta	Purple-crowned Lorikeet	Aves	
Coraciiformes	Meropidae	Merops	Rainbow Bee-eater	Aves	
Passeriformes	Meliphagidae	Anthochaera	Red Wattlebird	Aves	
Coraciiformes	Alcedinidae	Todiramphus	Red-backed Kingfisher	Aves	
Charadriiformes	Charadriidae	Charadrius	Red-capped Plover	Aves	
Passeriformes	Petroicidae	Petroica	Red-capped Robin	Aves	
Charadriiformes	Charadriidae	Erythrogonys	Red-kneed Dotterel	Aves	
Passeriformes	Acanthizidae	Acanthiza	Red-rumped Tit	Aves	
Passeriformes	Acanthizidae	Pyrrholaemus	Redthroat	Aves	
Psittaciformes	Psittacidae	Polytelis	Regent Parrot	Aves	
Columbiformes	Columbidae	Columba	Rock Pigeon	Aves	
Passeriformes	Climacteridae	Climacteris	Rufous Treecreeper	Aves	
Passeriformes	Pachycephalidae	Pachycephala	Rufous Whistler	Aves	
Psittaciformes	Psittacidae	Neophema	Scarlet-chested Parrot	Aves	
Passeriformes	Zosteropidae	Zosterops	Silvereye	Aves	
Passeriformes	Meliphagidae	Gavicalis	Singing Honeyeater	Aves	
Passeriformes	Acanthizidae	Acanthiza	Slender Thornbill	Aves	
Strigiformes	Strigidae	Ninox	Southern Boobook	Aves	
Passeriformes	Petroicidae	Drymodes	Southern Scrub-robin	Aves	
Passeriformes	Meliphagidae	Acanthagenys	Spiny-cheeked Honeyeater	Aves	
Passeriformes	Maluridae	Malurus	Splendid Fairy-wren	Aves	
Passeriformes	Pardalotidae	Pardalotus	Striated Pardalote	Aves	
Passeriformes	Meliphagidae	Plectorhyncha	Striped Honeyeater	Aves	
Caprimulgiformes	Podargidae	Podargus	Tawny Frogmouth	Aves	
Passeriformes	Corvidae	Corvus	Torresian Crow	Aves	
Passeriformes	Hirundinidae	Petrochelidon	Tree Martin	Aves	
Passeriformes	Neosittidae	Daphoenositta	Varied Sittella	Aves	
Falconiformes	Falconidae	Falco	Wala	Aves	
Accipitriformes	Accipitridae	Aquila	Wedge-tailed Eagle	Aves	
Passeriformes	Hirundinidae	Hirundo	Welcome Swallow	Aves	
Psittaciformes	Cacatuidae	Cacatua	Western Corella	Aves	

Psittaciformes	Psittacidae	Platycercus	Western Rosella	Aves	
Passeriformes	Petroicidae	Eopsaltria	Western Yellow Robin	Aves	
Accipitriformes	Accipitridae	Haliastur	Whistling Eagle-hawk	Aves	
Passeriformes	Hirundinidae	Cheramoeca	White-backed Swallow	Aves	
Passeriformes	Pomatostomidae	Pomatostomus	White-browed Babbler	Aves	
Passeriformes	Artamidae	Artamus	White-browed Woodswallow	Aves	
Passeriformes	Meliphagidae	Nesoptilotis	White-eared Honeyeater	Aves	
Passeriformes	Meliphagidae	Epthianura	White-fronted Chat	Aves	
Passeriformes	Meliphagidae	Purnella	White-fronted Honeyeater	Aves	
Passeriformes	Meliphagidae	Melithreptus	White-naped Honeyeater	Aves	
Ciconiiformes	Ardeidae	Ardea	White-necked Heron	Aves	
Passeriformes	Meliphagidae	Melithreptus	White-throated Honeyeater	Aves	
Passeriformes	Maluridae	Malurus	White-winged Fairy-wren	Aves	
Passeriformes	Rhipiduridae	Rhipidura	Willie Wagtail	Aves	
Charadriiformes	Scolopacidae	Tringa	Wood Sandpiper	Aves	
Ciconiiformes	Threskiornithidae	Platalea	Yellow-legged Spoonbill	Aves	
Passeriformes	Meliphagidae	Ptilotula	Yellow-plumed Honeyeater	Aves	
Passeriformes	Acanthizidae	Acanthiza	Yellow-tail	Aves	
Passeriformes	Meliphagidae	Manorina	Yellow-throated Miner	Aves	
Passeriformes	Estrildidae	Taeniopygia	Zebra Finch	Aves	
Passeriformes	Cinclosomatidae	Cinclosoma		Aves	
Strigiformes	Strigidae	Ninox		Aves	
Diprotodontia	Potoroidae	Bettongia	Burrowing Bettong	Mammalia	13
Artiodactyla	Bovidae	Capra	Goat	Mammalia	
Chiroptera	Vespertilionidae	Chalinolobus	Gould's Wattled Bat	Mammalia	
Chiroptera	Vespertilionidae	Nyctophilus	Greater Long-eared Bat	Mammalia	
Rodentia	Muridae	Mus	House Mouse	Mammalia	
Chiroptera	Molossidae	Ozimops	Inland Free-tailed Bat	Mammalia	
Dasyuromorphia	Dasyuridae	Sminthopsis	Little Long-tailed Dunnart	Mammalia	
Rodentia	Muridae	Notomys	Mitchell's Hopping-mouse	Mammalia	
Rodentia	Muridae	Pseudomys	Sandy Inland Mouse	Mammalia	
Chiroptera	Vespertilionidae	Vespadelus	Southern Forest Bat	Mammalia	
Dasyuromorphia	Dasyuridae	Ningau	Southern Ningau	Mammalia	
Diprotodontia	Macropodidae	Macropus	Western Grey Kangaroo	Mammalia	
Diprotodontia	Burramyidae	Cercartetus	Western Pygmy-possum	Mammalia	
Squamata	Scincidae	Tiliqua	Boggi	Reptilia	42
Squamata	Scincidae	Egernia	Bright Crevice-skink	Reptilia	
Squamata	Scincidae	Eremiascincus	Broad-banded Sand-swimmer	Reptilia	
Squamata	Scincidae	Cryptoblepharus	Buchanan's Snake-eyed Skink	Reptilia	
Squamata	Gekkonidae	Heteronotia	Bynoe's Gecko	Reptilia	
Squamata	Agamidae	Ctenophorus	Claypan Dragon	Reptilia	
Squamata	Scincidae	Menetia	Common Dwarf Skink	Reptilia	
Squamata	Agamidae	Ctenophorus	Crested Dragon	Reptilia	
Squamata	Elapidae	Acanthophis	Desert Death Adder	Reptilia	
Squamata	Scincidae	Liopholis	Desert Skink	Reptilia	
Squamata	Pythonidae	Morelia	Diamond Python	Reptilia	
Squamata	Diplodactylidae	Diplodactylus	Fat-tailed Gecko	Reptilia	
Squamata	Diplodactylidae	Diplodactylus	Fine-faced Gecko	Reptilia	
Squamata	Agamidae	Tympanocryptis	Gibber Earless Dragon	Reptilia	
Squamata	Scincidae	Egernia	Goldfields Crevice-skink	Reptilia	
Squamata	Elapidae	Suta	Gould's Hooded Snake	Reptilia	
Squamata	Elapidae	Simoselaps	Jan's Banded Snake	Reptilia	
Squamata	Elapidae	Pseudechis	King Brown Snake	Reptilia	
Squamata	Diplodactylidae	Lucasium	Main's Ground Gecko	Reptilia	
Squamata	Diplodactylidae	Oedura	Marbled Velvet Gecko	Reptilia	
Squamata	Pygopodidae	Delma	Marble-faced Delma	Reptilia	
Squamata	Typhlopidae	Anilius	Prong-snouted Blind Snake	Reptilia	
Squamata	Gekkonidae	Gehyra	Purplish Dtella	Reptilia	

Squamata	Scincidae	Egernia	Pygmy Spiny-tailed Skink	Reptilia	
Squamata	Diplodactylidae	Hesperoedura	Reticulated Velvet Gecko	Reptilia	
Squamata	Elapidae	Pseudonaja	Ringed Brown Snake	Reptilia	
Squamata	Elapidae	Suta	Rosen's Snake	Reptilia	
Squamata	Typhlopidae	Anilius	Southern Blind Snake	Reptilia	
Squamata	Scincidae	Lerista	Southern Robust Slider	Reptilia	
Squamata	Elapidae	Brachyuropsis	Southern Shovel-nosed Snake	Reptilia	
Squamata	Diplodactylidae	Crenadactylus	South-western Clawless Gecko	Reptilia	
Squamata	Scincidae	Ctenotus	Spotted Ctenotus	Reptilia	
Squamata	Agamidae	Ctenophorus	Spotted Military Dragon	Reptilia	
Squamata	Carphodactylidae	Underwoodisaurus	Thick-tailed Gecko	Reptilia	
Squamata	Agamidae	Moloch	Thorny Devil	Reptilia	
Squamata	Scincidae	Lerista	Timid Slider	Reptilia	
Squamata	Gekkonidae	Gehyra	Tree Dtella	Reptilia	
Squamata	Scincidae	Ctenotus	Western Limestone Ctenotus	Reptilia	
Squamata	Agamidae	Ctenophorus	Western Notted Dragon	Reptilia	
Squamata	Diplodactylidae	Diplodactylus	Wheat-belt Stone Gecko	Reptilia	
Squamata	Scincidae	Lerista	Wood Mulch-slider	Reptilia	
Squamata	Scincidae	Morethia	Woodland Morethia Skink	Reptilia	



Appendix 3: Fauna Habitat Assessment Locations

Habitat Assessment	Northing	Easting	Fauna Habitat
HA1	6584290.798	323606.2668	Salmon Gum Woodland
HA2	6584337.965	323241.8694	Mallee Eucalyptus Woodland
HA3	6584657.364	323720.6883	Mallee Eucalyptus Woodland
HA4	6583803.408	324350.2591	Acacia Shrubland
HA5	6583642.95	324171.7515	Salmon Gum Woodland
HA6	6583391.266	324417.0349	Casuarina Shrubland
HA7	6583443.478	323862.1888	Mallee Eucalyptus Woodland
HA8	6584101.989	323877.0238	Salmon Gum Woodland
HA9	6584061.537	323961.9161	Salmon Gum Woodland
HA10	6584613.963	323330.6392	Mallee Eucalyptus Woodland
HA11	6584125.667	324498.7654	Mallee Eucalyptus Woodland
HA12	6583456.441	324595.6322	Casuarina Shrubland
HA13	6572631.613	327425.5549	Mallee Eucalyptus Woodland
HA14	6572465.96	327500.5212	Mallee Eucalyptus Woodland
HA15	6577933.285	324786.6387	Acacia Shrubland
HA16	6578033.119	324730.5694	Acacia Shrubland
HA17	6578088.531	324678.1559	Acacia Shrubland
HA18	6577931.224	324718.757	Acacia Shrubland
HA19	6578086.375	326619.9324	Acacia Shrubland
HA20	6578081.942	326488.4382	Acacia Shrubland
HA21	6578174.567	326566.5523	Acacia Shrubland
HA22	6578211.678	326748.7207	Acacia Shrubland
HA23	6562830.18	307700.26	Mallee Eucalyptus Woodland
HA24	6562658.464	307598.7975	Mallee Eucalyptus Woodland
HA25	6562802.393	307872.6079	Mallee Eucalyptus Woodland
HA26	6562124.42	308097.3562	Mallee Eucalyptus Woodland
HA27	6562011.159	307891.7831	Salmon Gum Woodland
HA28	6561680.417	308087.948	Mallee Eucalyptus Woodland
HA29	6561587.233	308232.8817	Salmon Gum Woodland
HA30	6561970.8	308448.8941	Mallee Eucalyptus Woodland
HA31	6561233.134	309167.8781	Salmon Gum Woodland
HA32	6560868.861	309490.5099	Mallee Eucalyptus Woodland
HA33	6559816.98	309878.1912	Salmon Gum Woodland
HA34	6560402.766	309542.1976	Mallee Eucalyptus Woodland
HA35	6560915.145	309870.238	Mallee Eucalyptus Woodland
HA36	6560931.237	310330.2163	Mallee Eucalyptus Woodland
HA37	6560781.571	310675.8706	Mallee Eucalyptus Woodland
HA38	6564196.408	316114.9736	Mallee Eucalyptus Woodland
HA39	6564339.351	316213.6416	Mallee Eucalyptus Woodland
HA40	6564718.058	315217.596	Mallee Eucalyptus Woodland
HA41	6565034.079	315690.9757	Acacia Shrubland
HA42	6565498.311	314904.9603	Mallee Eucalyptus Woodland

Habitat Assessment	Northing	Easting	Fauna Habitat
HA43	6565151.133	315292.6669	Mallee Eucalyptus Woodland
HA44	6565582.182	315321.1465	Salmon Gum Woodland
HA45	6564722.061	315941.6647	Mallee Eucalyptus Woodland
HA46	6563728.864	316781.351	Mallee Eucalyptus Woodland
HA47	6562889.627	317292.1164	Mallee Eucalyptus Woodland
HA48	6562727.006	317193.1766	Mallee Eucalyptus Woodland
HA49	6562859.753	317840.4125	Mallee Eucalyptus Woodland
HA50	6562979.863	316533.5476	Mallee Eucalyptus Woodland
HA51	6560330.844	318823.5703	Mallee Eucalyptus Woodland
HA52	6560490.062	317478.7314	Mallee Eucalyptus Woodland
HA53	6560897.655	317615.502	Salmon Gum Woodland
HA54	6559519.325	315282.5201	Salmon Gum Woodland
HA55	6559786	315438	Mallee Eucalyptus Woodland
HA56	6561824	317860	Salmon Gum Woodland
HA57	6561458.409	317393.7638	Mallee Eucalyptus Woodland
HA58	6562184.445	316179.8247	Mallee Eucalyptus Woodland
HA59	6562352.926	315728.5031	Mallee Eucalyptus Woodland
HA60	6562014.814	316760.438	Mallee Eucalyptus Woodland
HA61	6562314	317844	Salmon Gum Woodland
HA62	6562247.415	317529.0572	Mallee Eucalyptus Woodland
HA63	6561793.97	318434.6067	Mallee Eucalyptus Woodland
HA64	6561432.592	316265.2561	Mallee Eucalyptus Woodland
HA65	6583632.822	324666.0339	Mallee Eucalyptus Woodland



Appendix 4: Fauna Habitat Assessment Examples

FAUNA HABITAT ASSESSMENT SHEET

(Goldfields)

Location: Coolgardie Gold Operation		HA 38: Mallee Eucalyptus Woodland Example			
Project Number: FM 002		Aspect	N	NE	NW
Date: 6 April 2023	Easting: 316114		S	SE	SW
Quadrat Size: 50 x 50	Northing: 6564196		E	W	N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation	Other: Mallee		Average Height (M)	Cover				
	Stratum			Scattered Plants	Sparse	Moderate	Thick	
Hummock Grassland			10	0	1	2	3	
Acacia Shrubland				<5%	<20%	20-60%	60-100%	
Riverine Woodland	Overstorey	<i>E. clelandiorum</i> , <i>E. torquata</i>	10	0	1	2	3	
Other Grassland	Midstorey	<i>Acacia</i>	2	<5%	<20%	20-60%	60-100%	
Euc Woodland	Ground Cover	<i>Eremophila</i>	1	0	1	2	3	
				<5%	<20%	20-60%	60-100%	

CONDITION

5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded
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LAST FIRE

0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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Notes

Notes

(general)

DISTURBANCE

(cattle)

0 heavy	1 medium	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	
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Notes					Notes				
Tracks and some mining in places					Some scats and tracks				
GROUND COVER									
Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%
Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%					
MICROHABITATS									
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 2-5km	2 500m - 2km	3 <500m
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common
Caves	Absent		Present		Woody Debris	0 none	1 rare	2 moderate	3 common
CONSERVATION SIGNIFICANT FAUNA									
Species					Notes				
Malleefowl					Unsuitable for breeding, generally too open to build mounds.				
					May potentially be used for foraging				
FAUNA RECORDED									
Birds					Mammals			Reptiles	
Weebill					Western Grey Kangaroo (scats)				
Purple-crowned Lorikeet									

FAUNA HABITAT ASSESSMENT SHEET

(Goldfields)

Location: Coolgardie Gold Operation		HA 1: Salmon Gum Woodland Example			
Project Number: FM 002		Aspect	N	NE	NW
Date: 7 April 2023	Easting: 323606		S	SE	SW
Quadrat Size: 50 x 50	Northing: 6584290		E	W	N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation	Hummock Grassland	Other:		Average Height (M)	Cover			
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick
	Riverine Woodland	Overstorey	<i>E. salmonophoa</i>	16	0 <5%	1 <20%	2 20-60%	3 60-100%
	Other Grassland	Midstorey	<i>Acacia</i>	2	0 <5%	1 <20%	2 20-60%	3 60-100%
	Euc Woodland	Ground Cover	<i>Eremophila, mixed herbs and grasses</i>	1	0 <5%	1 <20%	2 20-60%	3 60-100%

CONDITION

5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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Notes

Notes

(general)

DISTURBANCE

(cattle)

0 heavy	1 medium	2 mild	3 none	0 heavy	1 medium	2 mild	3 none
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Notes					Notes					
Tracks and some mining in places					Tracks in some places					
GROUND COVER										
Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%	
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *	
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%	
Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%						
MICROHABITATS										
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common	
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common	
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common	
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Prescence	0 none	1 rare	2 moderate	3 common	
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 2-5km	2 500m - 2km	3 <500m	
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common	
Caves	Absent		Present		Woody Debris	0 none	1 rare	2 moderate	3 common	
CONSERVATION SIGNIFICANT FAUNA										
Species					Notes					
Malleefowl					Unsuitable for breeding, generally too open to build mounds.					
					May potentially be used for foraging					
FAUNA RECORDED										
Birds					Mammals			Reptiles		
Brown Honeyeater					Western Grey Kangaroo scats			Sand Goanna tracks		
Australia Ringneck					Cattle scats					
Purple-crowned Lorikeet										
Common Bronzewing										
Red Wattlebird										

FAUNA HABITAT ASSESSMENT SHEET

(Goldfields)

Location: Coolgardie Gold Operation		HA 20: Acacia Shrubland Example			
Project Number: FM 002		Aspect	N	NE	NW
Date: 8 April 2023	Easting: 326488		S	SE	SW
Quadrat Size: 50 x 50	Northing: 6578081		E	W	N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation	Hummock Grassland	Other:		Average Height (M)	Cover			
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick
Riverine Woodland	Overstorey	Mixed Acacia		8	0 <5%	1 <20%	2 20-60%	3 60-100%
Other Grassland	Midstorey				0 <5%	1 <20%	2 20-60%	3 60-100%
Euc Woodland	Ground Cover	mixed low shrubs		1	0 <5%	1 <20%	2 20-60%	3 60-100%

CONDITION

LAST FIRE

5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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Notes

Notes

(General)

DISTURBANCE

(Cattle)

	0 heavy	1 medium	2 mild	3 none		0 heavy	1 medium	2 mild	3 none
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Notes					Notes					
Some tracks/exploration										
GROUND COVER										
Bare Ground	0	<5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%
Rock	0	<5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *
Leaf Litter	0	<5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%
Logs >10cm	0	<5%	1 <20%	2 20-60%	3 60-100%					
MICROHABITATS										
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common	
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common	
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common	
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common	
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 2-5km	2 500m - 2km	3 <500m	
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common	
Caves	Absent		Present		Woody Debris	0 none	1 rare	2 moderate	3 common	
CONSERVATION SIGNIFICANT FAUNA										
Species					Notes					
Malleefowl					Unsuitable for breeding, generally too open to build mounds.					
					May potentially be used for foraging					
FAUNA RECORDED										
Birds					Mammals				Reptiles	
Red Wattlebird					Western Grey Kangaro scats					
White-eared Honeyeater										

FAUNA HABITAT ASSESSMENT SHEET

(Goldfields)

Location: Coolgardie Gold Operation		HA 12: Casuarina Shrubland Example			
Project Number: FM 002		Aspect	N	NE	NW
Date: 9 April 2023	Easting: 324595		S	SE	SW
Quadrat Size: 50 x 50	Northing: 6583456		E	W	N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation	Other: Shrubland		Average Height (M)	Cover				
	Stratum			Scattered Plants	Sparse	Moderate	Thick	
Hummock Grassland								
Acacia Shrubland								
Riverine Woodland	Overstorey	Casuarina	16	0 <5%	1 <20%	2 20-60%	3 60-100%	
Other Grassland	Midstorey	Mixed Acacia	2	0 <5%	1 <20%	2 20-60%	3 60-100%	
Euc Woodland	Ground Cover	Mixed herbs and grasses	1	0 <5%	1 <20%	2 20-60%	3 60-100%	

CONDITION

5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded
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LAST FIRE

0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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Notes

Notes

(general)

DISTURBANCE

(cattle)

0 heavy	1 medium	2 mild	3 none	0 heavy	1 medium	2 mild	3 none
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Notes					Notes					
Small track										
GROUND COVER										
Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%	
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *	
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%	
Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%						
MICROHABITATS										
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common	
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common	
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common	
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common	
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 2-5km	2 500m - 2km	3 <500m	
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common	
Caves	Absent		Present		Woody Debris	0 none	1 rare	2 moderate	3 common	
CONSERVATION SIGNIFICANT FAUNA										
Species					Notes					
Malleefowl					Potential suitable habitat with enough cover to build mounds					
					Potential suitable foraging habitat					
FAUNA RECORDED										
Birds					Mammals			Reptiles		
Red Wattlebird										
Grey Shrike-thrush										



Targeted Malleefowl Survey – Bonnievale

Prepared for Focus Minerals Limited

August 2023





Limitations

Scope of services

This report ("the report") has been prepared by Western Ecological Pty Ltd (WE) in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and WE. In some circumstances, a range of factors such as time, budget, access and/or site disturbance constraints may have limited the scope of services. This report is strictly limited to the matters stated in it and is not to be read as extending, by implication, to any other matter in connection with the matters addressed in it.

Reliance on data

In preparing the report, WE have relied upon data and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise expressly stated in the report, WE have not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. WE have also not attempted to determine whether any material matter has been omitted from the data. WE will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WE. The making of any assumption does not imply that WE have made any enquiry to verify the correctness of that assumption.

The report is based on conditions encountered and information received at the time of preparation of this report or the time that site investigations were carried out. WE disclaim responsibility for any changes that may have occurred after this time. This report and any legal issues arising from it are governed by and construed in accordance with the law of Western Australia as at the date of this report.

Report Version	Revision No.	Purpose	Author/reviewer	Submitted to Client	
				Form	Date
Draft Report	1	For client review	Western Ecological / Focus Minerals	Electronic	07/08/2023
Final Report	2	Client submission	Western Ecological	Electronic	08/08/2023

Executive Summary

Focus Minerals Limited plans to mine the Bonnievale area (approx. 140 ha) in the very near future. Given the recent survey undertaken by Western Ecological (2023), and records of the Malleefowl (*Leipoa ocellata*) in the vicinity of the Bonnievale area, Western Ecological was commissioned to undertake targeted Malleefowl survey.

A search of the Department of Biodiversity, Conservation and Attractions threatened fauna was undertaken to identify records of the Malleefowl potentially occurring in and surrounding the survey area

The field assessment was undertaken on the 19 July 2023 by two qualified Zoologist (Dr Ron Firth and Laura Stevens). Systematic transects were primarily walked on foot throughout most of the survey area (apart from very heavily disturbed areas), but in some limited cases where possible driven by car at low speeds (approximately 10 km/h) as there are some tracks and old exploration drill lines

A large series of systematic transects were walked throughout vegetated sections of the survey area and no Malleefowl mounds, active or disused and historic were recorded. Further to this no Malleefowl or their signs (tracks, scratching's or feathers) were observed in the survey area while walking the systematic transects or opportunistically.



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1. Introduction

1.1 Background

Western Ecological (WE) understands that Focus Minerals Limited (Focus) plans to mine the Bonnievale area (approx. 140 ha) in the very near future (Figure 1). Given the recent survey undertaken by Western Ecological (2023), and records of the Malleefowl (*Leipoa ocellata*) in the vicinity of the Bonnievale area, Focus has requested that a targeted Malleefowl survey be undertaken.

1.2 Objectives and Scope

The objectives and scope of work (SoW) to be undertaken was as follows:

- Targeted Malleefowl Survey
- Technical fauna report.

1.3 Legislative context

Fauna in Western Australia is protected formally and informally by various legislative and non-legislative measures, which are as follows:

- *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* – Commonwealth Government
- *Biodiversity Conservation Act 2016 (BC Act)* – WA State Government.

Non-legislative measures:

- WA Department of Biodiversity, Conservation and Attractions (DBCA) Priority lists for flora, ecological communities and fauna.

A short description of each is given below. Other definitions, including species conservation categories, are provided in Appendix 1.

EPBC Act

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) aims to protect matters of national environmental significance, which are detailed in Appendix 1. Under the EPBC Act, the Department of Climate Change, Energy, the Environment and Water (DCCEEW) lists protected species and Threatened Ecological Communities (TECs) by criteria set out in the Act. Species are conservation significant if they are listed as Threatened (i.e., Critically Endangered, Endangered and Vulnerable) or Migratory.

Bird species protected as Migratory under the EPBC Act include those listed under international migratory bird agreements relating to the protection of birds, which migrate between Australia and other countries, for which Australia has agreed. This includes the Japan-Australia Migratory Bird Agreement (JAMBA), the China-Australia Migratory Bird Agreement (CAMBA), the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA) and the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention).

Some marine fauna or terrestrial fauna that use marine habitats are listed as Marine under the EPBC Act. These species are only considered conservation significant when a proposed development occurs in a Commonwealth marine area (i.e., any Commonwealth Waters or Commonwealth Marine Protected Area). Outside of such areas, the EPBC Act does not consider these species to be matters of national environmental significance, so are not protected under the Act.

BC Act

The *Biodiversity Conservation Act 2016* (BC Act) replaced both the *Wildlife Conservation Act 1950* and the *Sandalwood Act 1929* and came into effect on 1 January 2019. The aim of the new Act is to conserve and protect biodiversity and to promote the ecologically sustainable use of biodiversity components in the State, and will bring more activities within the scope of biodiversity laws.

Taxa listed as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1a, 1b, and 1c), or is a rediscovered species to be regarded as threatened species under section 26(2) of the BC Act. Other categories include extinct or extinct in the wild and they are listed under section 23 (1) of the BC Act (Appendix 1).

If species meet 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, they are covered under section 13(1) of the BC Act and are called specially protected species. Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act can't also be listed as Specially Protected species (see Appendix 1 for a more detailed description of each threat category).

Threatened Ecological Communities (TECs) are also covered under the BC Act and are placed into three categories of critically endangered, endangered or vulnerable under section 27(1a, 1b, and 1c) of the BC Act depending on their threat status.

DBCA Priority Species and Communities

DBCA lists species that are possibly threatened but that do not meet criteria for listing under the BC Act, or are otherwise data deficient, and adds them 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. Consideration 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 (see Appendix 1 for more detail of the priority codes).

The DBCA also has a list of Priority Ecological Communities (PECs) that have scant information available to be considered a TEC, or which are rare but not currently threatened. Ecological communities that do not meet survey criteria or that are not sufficiently defined are added to the PEC list under priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community, and evaluation of conservation status, so that consideration can be given to their declaration as a TEC. Ecological communities that are adequately known, and are rare but not threatened or meet criteria for near threatened, or that have been recently removed from the threatened list, are placed in priority 4. These ecological communities require regular monitoring. Conservation dependent ecological communities are placed in priority 5.

Informal Recognition of Threatened Fauna

Certain populations or communities of fauna may be of local significance or interest because of their patterns of distribution and abundance. For example, fauna may be locally significant because they are range extensions to the previously known distribution or are newly discovered species (and have the potential to be of conservation significance). In addition, many species are in decline as a result of threatening processes (land clearing, grazing, and changed fire regimes) and relict populations of such species assume local importance for DBCA. It is not uncommon for DBCA to make comment on these species of interest.

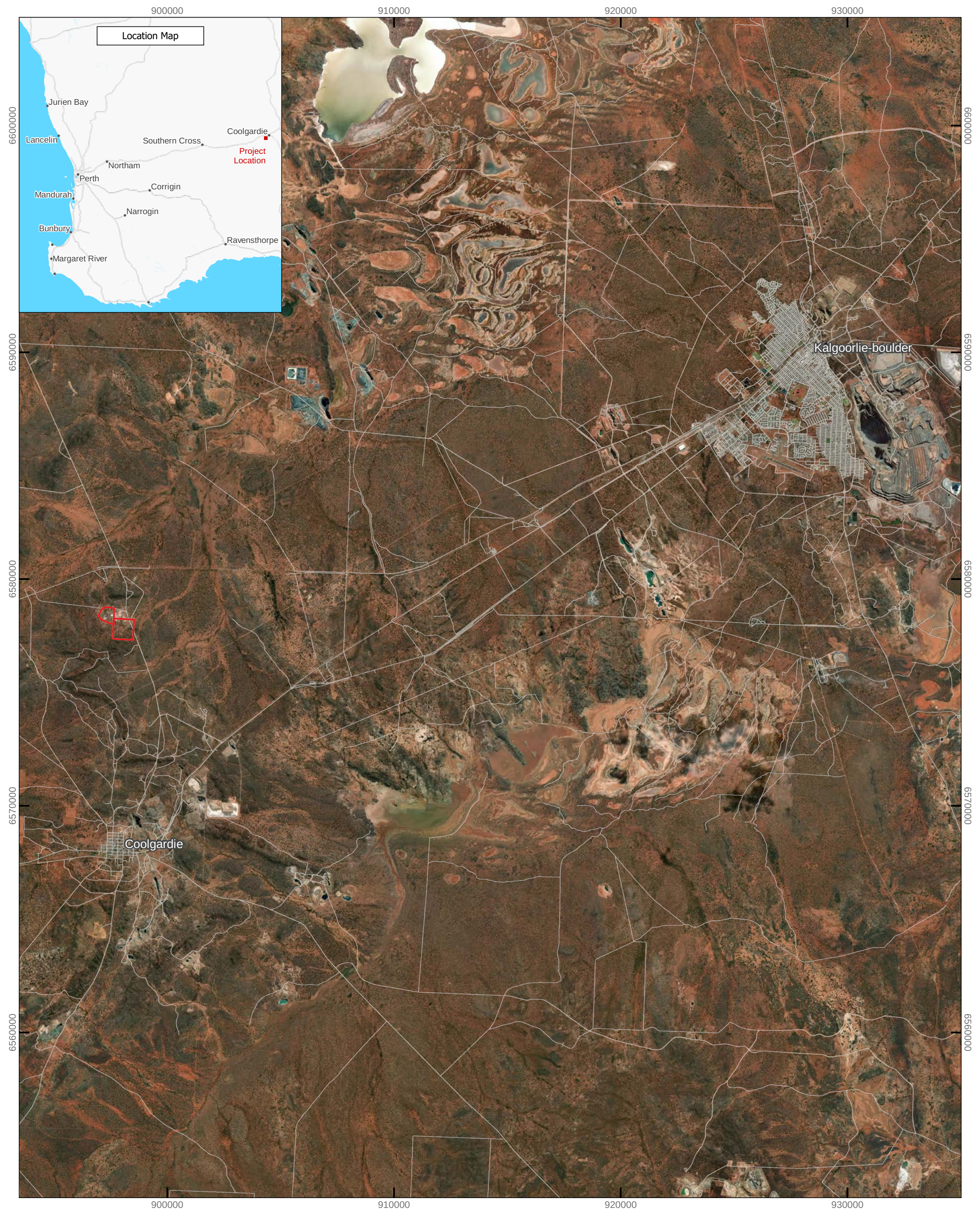
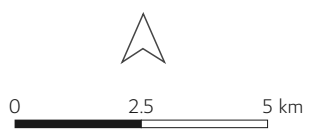


Figure 1: Project Location



Legend
 Survey Boundary

GDA2020 - MGA Zone 51



2. Methods

2.1 Survey Guidance

The fauna assessment was completed in accordance with the following EPA, DBCA and DAWE requirements for the environmental surveying and reporting of fauna surveys in WA, where relevant and practical, and as documented in:

- EPA Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment (EPA 2020)
- National Recovery Plan for Malleefowl (*Leipoa ocellata*), Department for Environment and Heritage (Benshemesh 2007).

2.2 Desktop Assessment

A search of the DBCA threatened fauna database centered on the following co-ordinates 324654.22 E / 6573318.20 S with a 50 km buffer was undertaken to identify records of the Malleefowl potentially occurring in and surrounding the survey area (DBCA 2023) (Appendix 2). However, DBCA increased the search buffer to 80 km to capture a greater number of records.

2.3 Malleefowl Field Assessment

The field assessment was undertaken on the 19 July 2023 by two qualified Zoologist (Dr Ron Firth and Laura Stevens). The following survey methods were undertaken in the survey area.

The Malleefowl survey methods undertaken in the survey area were consistent with relevant guidelines advice and current practices where relevant and practical and were as follows:

- Systematic transects were primarily walked on foot throughout most of the survey area (apart from very heavily disturbed areas), but in some limited cases where possible driven by car at low speeds (approximately 10 km/h) as there are some tracks and old exploration drill lines
- Recording evidence if present of Malleefowl activity while walking the transects such as:
 - Malleefowl tracks
 - Malleefowl nesting mounds including status (inactive/ active) and activity according to the following criteria:
 - Nest in preparation – eggs not laid (evidence of litter trail)
 - Mound is in progress/ maintenance – eggs assumed to be laid
 - Evidence of chicks leaving nest – chicks fledging site / egg shell fragments
 - Decommissioned – spreading and returning of mound soil
- Malleefowl individual sightings and assessment of age (chick/ adult)
- Opportunistic observations of Malleefowl evidence (tracks, mounds, feathers and or individual sightings) in the survey area while not walking the systematic transects.

3. Results

3.1 Database Search Results

There were 183 Malleefowl records of the Malleefowl in the DBCA threatened fauna database (Figure 2, Appendix 2). The oldest record was from 1902 and 45 km from the survey area. The two most recent records were both from 2019, and they were both sightings of birds, the closest of which was 12.8 km from the survey area, and the other record was 48.3 km from the survey area.

The closest five Malleefowl records to the survey area from the DBCA threatened fauna database have been summarised below and can be seen in Figure 2 for spatial context (including all records). We have used categories that are in the DBCA threatened fauna database that help provide further perspective to the records (Appendix 2).

The closest Malleefowl record was 1.386 km from the survey area and was recorded in 2016, it's a sighting and its certainty is given as moderately certain.

Table 1: Closest five Malleefowl records to the survey area from the DBCA threatened fauna database.

*Distance (km)	Year	Certainty	Observation Type	Accuracy (m)
1.386	2016	Moderately Certain	Sighting	1000
4.324	2016	Moderately Certain	Sighting	1000
5.574	2012	Certain	Sighting	1000
5.861	2013	Certain	Sighting	1000
8.982	1968	Moderately Certain	Secondary Sign	1000

*We have calculated the distance by using GIS software and the location coordinates provided by DBCA.

3.2 Field Survey Results

A series of systematic transects were walked throughout vegetated sections of the survey area and no Malleefowl mounds, active or disused and historic were recorded (Figure 3). Further to this no Malleefowl or their signs (tracks, scratching's or feathers) were observed in the survey area while walking the systematic transects or opportunistically. We have also added the survey tracks to Figure 3 from the basic fauna survey that was undertaken in April (Western Ecological 2023).



Figure 2: DBCA Malleefowl Database Records



- Legend**
- ◆ DBCA Malleefowl Records
 - ▭ Survey Boundary
 - 50km Buffer



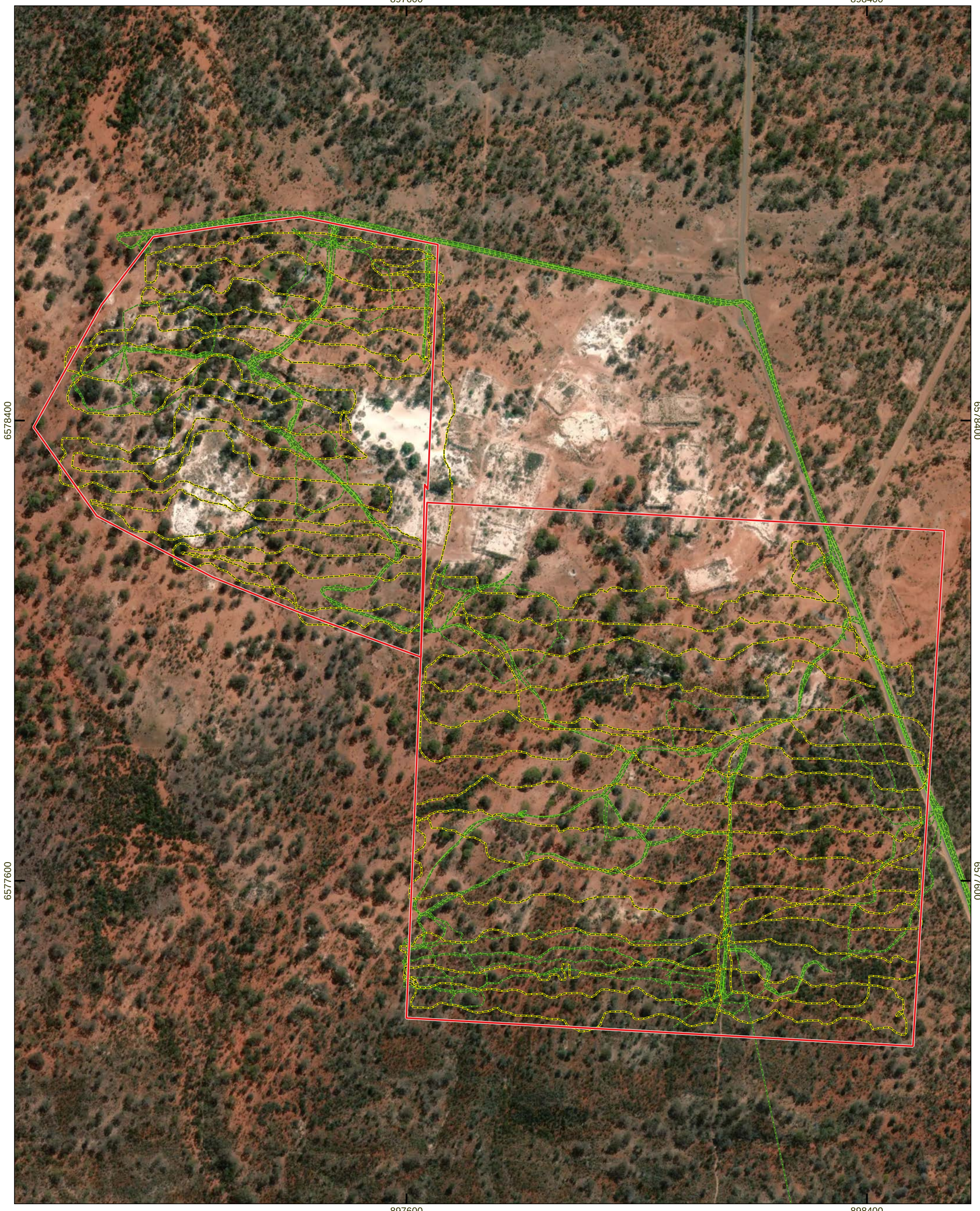
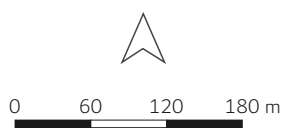


Figure 3: Survey Tracks



GDA2020 - MGA Zone 51

Legend

- Basic Fauna Assessment Tracks April 2023
- - - Malleefowl Survey Tracks July 2023
- Survey Boundary



4. Discussion

4.1 Malleefowl

During the assessment no active Malleefowl mounds were recorded and no disused and or historic mounds were observed despite a large series of systematic tracks having been traversed across the survey area. Moreover, no Malleefowl or their signs such as tracks, scratching's or feathers were observed in the survey area during this assessment or the survey undertaken in April (Western Ecological 2023).

The habitats present in the survey area are likely unsuitable for mound construction because they are relatively open with vegetation cover in the upper storey considered not dense enough for Malleefowl to construct their mounds (Plate 1). Further to this much of the survey area has been disturbed as a result of historic (over 100 years) and recent mining and exploration activity that has included the clearing of some vegetation. Malleefowl prefer habitat with a dense canopy and an open ground layer in which they can build their mounds (Benshemesh 2007). Benshemesh (1992) also found that dense canopy cover was the most important feature associated with high breeding densities at sites in Victoria. There are also relatively few shrub species in the midstorey habitats of the survey area which might provide a food source (Plate 2 and 3).



Plate 1: Salom Gum Woodland in the survey area unsuitable for Malleefowl mound construction.



Plate 2: Acacia Shrubland in the survey area unsuitable for Malleefowl mound construction.



Plate 3: Casuarina Shrubland in the survey area unsuitable for Malleefowl mound construction.

Studies have also shown that a wide range of food shrubs, rather than an abundance of any one species is probably important for Malleefowl during for example droughts (Harlen & Priddel 1996). This is supported by studies showing that Malleefowl are more abundant in areas where shrubs are more diverse (Woinarski 1989).

These birds also have a relatively large home range that can be up to 4 km² in low rainfall areas (Booth 1987). There are records of the Malleefowl nearby the survey area, consequently, birds may forage in the survey area, but not build mounds.

5. References

- Benshemesh, J. (1992). The conservation ecology of Malleefowl, with particular regard to fire. Pages 1-224. Monash University, Clayton.
- Benshemesh, J. (2007). National Recovery Plan for Malleefowl, Department for Environment and Heritage, South Australia.
- Booth, D. T. (1987). Home range and hatching success of Malleefowl, *Leipoa ocellata* Gould (Megapodiidae), in Murray mallee near Renmark, S.A. Australian Wildlife Research 14, 95-104.
- Department of Biodiversity, Conservation and Attractions (DBCA) (2023). Threatened and Priority Fauna Information (custom search).
- Harlen, R., & D. Priddel. (1996). Potential food resources available to malleefowl *Leipoa ocellata* in marginal mallee lands during drought. Australian Journal of Ecology 21, 418-428.
- Jones, D., & Goth, A. (2008). Mound-builders. CSIRO Publishing.
- Western Ecological (2023). Coolgardie Gold Project - Basic Terrestrial Fauna Survey. Unpublished Report Prepared for Focus Minerals Limited, May 2023.
- Woinarski, J. C. Z. (1989). The vertebrate fauna of Broombush *Melaleuca uncinata* vegetation in north-western Victoria, with reference to effects of broombush harvesting. Australian Wildlife Research 16, 217-238.



APPENDICES



Appendix 1: Conservation Categories



Categories of Threatened Fauna Species under the EPBC Act.

Conservation Code	Description
Ex	Extinct Taxa which at a particular time if, at the time, there is no reasonable doubt that the last member of the species has died.
ExW	Extinct in the Wild Taxa which are known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Cr	Critically Endangered Taxa which at a particular time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
En	Endangered Taxa which is not critically endangered and it is facing a very high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
Vu	Vulnerable Taxa which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

Source: Environment Protection and Biodiversity Conservation Act 1999.



CONSERVATION CODES

For Western Australian Flora and Fauna

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.

EN **Endangered species**

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

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

VU **Vulnerable species**

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

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

Extinct species

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

EX Extinct species

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

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

EW Extinct in the wild species

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

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

Specially protected species

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

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

MI Migratory species

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

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

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

CD Species of special conservation interest (conservation dependent fauna)

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

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

OS Other specially protected species

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

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

P **Priority species**

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

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

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

1 **Priority 1: Poorly-known species**

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

2 **Priority 2: Poorly-known species**

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

3 **Priority 3: Poorly-known species**

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

4 **Priority 4: Rare, Near Threatened and other species in need of monitoring**

(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.

(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.

(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

¹ The definition of flora includes algae, fungi and lichens

² Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).



Appendix 2: DBCA Database Records

COM_NAME	Date	SOURCE_ID	SOURCE	CERTAINTY	OBS_METHOD	OBS_TYPE	COUNT	LOCALITY	SITE	ACCURACY	LONG_GDA	LAT_GDA
Malleefowl	29/07/1994 0:00	804	TFAUNA	Certain	Opportunistic sight	Secondary sign	0	Bullabulling	one active nest at B	10000	120.9000035	-30.9758004
Malleefowl	8/02/1995 0:00	1380	TFAUNA	Moderately certain	Opportunistic sight	Day sighting	1	Londonderry	Yerilla Sandalwood	1000	121.326725	-31.04871101
Malleefowl	1/10/1908 0:00	3787	TFAUNA	Certain	Historical (written)	Day sighting	2	Kalgoorlie	Kalgoorlie & up to 8	50000	122.0014435	-30.74870205
Malleefowl	15/11/2000 0:00	4010	TFAUNA	Certain	Opportunistic sight	Day sighting	1	Mount Burges	access road to Kunc	500	121.2237816	-30.70903591
Malleefowl	1/05/1985 0:00	10429	TFAUNA	Certain	Opportunistic sight	Sighting	2	Jaurdie Hills	Jaurdie Hills	10000	120.897002	-30.70299829
Malleefowl	13/12/2006 0:00	12566	TFAUNA	Certain	Opportunistic sight	Day sighting	1	Bullabulling	Bullabulling	1000	120.9480707	-31.05183963
Malleefowl	18/01/2007 0:00	12567	TFAUNA	Certain	Opportunistic sight	Day sighting	2	Bullabulling	Bullabulling	1000	120.951963	-31.01881458
Malleefowl	26/02/2007 0:00	13077	TFAUNA	Certain	Opportunistic sight	Secondary sign	0	Victoria Rock	Site about 500m off	1000	121.0273862	-31.61686089
Malleefowl	26/08/2007 0:00	13141	TFAUNA	Certain	Opportunistic sight	Day sighting	1	Kurnalpi	On the Yarri Rd, 10C	1000	121.7196108	-30.3767017
Malleefowl	25/06/2008 0:00	16093	TFAUNA	Certain	Opportunistic sight	Day sighting	2	Bullabulling	Bullabulling pastora	1000	120.8196106	-31.07430229
Malleefowl	10/11/2009 0:00	18698	TFAUNA	Certain	Opportunistic sight	Day sighting	1	Mount Burges	North of Mount Bur	500	121.0681051	-30.81130332
Malleefowl	14/10/2009 0:00	18774	TFAUNA	Certain	Opportunistic sight	Day sighting	1	Bullabulling	Bullabulling, road fr	1000	120.8636708	-30.98827482
Malleefowl	18/01/2010 0:00	18777	TFAUNA	Certain	Opportunistic sight	Day sighting	2	Goldfields Woodlar	Goldfields Woodlan	1000	120.5333313	-31.13000299
Malleefowl	22/10/2010 0:00	19062	TFAUNA	Certain	Opportunistic sight	Sighting	1		Vic Rock Road	1000	120.9143284	-31.33327672
Malleefowl		19063	TFAUNA	Certain	Historical (written)	Sighting	1		South of Wallaroo F	1000	120.5062899	-30.82953135
Malleefowl	5/04/2011 0:00	19178	TFAUNA	Certain	Opportunistic sight	Day sighting	1		VCL mining compan	1000	120.7778931	-30.29252596
Malleefowl	4/08/2011 0:00	19207	TFAUNA	Certain	Opportunistic sight	Day sighting	1		Yallari Timber Reser	1000	121.3655792	-31.13985556
Malleefowl	4/08/2011 0:00	19208	TFAUNA	Certain	Opportunistic sight	Secondary sign	0		Yallari Timber Reser	1000	121.3907596	-31.1219586
Malleefowl	4/07/2011 0:00	19213	TFAUNA	Certain	Opportunistic sight	Day sighting	2			1000	120.6490883	-30.40222642
Malleefowl	27/09/2011 0:00	19242	TFAUNA	Certain	Opportunistic sight	Day sighting	1			1000	121.0860781	-31.03788659
Malleefowl	8/11/2011 0:00	19247	TFAUNA	Certain	Opportunistic sight	Day sighting	1	Victoria Rock Natur	UCL between Hollar	1000	120.8205574	-31.49721896
Malleefowl	14/10/2009 0:00	19283	TFAUNA	Certain	Opportunistic sight	Day sighting	1		on road from Bullak	1000	120.8636708	-30.98827482
Malleefowl	10/11/2009 0:00	19284	TFAUNA	Certain	Opportunistic sight	Day sighting	1		north of Mt Burges	1000	121.060324	-30.68600181
Malleefowl	28/11/2011 0:00	19812	TFAUNA	Certain	Opportunistic sight	Dead	1	Wallaroo	3km north of the cc	1000	120.3148443	-30.78935691
Malleefowl	10/11/2011 0:00	19813	TFAUNA	Certain	Survey	Caught or trapped	1		gravel area just of s	1000	121.5961067	-30.61832964
Malleefowl	9/07/2012 0:00	20207	TFAUNA	Certain	Opportunistic sight	Day sighting	2	Coolgardie	Just off cave hill roa	1000	121.2574977	-31.3269487
Malleefowl	9/08/2012 0:00	20951	TFAUNA	Very Certain (photo)	Opportunistic sight	Day sighting	1	Cave Hill Nature Re	Cave Hill Nature Res	1000	121.2213908	-31.65722657
Malleefowl	15/04/2013 0:00	23184	TFAUNA	Certain	Opportunistic sight	Dead	1	Bullabulling	48km West of Coolg	1000	120.7200792	-31.11944667
Malleefowl	23/04/2013 0:00	23234	TFAUNA	Moderately certain	Opportunistic sight	Day sighting	1	Bullabulling	~10km east if Bullak	1000	120.9623811	-30.97860376
Malleefowl	16/05/2013 0:00	23255	TFAUNA	Moderately certain	Opportunistic sight	Night sighting	1	Feysville	Out the front of Pev	1000	121.5947743	-31.00514925
Malleefowl	1/05/2012 0:00	23397	TFAUNA	Certain	Targeted survey	Day sighting	1	Orabanda	Ora Banda area.	1000	121.09041	-30.36350826
Malleefowl	15/10/2012 0:00	23398	TFAUNA	Certain	Targeted survey	Day sighting	1	Orabanda	Ora Banda area.	1000	121.0847096	-30.3666726
Malleefowl	15/10/2012 0:00	23400	TFAUNA	Certain	Targeted survey	Day sighting	1	Orabanda	Ora Banda area.	1000	121.086955	-30.35554577
Malleefowl	15/10/2012 0:00	23401	TFAUNA	Certain	Targeted survey	Day sighting	1	Orabanda	Ora Banda area.	1000	121.0920882	-30.36334332
Malleefowl	15/10/2012 0:00	23402	TFAUNA	Certain	Targeted survey	Day sighting	1	Orabanda	Ora Banda area.	1000	121.0762598	-30.36942634
Malleefowl	15/10/2012 0:00	23403	TFAUNA	Certain	Targeted survey	Day sighting	1	Orabanda	Ora Banda area.	1000	121.0742909	-30.37008297
Malleefowl	15/10/2012 0:00	23404	TFAUNA	Certain	Targeted survey	Day sighting	1	Orabanda	Ora Banda area.	1000	121.0804726	-30.36947026
Malleefowl	17/05/2013 0:00	23424	TFAUNA	Certain	Opportunistic sight	Secondary sign	0	Schahil Timber reser	Schahil Timber reserv	1000	121.2797272	-31.18666623
Malleefowl	17/08/2013 0:00	24612	TFAUNA	Certain	Opportunistic sight	Day sighting	0	Cave Hill Conservat	Cave Hill Conservati	1000	121.2250386	-31.65783662
Malleefowl	19/08/2013 0:00	24613	TFAUNA	Certain	Opportunistic sight	Day sighting	1	Burra Rock Conserv	Carpark at Burra Ro	1000	121.1975205	-31.39548895
Malleefowl	12/09/2013 0:00	24614	TFAUNA	Certain	Opportunistic sight	Day sighting	1	Ora Banda	500m before Cawse	1000	121.1781055	-30.41326167
Malleefowl	17/09/2013 0:00	24615	TFAUNA	Certain	Opportunistic sight	Day sighting	1	Kanowna	~5km before the Mi	1000	121.3115282	-30.52331977
Malleefowl	16/10/2013 0:00	24778	TFAUNA	Certain	Opportunistic sight	Dead	1	Kanowna	3.1km north of Pad	1000	121.3325001	-30.44670406
Malleefowl	16/10/2013 0:00	24779	TFAUNA	Certain	Opportunistic sight	Day sighting	1		3.2km east of cawse	1000	121.180649	-30.41250322
Malleefowl	21/10/2013 0:00	24780	TFAUNA	Moderately certain	Opportunistic sight	Day sighting	1	Feysville	Woollibar Station, ju	1000	121.5596018	-30.94387297
Malleefowl	12/11/2013 0:00	24798	TFAUNA	Certain	Opportunistic sight	Dead	1	Kanowna	~4.45km east of Cav	1000	121.2255951	-30.41827339
Malleefowl	19/12/2013 0:00	24837	TFAUNA	Certain	Opportunistic sight	Dead	1	Kanowna	~100-200m W of dr	1000	121.2154327	-30.41726875
Malleefowl	15/12/2013 0:00	24838	TFAUNA	Certain	Opportunistic sight	Day sighting	1	Kanowna	~10km W of Menzie	1000	121.188512	-30.41340649
Malleefowl	5/12/2013 0:00	24839	TFAUNA	Certain	Opportunistic sight	Day sighting	1		3.26km E of Cawse	1000	121.2132622	-30.41698644
Malleefowl	29/01/2014 0:00	24875	TFAUNA	Certain	Opportunistic sight	Day sighting	2	Burra Rock	Burra Rock, Directly	1000	121.1989932	-31.39491429

Malleefowl	22/11/2009 0:00	60800	FAUNASURVI	Certain	Survey	Unknown	1	WIDGIEMOOLTHA	GoldfieldsLakeLefro	100	121.7329	-31.332
Malleefowl		79807	TFAUNA	Certain	Historical (written)	Secondary sign	0	KURNALPI		1000	121.7197227	-30.35932457
Malleefowl		79808	TFAUNA	Certain	Historical (written)	Secondary sign	0	KURNALPI		1000	121.7297642	-30.36086622
Malleefowl		79809	TFAUNA	Certain	Historical (written)	Secondary sign	0	KURNALPI		1000	121.6695371	-30.40110445
Malleefowl	21/01/2014 0:00	79954	TFAUNA	Certain	Opportunistic sight	Secondary sign	0	Ora Banda	North of Siberia Ber	1000	120.9720594	-30.19431491
Malleefowl	5/11/2011 0:00	80011	TFAUNA	Certain	Opportunistic sight	Dead	1	Boorabbin	1km from the turn c	1000	120.3249118	-30.82831654
Malleefowl	28/11/2011 0:00	80012	TFAUNA	Certain	Opportunistic sight	Dead	1	Boorabbin	Mt Walton Road	1000	120.3249108	-30.82831874
Malleefowl	24/01/2014 0:00	80016	TFAUNA	Certain	Opportunistic sight	Secondary sign	0	Ora Banda	south of the former	1000	120.9720594	-30.19431491
Malleefowl	23/04/2015 0:00	80078	TFAUNA	Certain	Opportunistic sight	Day sighting	2	Kurnalpi	Yarri Rd intersector	50	121.732856	-30.35751261
Malleefowl	27/04/2015 0:00	80084	TFAUNA	Certain	Opportunistic sight	Day sighting	1	Parkeston	100m along a small	1000	121.5637194	-30.68933338
Malleefowl	6/03/2015 0:00	80086	TFAUNA	Certain	Opportunistic sight	Day sighting	2	Bulong	10.6km SSE of Ham	1000	121.7275462	-30.84136495
Malleefowl	1/04/2015 0:00	80087	TFAUNA	Certain	Opportunistic sight	Day sighting	2	Feysville	Brown Hil on Woolu	1000	121.5101954	-30.97633273
Malleefowl	4/05/2015 0:00	80518	TFAUNA	Certain	Opportunistic sight	Day sighting	1	Ora Banda	Davyhurst St Ora B	1000	120.9739005	-30.27469748
Malleefowl	14/09/2015 0:00	81108	TFAUNA	Certain	Opportunistic sight	Night sighting	1	Kanowna	bushland, 50km N c	1000	121.4703823	-30.26616603
Malleefowl	1/03/2016 0:00	81953	TFAUNA	Moderately certain	Opportunistic sight	Sighting	1	Coolgardie	Coolgardie North R	1000	121.1805031	-30.90759935
Malleefowl	2/02/2016 0:00	81954	TFAUNA	Moderately certain	Opportunistic sight	Sighting	1	Coolgardie	Coolgardie North R	1000	121.1738985	-30.88129979
Malleefowl	30/12/2015 0:00	81955	TFAUNA	Moderately certain	Opportunistic sight	Sighting	1	Coolgardie	Between Burra Rock	1000	121.2008892	-31.01393708
Malleefowl	21/01/2016 0:00	81960	TFAUNA	Certain	Opportunistic sight	Dusk sighting	1	Yallari Timber Reser	Yallari Timber Reser	1000	121.3396003	-31.12840004
Malleefowl	4/10/2016 0:00	84821	TFAUNA	Moderately certain	Opportunistic sight	Sighting	1	Mount Burges	Traveling route bac	1000	120.937504	-30.500398
Malleefowl	1/01/2017 0:00	85124	TFAUNA	Moderately certain	Opportunistic sight	Sighting	1	Kurnalpi	1.5km E of Bullock f	1000	121.8805	-30.5291
Malleefowl	12/10/2013 0:00	89734	TFAUNA	Certain	Community survey	Secondary sign	0	Ora Banda	Camper Down Area	1000	120.9794	-30.203
Malleefowl	12/10/2013 0:00	89735	TFAUNA	Very Certain (photo	Community survey	Secondary sign	0	Ora Banda	Camper Down Area	1000	120.9861094	-30.20611515
Malleefowl	14/10/2013 0:00	89736	TFAUNA	Certain	Community survey	Secondary sign	0	Ora Banda	Camper Down Area	1000	120.986	-30.2049
Malleefowl	15/10/2013 0:00	89737	TFAUNA	Very Certain (photo	Community survey	Secondary sign	0	Ora Banda	Camper Down Area	1000	120.9713923	-30.20861267
Malleefowl	16/10/2013 0:00	89738	TFAUNA	Moderately certain	Community survey	Secondary sign	0	Ora Banda	Camper Down Area	1000	120.9536111	-30.22972222
Malleefowl	1/06/1996 0:00	89752	TFAUNA	Moderately certain	Opportunistic sight	Secondary sign	0	Coolgardie	4WD Holland Track,	10000	121.3053	-31.0052
Malleefowl	3/05/2017 0:00	89764	TFAUNA	Very Certain (photo	Monitoring	Remote camera	1	Walleroo	W of western bound	1000	120.6245	-30.4336
Malleefowl	2/11/1990 0:00	89791	TFAUNA	Moderately certain	Opportunistic sight	Sighting	1	WALLAROO	1 km east of Wallar	Not defined	120.5	-30.80833333
Malleefowl	28/01/1965 0:00	89878	TFAUNA	Moderately certain	Historical (written)	Secondary sign	0	MOUNT BURGES	12 miles North of C	1000	121.1167	-30.7833
Malleefowl	26/01/1965 0:00	89973	TFAUNA	Moderately certain	Historical (written)	Secondary sign	0	WIDGIEMOOLTHA	2 miles South West	1000	121.55	-31.5166
Malleefowl	5/09/2004 0:00	90011	TFAUNA	Moderately certain	Opportunistic sight	Secondary sign	0	ORA BANDA	200-300m northwe	500	120.9175722	-30.28046667
Malleefowl	1/09/1994 0:00	90028	TFAUNA	Moderately certain	Opportunistic sight	Sighting	2	BULLABULLING	22 kms west of Coo	1000	120.9392148	-30.984965
Malleefowl	28/08/1979 0:00	90140	TFAUNA	Moderately certain	Opportunistic sight	Secondary sign	0	WIDGIEMOOLTHA	4 miles South West	1000	121.5333	-31.55
Malleefowl	5/02/2004 0:00	90196	TFAUNA	Moderately certain	Opportunistic sight	Sighting	1	KANOWNA	50 km nth of kalgoc	Not defined	121.2	-30.56666667
Malleefowl	15/04/2004 0:00	90251	TFAUNA	Moderately certain	Opportunistic sight	Sighting	2	BOORABBIN	8 km N of GE hwy o	1000	120.2995	-31.13883333
Malleefowl		90274	TFAUNA	Moderately certain	Opportunistic sight	Secondary sign	0	ORA BANDA	90 km nth of Kalgoc	500	120.9945639	-30.22573664
Malleefowl	14/04/1996 0:00	90433	TFAUNA	Moderately certain	Opportunistic sight	Sighting	1	WIDGIEMOOLTHA	Binneringie rd 5KM	1000	121.6619444	-31.53194444
Malleefowl	1/01/1902 0:00	90446	TFAUNA	Moderately certain	Opportunistic sight	Secondary sign	0	BOORARA	Boorara	10000	121.6333	-30.8
Malleefowl	29/07/1994 0:00	90471	TFAUNA	Moderately certain	Opportunistic sight	Secondary sign	0	WALLAROO	Bullabulling No. 8 P	Not defined	120.5347918	-31.06539083
Malleefowl	2/07/2001 0:00	90604	TFAUNA	Moderately certain	Opportunistic sight	Sighting	1	BULONG	Corsair Mine 10km	Not defined	121.6833333	-30.75
Malleefowl	11/12/1988 0:00	90650	TFAUNA	Moderately certain	Opportunistic sight	Sighting	1	DORDIE ROCK NATI	Dordie Rock Nature	Not defined	121.6	-31.6
Malleefowl	1/01/1988 0:00	90726	TFAUNA	Moderately certain	Opportunistic sight	Sighting	1	MOUNT BURGES	Eight Mile Rock dan	Not defined	121	-30.8
Malleefowl	20/09/2002 0:00	90850	TFAUNA	Moderately certain	Opportunistic sight	Sighting	2	KARRAMINDIE	grt eastern hwy 1 l	1000	121.3166667	-30.86666667
Malleefowl	2/04/2002 0:00	90857	TFAUNA	Moderately certain	Opportunistic sight	Sighting	2	BULONG	Hampton Hill Statio	Not defined	121.65	-30.76666667
Malleefowl	29/10/2003 0:00	90877	TFAUNA	Moderately certain	Opportunistic sight	Secondary sign	0	VICTORIA ROCK	Holland Track Hyde	1000	120.5801	-31.5746
Malleefowl	17/04/2003 0:00	90924	TFAUNA	Moderately certain	Opportunistic sight	Sighting	1	KURNALPI	intersection of Yarri	500	121.6963333	-30.55
Malleefowl	1/01/1910 0:00	90949	TFAUNA	Moderately certain	Opportunistic sight	Sighting	1	LAMINGTON	Kalgoorie	50000	121.4667	-30.7333
Malleefowl	1/01/1991 0:00	90950	TFAUNA	Moderately certain	Opportunistic sight	Sighting	1	BULLABULLING	Kangaroo Hills Timb	Not defined	121.0422222	-31.02361111
Malleefowl	8/11/1982 0:00	91256	TFAUNA	Moderately certain	Opportunistic sight	Sighting	1	KURNALPI	Near Gidabeli [pres	10000	121.75	-30.3333
Malleefowl	29/07/1994 0:00	91327	TFAUNA	Moderately certain	Opportunistic sight	Secondary sign	0	WALLAROO	No 8 Pumping Statio	Not defined	120.5333333	-31.06666667
Malleefowl		91511	TFAUNA	Moderately certain	Opportunistic sight	Dead	1	ORA BANDA	Ora Banda	10000	121.0667	-30.3666

Malleefowl	4/11/1947 0:00	91581 TFAUNA	Moderately certain Opportunistic sight Secondary sign	0 LAMINGTON	PO Kalgoorlie	50000	121.4667	-30.7333
Malleefowl	30/01/2005 0:00	91788 TFAUNA	Moderately certain Opportunistic sight Secondary sign	0 BOORABBIN	track off Ryans find	1000	120.2976313	-31.13803402
Malleefowl	1/01/1988 0:00	91868 TFAUNA	Moderately certain Opportunistic sight Sighting	1 MOUNT BURGESS	WMC sand pit Jaurc	Not defined	121.0666667	-30.81666667
Malleefowl	8/02/1995 0:00	91897 TFAUNA	Moderately certain Opportunistic sight Sighting	1 LONDONDERRY	Yallari Timber Reser	Not defined	121.3218333	-31.0665
Malleefowl	8/02/1995 0:00	91905 TFAUNA	Moderately certain Opportunistic sight Day sighting	1 LONDONDERRY	Yerilla Sandalwood	Not defined	121.3261111	-31.06527778
Malleefowl	1/01/1979 0:00	91947 TFAUNA	Moderately certain Opportunistic sight Sighting	1 HIGGINSVILLE		10000	121.416667	-31.75
Malleefowl	1/07/2003 0:00	92034 TFAUNA	Moderately certain Opportunistic sight Sighting	1 KURNALPI		500	121.7218778	-30.33005278
Malleefowl	25/05/2017 0:00	92087 TFAUNA	Very Certain (photo Opportunistic sight Day sighting	1 Goldfields Woodlar	5km N of Victoria R	1000	120.9380525	-31.24083453
Malleefowl	24/10/2017 0:00	92950 TFAUNA	Very Certain (photo Monitoring Remote camera	1 Londonderry	Scahill Rimber Rese	50	121.21599	-31.20692
Malleefowl	3/11/2017 0:00	92951 TFAUNA	Very Certain (photo Monitoring Remote camera	1 Londonderry	Scahill Rimber Rese	1000	121.2349	-31.2238
Malleefowl	20/02/2018 0:00	93251 TFAUNA	Very Certain (photo Opportunistic sight Dawn sighting	2 Kanowna	Borad Arrow-Ora B	1000	121.2105	-30.4169
Malleefowl	19/02/2018 0:00	93252 TFAUNA	Not sure Opportunistic sight Sighting	1 Ora Banda	Norton Gold field m	1000	121.1507	-30.3984
Malleefowl	9/09/2017 0:00	94412 TFAUNA	Moderately certain Opportunistic sight Day sighting	1 Karramindie	Karramindie State F	1000	121.3983551	-31.0041971
Malleefowl	17/07/2017 0:00	94413 TFAUNA	Very Certain (photo Opportunistic sight Dusk sighting	1 Karramindie	50m E of the S/W c	1000	121.3856808	-31.01733691
Malleefowl	21/03/2018 0:00	94414 TFAUNA	Very Certain (photo Opportunistic sight Secondary sign	0 Karramindie	1.7km S of Karramir	10000	121.398	-30.968
Malleefowl	17/04/2018 0:00	94459 TFAUNA	Certain Opportunistic sight Day sighting	1 Londonberry	Old woodline track	500	121.2054	-31.1891
Malleefowl	19/04/2018 0:00	94523 TFAUNA	Very Certain (photo Monitoring Remote camera	2 Londonderry	3.5km S of Scahill Ti	50	121.2331049	-31.22229846
Malleefowl	26/04/2018 0:00	94524 TFAUNA	Very Certain (photo Monitoring Remote camera	1 Wallaroo	Approx. 2km W of e	50	120.6148963	-30.43419603
Malleefowl	3/05/2018 0:00	94528 TFAUNA	Certain Opportunistic sight Day sighting	1 Kanowna	Golden cities Mine	1000	121.3780119	-30.43311297
Malleefowl	25/10/2006 0:00	94547 TFAUNA	Moderately certain Opportunistic sight Sighting	1 WIDGIEMOOLTHA	2 km S of Cave Hill F	1000	121.513	-31.595
Malleefowl	7/12/2005 0:00	94560 TFAUNA	Moderately certain Opportunistic sight Sighting	1 WIDGIEMOOLTHA	400 m on the W bo	1000	121.539	-31.473
Malleefowl	31/05/2018 0:00	94624 TFAUNA	Very Certain (photo Opportunistic sight Dead	1 Widgiemooltha	Adjacent to Binnerij	50	121.6516062	-31.52872277
Malleefowl	24/05/2018 0:00	94648 TFAUNA	Very Certain (photo Opportunistic sight Secondary sign	0 Kurnalpi	Hampton Hill Pastr	1000	121.6937418	-30.41724709
Malleefowl	3/07/2018 0:00	96048 TFAUNA	Very Certain (photo Opportunistic sight Day sighting	0 Kalgoorlie	West north-west of I	1000	121.2903	-30.5262
Malleefowl	27/09/2018 0:00	96279 TFAUNA	Certain Opportunistic sight Day sighting	2 Golden Cities	Goldfields mining te	1000	121.1669216	-30.40849499
Malleefowl	19/11/2007 0:00	96627 TFAUNA	Certain Opportunistic sight	1 Coolgardie	approx. 1km E of Ca	1000	121.2454	-31.6565
Malleefowl	22/08/2007 0:00	96637 TFAUNA	Certain Opportunistic sight	1 Coolgardie	Victoria Rock Rd, ab	1000	121.0151	-31.0848
Malleefowl	2/07/2007 0:00	96644 TFAUNA	Certain Opportunistic sight	1 Kalgoorlie	Broad Arrow-Ora B	10000	121.2054033	-30.41640048
Malleefowl	31/05/2007 0:00	96650 TFAUNA	Certain Opportunistic sight	1 Coolgardie	Cave Hill, Goldfields	1000	121.1886	-31.6688
Malleefowl	29/05/2007 0:00	96651 TFAUNA	Certain Opportunistic sight	1 Coolgardie	Burra Rock Road, 11	1000	121.0904	-31.28
Malleefowl	28/02/2007 0:00	96684 TFAUNA	Certain Opportunistic sight	0 Coolgardie	on track between V	1000	121.0108	-31.6653
Malleefowl	5/11/2018 0:00	96736 TFAUNA	Certain Opportunistic sight Dead	1 Kalgoorlie	Goldfields Hwy, abc	1000	121.2612171	-30.29421251
Malleefowl	9/07/2012 0:00	96761 TFAUNA	Certain Opportunistic sight	1 Widgiemooltha	Just off Cave Hill Rd	1000	121.5162	-31.5466
Malleefowl	1/06/2012 0:00	96764 TFAUNA	Certain Opportunistic sight	0 Widgiemooltha	about 10km before	1000	121.3904993	-31.60239797
Malleefowl	1/06/2012 0:00	96765 TFAUNA	Certain Opportunistic sight	0 Widgiemooltha	about 10km before	1000	121.3573	-31.5983
Malleefowl	28/05/2012 0:00	96766 TFAUNA	Certain Opportunistic sight	0 Ora Banda	Carina Iron Ore Proj	1000	120.3051188	-30.8106826
Malleefowl	18/07/2012 0:00	96784 TFAUNA	Certain Opportunistic sight	4 Coolgardie	Borefields on Focus	1000	121.1779036	-30.81110794
Malleefowl	21/06/2012 0:00	96791 TFAUNA	Certain Opportunistic sight	1 Kookynie	Yarri Rd	1000	121.7446	-30.3398
Malleefowl	1/11/2008 0:00	96803 TFAUNA	Certain Opportunistic sight	1 Kambalda		1000	121.4960545	-31.23542216
Malleefowl	1/11/2008 0:00	96804 TFAUNA	Certain Opportunistic sight	1 Ora Banda	near Canegrass	1000	121.0083333	-30.22305556
Malleefowl	1/01/2006 0:00	96805 TFAUNA	Certain Opportunistic sight	1 Coolgardie	23.2km south of T i	1000	121.3565673	-31.07792693
Malleefowl	18/10/2008 0:00	96812 TFAUNA	Certain Opportunistic sight Day sighting	1 Menzies	approx. 25km north	1000	120.9746457	-30.18364636
Malleefowl	19/02/2008 0:00	96836 TFAUNA	Certain Opportunistic sight	1 Woolgangie	6km S of Great East	1000	120.5415	-31.2465
Malleefowl	16/01/2008 0:00	96872 TFAUNA	Certain Opportunistic sight Dusk sighting	1 Coolgardie	Great Eastern Hwy,	1000	120.7591667	-31.09055556
Malleefowl	14/07/2009 0:00	96895 TFAUNA	Certain Opportunistic sight	2 Coolgardie	Juardi Hills Rd, 100r	1000	121.0136012	-30.80519283
Malleefowl	5/03/2009 0:00	96905 TFAUNA	Certain Opportunistic sight	1 Londonerry	about 3km south of	1000	121.1719	-31.3593
Malleefowl	7/02/2009 0:00	96906 TFAUNA	Certain Opportunistic sight	2 Coolgardie	Juardi Hills Rd, near	10000	121.9516716	-30.7644422
Malleefowl	10/01/2009 0:00	96909 TFAUNA	Certain Opportunistic sight Day sighting	1 Ora Banda	Approx. 6km north	1000	120.7435664	-30.46330305
Malleefowl	25/11/2010 0:00	96928 TFAUNA	Certain Opportunistic sight	1 Londonberry	Burra Rock Nature F	1000	121.1997	-31.3934
Malleefowl	23/10/2010 0:00	96933 TFAUNA	Certain Opportunistic sight	1 Wallaroo	On entrance track t	1000	120.5062899	-30.82953135
Malleefowl	8/10/2010 0:00	96934 TFAUNA	Certain Opportunistic sight	1 Kambalda	5km along pipeline	1000	121.5138889	-31.225

Malleefowl	24/05/2010 0:00	96946	TFAUNA	Certain	Opportunistic sight	Dead	1	Kambalda	9km N of Kambalda	10000	121.6223987	-31.12479734
Malleefowl	25/05/2010 0:00	96949	TFAUNA	Certain	Opportunistic sight	Day sighting	2	Walleroo	On Mt Walton intra	1000	120.3136603	-30.78648245
Malleefowl	13/09/2010 0:00	96970	TFAUNA	Certain	Opportunistic sight		1	Bullabulling	Great Eastern Hwy,	10000	120.7608959	-31.08899931
Malleefowl	11/02/2011 0:00	96986	TFAUNA	Certain	Opportunistic sight		1	Ora Banda	Broad Arrow-Ora Bz	1000	121.1784	-30.412
Malleefowl	10/02/2011 0:00	96989	TFAUNA	Certain	Opportunistic sight		2	Londonderry	Burra Rock camping	1000	121.1806	-31.3981
Malleefowl	18/09/2011 0:00	97009	TFAUNA	Certain	Survey		0	Ora Banda		1000	121.0127559	-30.48430067
Malleefowl	18/09/2011 0:00	97010	TFAUNA	Certain	Survey		0	Ora Banda		1000	121.0077773	-30.48530722
Malleefowl	28/09/2013 0:00	97280	TFAUNA	Certain	Opportunistic sight	Sighting	1	Coolgardie	7km south of Coolg	1000	121.121131	-30.99719
Malleefowl		97281	TFAUNA	Certain	Opportunistic sight	Secondary sign	0	Burra Rock Conserv		1000	121.186	-31.3968
Malleefowl	22/12/2012 0:00	97304	TFAUNA	Certain	Opportunistic sight	Sighting	1	Kalgoorlie	Goldfield HWY	1000	121.617	-31.0769
Malleefowl	10/03/2013 0:00	97318	TFAUNA	Certain	Opportunistic sight	Sighting	2	Kalgoorlie	Kalgoorlie to Menzi	1000	121.2682	-30.2903
Malleefowl	28/06/2013 0:00	97322	TFAUNA	Certain	Opportunistic sight	Secondary sign	0	Ora Banda	In the bush approx	1000	120.966	-30.3755
Malleefowl	17/05/2013 0:00	97323	TFAUNA	Certain	Opportunistic sight	Sighting	1	Ora Banda	Between Broad Arrc	1000	121.2041	-30.4162
Malleefowl	31/05/2013 0:00	97328	TFAUNA	Certain	Opportunistic sight	Sighting	1	Goldfields- Kalgoor	Great Eastern Highw	1000	121.2113	-30.9067
Malleefowl	20/03/2019 0:00	97754	TFAUNA	Certain	Opportunistic sight	Dusk sighting	1	Arrow Lake		10000	121.4969302	-30.53248394
Malleefowl	22/10/2018 0:00	100171	TFAUNA	Very Certain (photo)	Survey	Secondary sign	0	Cassini/Redross Prc	56km N of Norsema	500	121.6265679	-31.7019421
Malleefowl	22/10/2018 0:00	100172	TFAUNA	Very Certain (photo)	Survey	Secondary sign	0	Cassini/Redross prc	56km N of Norsema	50	121.6290354	-31.71065592
Malleefowl	31/10/2019 0:00	127118	TFAUNA	Certain	Opportunistic sight	Sighting	1	Mungari	Mungari turnoff fro	50	121.30051	-30.872284
Malleefowl	3/02/2012 0:00	388430	FAUNASURVI	Certain	Survey	Unknown	1	FEYSVILLE	Kalgoorlie, Goldfielc	100	121.7006	-31.0169
Malleefowl	2/06/2012 0:00	461821	FAUNASURVI	Certain	Survey	Unknown	1	FEYSVILLE	Kalgoorlie Region, G	100	121.618	-31.1145
Malleefowl	2/06/2012 0:00	461822	FAUNASURVI	Certain	Survey	Unknown	1	FEYSVILLE	Kalgoorlie Region, G	100	121.6032	-31.0679
Malleefowl	2/06/2012 0:00	461823	FAUNASURVI	Certain	Survey	Unknown	1	FEYSVILLE	Kalgoorlie Region, G	100	121.5923	-30.9834
Malleefowl	2/06/2012 0:00	461824	FAUNASURVI	Certain	Survey	Unknown	1	FEYSVILLE	Kalgoorlie Region, G	100	121.6413	-31.0894
Malleefowl	2/06/2012 0:00	461836	FAUNASURVI	Certain	Survey	Unknown	1	FEYSVILLE	Kalgoorlie Region, G	10000	121.6089	-31.0423
Malleefowl	20/04/2012 0:00	552507	FAUNASURVI	Certain	Survey	Unknown	1	BULONG	Hampton Hill, Bulor	3000	121.7624	-30.8245
Malleefowl	14/09/2012 0:00	1288415 7	BIRDATA				0	Siberia	Siberia	100	120.9486	-30.2403
Malleefowl	21/06/2013 0:00	1367499 7	BIRDATA				0	Credo	Credo	100	120.7014	-30.4311
Malleefowl	18/06/2013 0:00	1367512 7	BIRDATA				0	Roadside	Roadside	100	120.7914	-30.4114
Malleefowl	17/07/1979 0:00	67598 7	BIRDATLAS1				0	HIGGINSVILLE	HIGGINSVILLE	18000	121.4181	-31.7487
Malleefowl		urn:lsid:taxon WAM_BIRDS	WAM Vouchered	Collection	Specimen		1	Ora Banda		10000	121.05	-30.3667
Malleefowl		urn:lsid:taxon WAM_BIRDS	WAM Vouchered	Collection	Specimen		1	Kalgoorlie		0	121.4669	-30.75



**Reconnaissance Flora and
Vegetation Survey of the
Bonnievale Project Area- May and
September 2023**

Prepared for



Focus Minerals Ltd

FINAL V2.0
November 2023

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1 INTRODUCTION

Focus Minerals Ltd (ASX:FML) are conducting exploration and development at their Bonnievale Project in Western Australia's Coolgardie Region (DCCEEW, 2023).

Native Vegetation Solutions (NVS) was supplied with a survey area located approximately 50 km southwest of Kalgoorlie, in the Coolgardie Region (COO) of Western Australia (Figure 1).

The total survey area received from FML covered approximately 119.1 ha. The survey area lies within Mining Tenements M15/277 M15/595, M15/877 and M15/1853 and Prospecting Licenses P15/5704. 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 exploration and development 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 million hectares and comprises the Yilgarn craton's 'Eastern Goldfields' Terrains. The subregion is characterised by gentle undulating plains, the west containing Archaean greenstone ridges and low hills, while the east contains a horst of proterozoic granulite. In the western half there are a series of large playa lakes which are remnants of an ancient major drainage line. The dominant soil type is Calcareous earth, which cover most of the plains and greenstone areas. The vegetation of the Eastern Goldfields botanical subregion consists of mallees, diverse *Eucalyptus* woodlands and *Dodonaea* shrublands and is rich in endemic Acacias. The salt lakes support dwarf shrublands of samphire. Acacia thickets and shrubheaths are found on sandplains (CALM, 2002).

2.2 Climate

The climate of the Coolgardie Region is classified as Arid with 200-300 mm of rainfall, sometimes in summer but usually in winter (CALM, 2002). The nearest official meteorological weather station with the most complete and up to date temperature information is Kalgoorlie-Boulder Airport (station number 012038), which is located approximately 46.4 km northeast 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 33.6°C) and diurnal temperature variations are relatively consistent throughout the year (Figure 2).

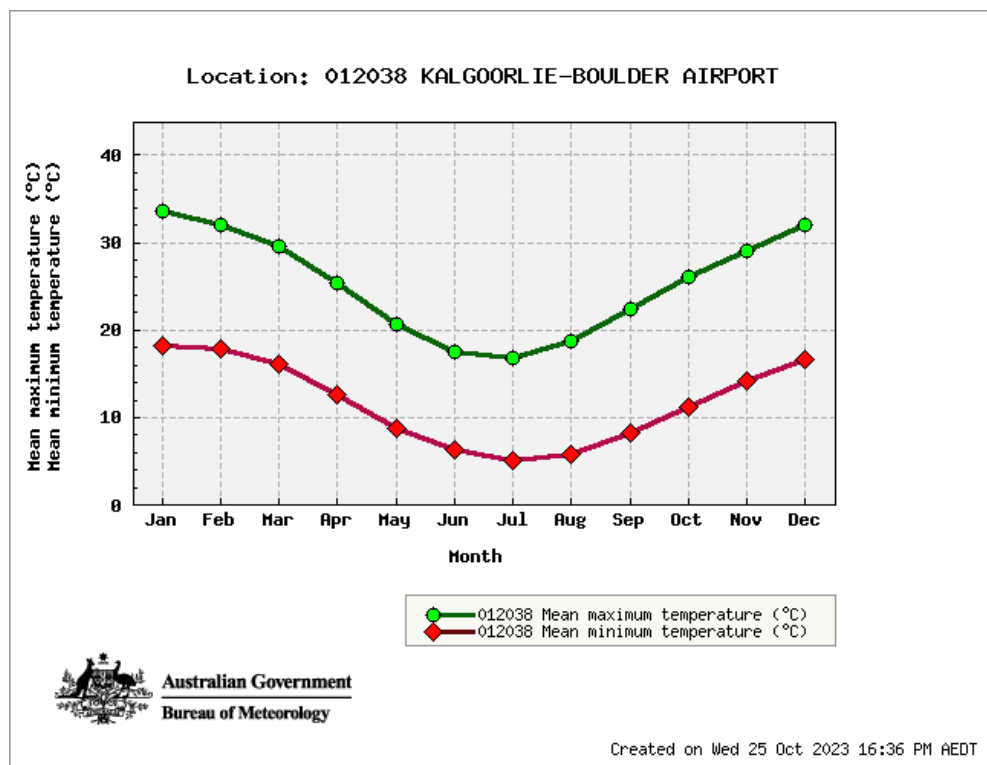


Figure 2: Mean temperature ranges for Kalgoorlie-Boulder Airport weather station

2.2.2 Rainfall

The annual average rainfall at Kalgoorlie-Boulder Airport is 264.7 mm, which falls (>1 mm) on an average of 39 rain-days (BOM, 2023). Larger rainfall events occur from January to March and May to August (Figure 3). Prior to the survey in May 2023, rainfall in April exceeded its monthly average, as well as the months of July and August preceding the September survey. Rainfall for all other months remained below monthly averages (BOM, 2023).

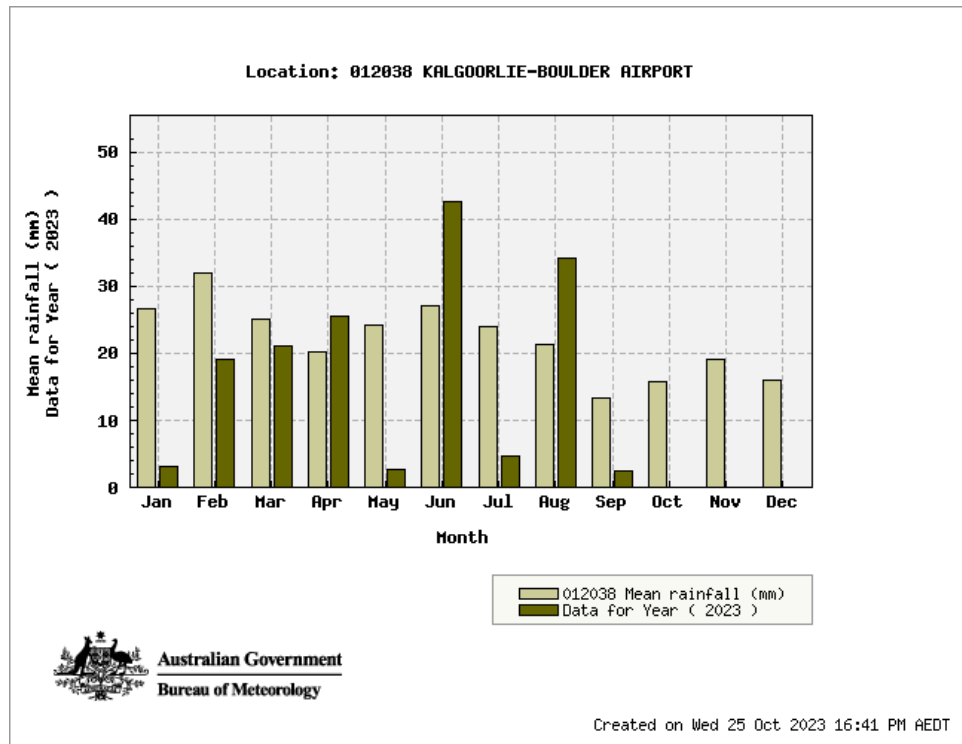


Figure 3: Monthly and mean rainfall for Kalgoorlie-Boulder Airport weather station

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 18 years' experience in botanical surveys throughout the Murchison Region and over a variety of environments across Western Australia.
- Ms Adele Thomasz (*BSc- Conservation and Wildlife Biology*), Native Vegetation Solutions, data collation and preparation of the report; and
- Mr Frank Obbens (*BSc*) Consultant Botanist, Bushtech Consultancy, undertook the identification of unknown flora samples collected by NVS in the field. Threatened flora range extensions and new locations were submitted to the WAHERB as per the EPA Technical Guidelines (EPA 2016a).

3.2 Preliminary Desktop Study

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

3.2.1 *Environment Protection and Biodiversity Conservation Act Protected Matters*

The *EPBC Act* Protected Matters Search tool was utilised to provide results for matters of National Environmental Significance within the survey area using the survey area as the search criteria with a 10 km buffer (DCCEEW, 2023).

3.2.2 *Threatened Flora and Communities*

The Threatened and Priority Flora Database managed by the Department of Biodiversity, Conservation and Attractions (DBCA) was searched for threatened and priority flora within a 30 km radial area of the survey area (DBCA, 2023a).

The TEC and PEC database was searched to determine the presence of PECs or TECs (DBCA, 2023), with Geographic Information System (GIS) data supplied for assessment, within a 30 km radial area of the survey area.

3.2.3 *Environmentally Sensitive Areas (ESAs) and Conservation Reserves*

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

3.2.4 *Vegetation Type, Extent and Status*

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

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

conservation recognise that the retention of 30% or more of the pre-clearing extent of a Beard vegetation association is necessary if Australia's biological diversity is to be protected.

3.2.5 Wetlands

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

3.2.6 Dieback

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

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

3.3 Site Investigation

Site visits of the survey area were carried out by Botanist Eren Reid from Native Vegetation Solutions on the 16th May 2023 and 22nd of September 2023. The purpose of the site visits was to examine the flora and vegetation groups contained within the survey area. A total of 16 hours was spent on site traversing the survey areas, 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

The Scientific License FB62000517 was required for the field work, held by Mr Eren Reid, with expiry 16/02/2026.

Two Regulation 4 entry permits were granted for this work in sections of the Kangaroo Hill Timber Reserve, CE006852 and CE006907.

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 Metadata and Licensing Statement in .pdf format;
- 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 Murchison 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 May and September 2023. Flowering annual species were present within the survey area, suggesting recent above average rainfall in April, July and August 2023 was sufficient for the period of survey.
Disturbance in survey area	N	Minor disturbance (historical mining access tracks and exploration) was observed within the survey area, however, did not compromise the results of the survey as these areas were avoided whilst collecting data.
Intensity of survey effort	N	The survey intensity is considered to have been sufficient for a reconnaissance survey according to EPA (2016) guidelines. Areas most likely to contain threatened and priority species were targeted. Vegetation mapping sites were selected to provide adequate coverage of the survey area.
Resources	N	Resources, in terms of time, equipment, support and personnel were adequate to undertake and complete the reconnaissance survey.
Access problems	N	All the areas in need of survey were easily accessible from existing tracks, or by foot.
Availability of contextual information on the region	N	Contextual information regarding vegetation and flora of the Coolgardie bioregion is readily available. Adequate information was able to be accessed from available databases.

4. RESULTS

4.1 Preliminary Desktop Assessment

4.1.1 EPBC Act Protected Matters

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

The EPBC Protected Matters report indicated two Threatened plant species or species habitat are known to occur within the area, *Gastrolobium graniticum* (Endangered), and *Thelymitra stellata* (Endangered).

No TECs or Commonwealth Reserves occur within the requested survey area.

The search results indicate that the survey area lies within one State and Territory Reserve, Kangaroo Hills Timber Reserve 5(1)(g).

Scahill Timber Reserve 5(1)(g) occurs within 10 km of the survey area. The location of these reserves is shown in Map 3 of Appendix 4.

4.1.2 Threatened Flora and Communities

The DBCA database searches revealed a potential for one Threatened and 51 Priority Flora species to occur within a 30 km radius of the survey area (DBCA, 2023a). One Priority Flora *Eremophila veronica* (P3) is known to occur within the survey area. No Threatened Flora returned from the database results occur in 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, 2023) revealed that no PECs or TECs fall within the survey area, or within 30 km of the survey area.

Priority Flora and Threatened Flora species within a 30 km radius of the survey area are displayed in Map 3 of Appendix 4.

4.1.3 Environmentally Sensitive Areas and Conservation Reserves

No ESA's are located within the survey area. However, there are five 'C' Class Reserves that intersect the survey area. Reserve details are listed in Table 2 below.

Table 2: Reserves located within the survey area

Reserve Number	Class	Purpose	Responsible Agency
R 17462	C	Government Requirements	Department of Planning, Lands and Heritage (SLSD)
R 6226	C	Recreation	Department of Planning, Lands and Heritage (SLSD)
R 4596	C	Church	Department of Planning, Lands and Heritage (SLSD)
R5566	C	Townsite	Department of Biodiversity, Conservation and Attractions (SCLM)
R4565	C	Church	Department of Planning, Lands and Heritage (SLSD)

4.1.4 Land Systems

As part of the Rangeland resource surveys, the Department of Agriculture mapped the Land Systems of Western Australia (DPIRD, 2017). The Land Systems occurring within the survey area are listed in Table 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 (%)
BB5	Rocky ranges and hills of greenstones-basic igneous rocks	119.1	100%

4.1.5 Vegetation Type, Extent and Status

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

Information relating to known Beard (1990) vegetation units within the survey area has been summarised in Table 4, Table 5 and Table 6 below. This information has been compiled through both desktop assessments and the site visit.

The extent of the Beard vegetation units within the survey area at all scales are less than 1% of the total area at each scale (Table 4).

Both Beard vegetation units are above the 30% threshold at a State, bioregional and subregional scale.

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 Association WA**	By IBRA Region** (COO)	By IBRA Sub-region** (COO03)	By Shire** (Shire of Coolgardie)
9	60.36	50.67%	<1%	<1%	<1%	<1%	<1%
1294	58.75	49.33%	<1%	<1%	<1%	<1%	<1%

Table 5: Summary of information regarding Pre-European and current vegetation extent of Vegetation Association 9 within the survey area

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

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

**Source: DBCA, (2019)

***Source: Field Assessment

Table 6: Summary of information regarding Pre-European and current vegetation extent of Vegetation Association 1294 within the survey area

Factor	Value				
Beard Vegetation Association*	1294				
Vegetation Association Description*	Medium woodland; coral gum				
Pre-European Extent (ha)	Scale				
	By Association (WA)	By Association (WA)	By IBRA Region (COO)	By IBRA Sub-region (COO03)	By Shire (Shire of Coolgardie)
	6,181*	6,295.55**	6,295.55**	6,295.55**	3,385.95**
% Pre-European Extent Remaining	100.00%*	96.06%**	96.06%**	96.06%**	99.79%**
Surrounding Land Use***	Mining, Exploration, Pastoral Lease				
Weed prevalence***	Low				

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

**Source: DBCA, (2019)

***Source: Field Assessment

4.1.6 Wetlands

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

4.1.7 Dieback

The survey area lies south of the 26th parallel, however receives average annual rainfall of 264.7 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.

No Priority Flora were recorded in the survey area.

4.2.2 Vegetation Type, Extent and Status

A total of 32 families, 62 genera and 139 species were recorded within the survey area. Six major vegetation groups were recorded in the survey area and range from Completely Degraded to Very Good condition (using the scale of Keighery 1994, see Appendix 3). Existing disturbance within the survey area is comprised of historic exploration and mining 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 7 below. Maps of the survey area can be seen in Appendix 4.

Table 7: Vegetation Group Summary

Vegetation Group	Veg Group Code	Families	Genera	Species	Area (ha)	Percentage of survey area (%)
<i>Eucalyptus griffithsii</i> over <i>Acacia acuminata</i> and sclerophyll shrubland	A	23	38	80	2.24	1.88%
<i>Acacia quadrimarginea</i> and <i>Acacia acuminata</i> over sclerophyll shrubland	B	22	35	58	17.24	14.48%
Transitional <i>Eucalyptus</i> woodland over sclerophyll shrubland on flats	C	17	31	75	38.65	32.45%
Open <i>Eucalyptus salmonophloia</i> woodland	D	17	30	58	0.9	0.76%
<i>Eucalyptus salmonophloia</i> woodland over sclerophyll shrubland	E	19	37	63	37.54	31.52%
<i>Eucalyptus ravida</i> woodland	F	8	11	13	11.79	9.89%
Existing Disturbance	N/A	N/A	N/A	N/A	10.75	9.02%
	Total	32*	62*	139*	119.12#	100.00#

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

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

4.2.2.1 *Eucalyptus griffithsii* over *Acacia acuminata* and sclerophyll shrubland (A)

This Tree Mallee (Muir, 1977) consisted of 23 Families, 38 Genera and 80 Species. The vegetation group was approximately 2.24 ha which makes up 1.88% of the survey area.



Figure 4: Vegetation Group A within the survey area

4.2.2.2 *Acacia quadrimarginea* and *Acacia acuminata* over sclerophyll shrubland (B)

This Thicket (Muir, 1977) consisted of 22 Families, 35 Genera and 58 Species. The vegetation group was approximately 17.24 ha which makes up 14.48% of the survey area.



Figure 5: Vegetation Group B within the survey area

4.2.2.3 Transitional *Eucalyptus* woodland over sclerophyll shrubland on flats (C)

This Low Woodland A (Muir, 1977) consisted of 17 Families, 31 Genera and 75 Species. The vegetation group was approximately 38.65 ha which makes up 32.45% of the survey area.



Figure 6: Vegetation Group C within the survey area

4.2.2.4 Open *Eucalyptus salmonophloia* woodland (D)

This Woodland (Muir, 1977) consisted of 17 Families, 30 Genera and 58 Species. The vegetation group was approximately 0.9 ha which makes up 0.76% of the survey area.



Figure 7: Vegetation Group D within the survey area

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

This Woodland (Muir, 1977) consisted of 19 Families, 37 Genera and 63 Species. The vegetation group was approximately 37.54 ha which makes up 31.52% of the survey area.



Figure 8: Vegetation Group E within the survey area

4.2.2.6 *Eucalyptus ravida* woodland (F)

This Tree Mallee (Muir, 1977) consisted of 8 Families, 11 Genera and 13 Species. The vegetation group was approximately 11.79 ha which makes up 9.89% of the survey area.



Figure 9: Vegetation Group F within the survey area

4.2.2.7 Existing Disturbance

Existing disturbance within the survey area consisted of historic exploration clearing and access roads and was approximately 10.75 ha which makes up 9.02% of the survey area.



Figure 10: Existing disturbance within the survey area

4.2.3 Weeds

Four weed species were recorded within the survey area, *Centaurea melitensis* (Maltese Cockspur), *Carrichtera annua* (Ward's Weed), *Cuscuta planiflora* (red dodder) and *Salvia verbenaca* (Wild Sage) These species are 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 “Very Good” with most of the area falling into the “Good” Category. Areas which were affected by historic exploration and clearing were deemed in “Completely Degraded” condition. A map of the vegetation condition within the survey is depicted in Appendix 4.

5. DISCUSSION

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

Four weed species was recorded within the survey area. None of the species recorded in the survey area are considered a Declared Pest (DPIRD, 2023).

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

No TECs were recorded in the survey area. No 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 Murchison 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: 25/10/2023
- 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: 25/10/2023
- 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: 25/10/2023
- 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: 25/10/2023
- 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: 25/10/2023
- 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
- DBCA, (2023), *TEC/PEC Database Results Ref:52_0223EC*, Department of Biodiversity, Conservation and Attractions
- DBCA, (2023a), *Threatened Flora Database Results Ref: 57_0223FL*, 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: 25/10/2023
- 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: 25/10/2023

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

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

Accessed: 25/10/2023

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 Bendering Reserve. Records of the Western Australian Museum Supplement 3

Native Vegetation Solutions (NVS), (2022) *Targeted Threatened Flora Survey of Kangaroo Hills Timber Reserve - June 2022*, Unpublished report Prepared by NVS for Focus Minerals Ltd

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 25/10/2023

7. GLOSSARY

Acronyms:

BOM	Bureau of Meteorology, Australian Government
BSc	Bachelor of Science
CALM	Department of Conservation and Land Management (now DBCA)
CPS	Clearing Permit System (DWER)
COO	Coolgardie Bioregion (IBRA)
COO03	Eastern Goldfields Subregion (IBRA)
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



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: 25-Oct-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:	2
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	Buffer Status
Historic			
Goldfields Water Supply Scheme, Western Australia	WA	Listed place	In feature area

Listed Threatened Species			[Resource Information]
Status of Conservation Dependent and Extinct are not MNES under the EPBC Act. Number is the current name ID.			
Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may 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 geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area	In feature area
PLANT			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Gastrolobium graniticum Granite Poison [14872]	Endangered	Species or species habitat known to occur within area	In feature area
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 may 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 buffer area only

Other Matters Protected by the EPBC Act

Commonwealth Lands [\[Resource Information \]](#)

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

Commonwealth Land Name	State	Buffer Status
Unknown		
Commonwealth Land - [52183]	WA	In feature area

Listed Marine Species [\[Resource Information \]](#)

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis			
Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
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 may occur within area overfly marine area	In feature area
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Chalcites osculans as Chrysococcyx osculans			
Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area	In feature area

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

Extra Information

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

EPBC Act Referrals					[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status	
Controlled action					
Goldfields Water Supply Scheme Project	2019/8547	Controlled Action	Post-Approval	In feature area	
Nava-1 Cable System	2001/510	Controlled Action	Completed	In feature area	
Not controlled action					
Focus, Greenfields and Carins Intersection Upgrade, Great Eastern Highway, WA	2014/7171	Not Controlled Action	Completed	In feature area	
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.

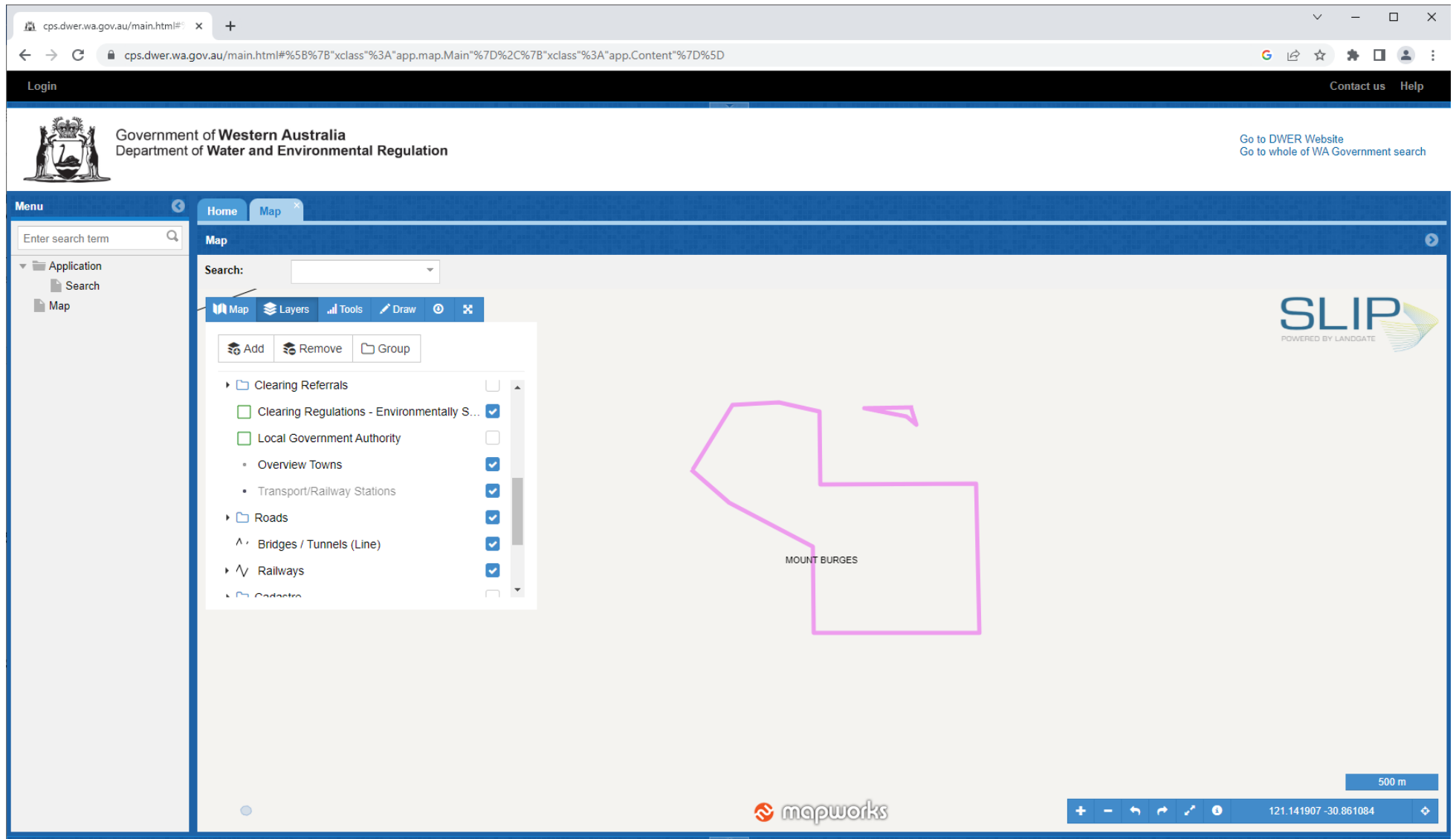
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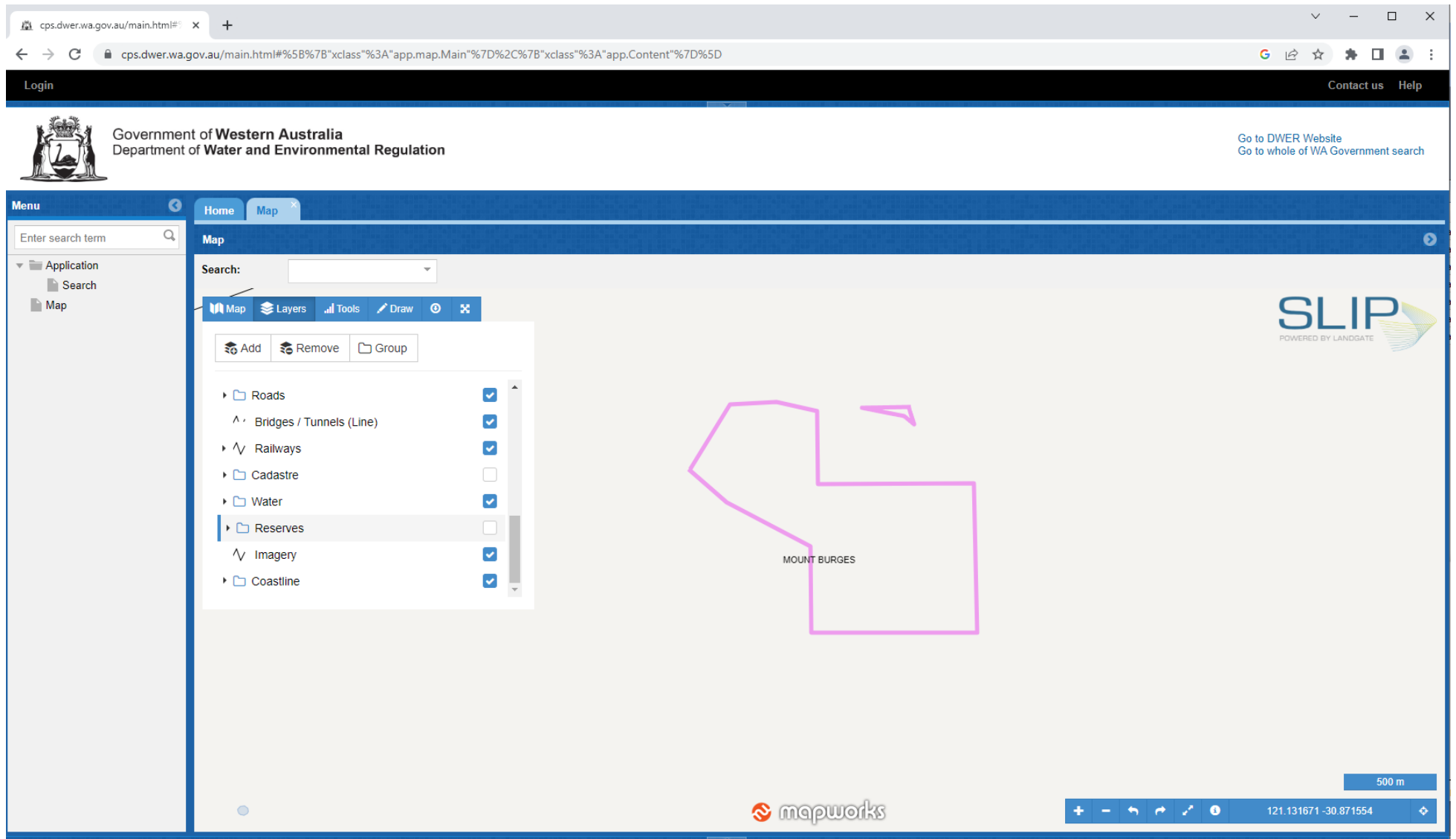
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Canberra ACT 2601 Australia

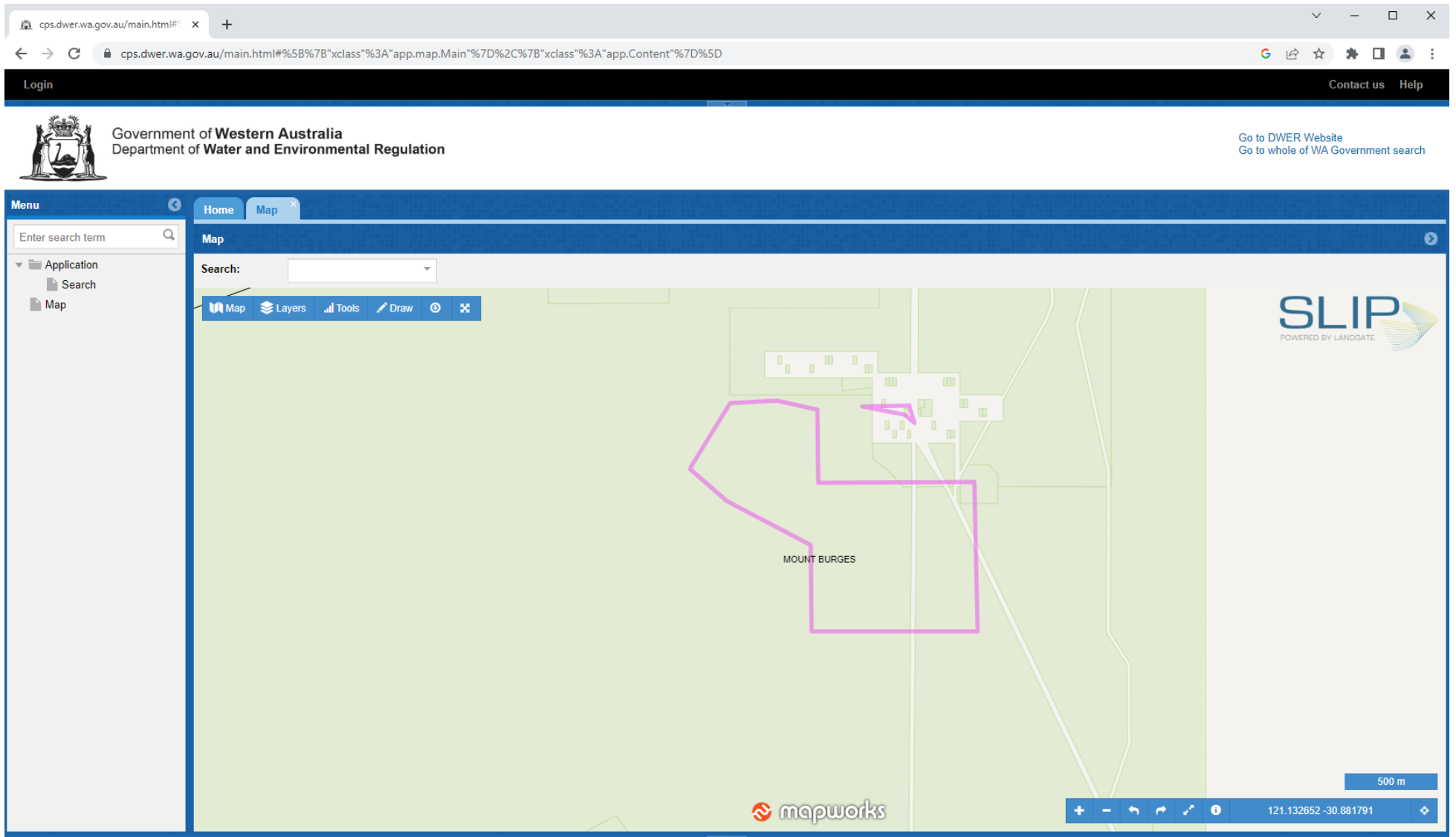
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DWER's Clearing Permit System Map Viewer showing no ESA's (dark green shaded areas) within the survey area (pink polygons) (DWER, 2023)



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



DWER Clearing Permit System Map Viewer showing Class C reserves (green polygons) within the survey area (pink polygons) (DWER, 2023)

Appendix 2: Threatened Flora Databases Search Results

GIS information provided in the Search results (Reference: 57_0223FL) listed the following species within a 30 km radius of the survey area (DBCA, 2023a):

Taxon	Conservation Code	Comment (Post Field work)
<i>Acacia coatesii</i>	P1	Unlikely- Potential habitat, habitat extensively searched
<i>Acacia crenulata</i>	P3	Unlikely- Potential habitat, habitat extensively searched
<i>Acacia epedunculata</i>	P1	Unlikely- No suitable habitat
<i>Acacia sclerophylla</i> var. <i>teretiuscula</i>	P1	Unlikely- No suitable habitat
<i>Acacia websteri</i>	P1	Unlikely- No suitable habitat
<i>Allocasuarina eriochlamys</i> subsp. <i>grossa</i>	P3	Unlikely- No suitable habitat
<i>Alyogyne</i> sp. Great Victoria Desert	P3	Unlikely- No suitable habitat
<i>Alyxia tetanifolia</i>	P3	Unlikely- No suitable habitat
<i>Austrostipa frankliniae</i>	P2	Unlikely- Potential habitat, habitat extensively searched
<i>Austrostipa turbinata</i>	P3	Unlikely- Potential habitat, habitat extensively searched
<i>Bossiaea celata</i>	P3	Unlikely- No suitable habitat
<i>Calandrinia lefroyensis</i>	P1	Unlikely- Potential habitat, habitat extensively searched
<i>Chamelaucium</i> sp. Parker Range	P1	Unlikely- No suitable habitat
<i>Chrysocephalum apiculatum</i> subsp. <i>norsemanense</i>	P3	Unlikely- No suitable habitat
<i>Cryptandra crispula</i>	P3	Unlikely- Potential habitat, habitat extensively searched
<i>Cyathostemon verrucosus</i>	P3	Unlikely- No suitable habitat
<i>Dampiera plumosa</i>	P1	Unlikely- No suitable habitat
<i>Eremophila acutifolia</i>	P3	Unlikely- Potential habitat, habitat extensively searched
<i>Eremophila caerulea</i> subsp. <i>merrallii</i>	P4	Unlikely- Potential habitat, habitat extensively searched
<i>Eremophila microphylla</i>	P3	Unlikely- Potential habitat, habitat extensively searched
<i>Eremophila praecox</i>	P2	Unlikely- Potential habitat, habitat extensively searched
<i>Eremophila veronica</i>	P3	Unlikely- Potential habitat, habitat extensively searched
<i>Eucalyptus educta</i>	P2	Unlikely- No suitable habitat
<i>Eucalyptus exigua</i>	P3	Unlikely- No suitable habitat
<i>Eucalyptus frenchiana</i>	P3	Unlikely- Potential habitat, habitat extensively searched
<i>Eucalyptus jutsonii</i> subsp. <i>jutsonii</i>	P4	Unlikely- Potential habitat, habitat extensively searched
<i>Eucalyptus websteriana</i> subsp. <i>norsemanica</i>	P1	Unlikely- Potential habitat, habitat extensively searched
<i>Gastrolobium graniticum</i>	T	Unlikely- No suitable habitat
<i>Gompholobium cinereum</i>	P3	Unlikely- No suitable habitat
<i>Goodenia salina</i>	P2	Unlikely- Potential habitat, habitat extensively searched
<i>Grevillea georgeana</i>	P3	Unlikely- Potential habitat, habitat extensively searched
<i>Hakea rigida</i>	P2	Unlikely- Potential habitat, habitat extensively searched
<i>Hibbertia pachyphylla</i>	P3	Unlikely- Potential habitat, habitat extensively searched
<i>Isoetes brevicula</i>	P3	Unlikely- Potential habitat, habitat extensively searched
<i>Isolepis australiensis</i>	P3	Unlikely- Potential habitat, habitat extensively searched
<i>Lepidium merrallii</i>	P2	Unlikely- Potential habitat, habitat extensively searched
<i>Lepidosperma</i> sp. Parker Range	P1	Unlikely- No suitable habitat
<i>Melaleuca macronychia</i> subsp. <i>trygonoides</i>	P3	Unlikely- Potential habitat, habitat extensively searched
<i>Melichrus</i> sp. Coolgardie	P1	Unlikely- No suitable habitat
<i>Myriophyllum petraeum</i>	P4	Unlikely- Potential habitat, habitat extensively searched
<i>Notisia intonsa</i>	P3	Unlikely- No suitable habitat
<i>Phebalium appressum</i>	P1	Unlikely- Potential habitat, habitat extensively searched
<i>Phebalium clavatum</i>	P2	Unlikely- Potential habitat, habitat extensively searched
<i>Philothea pachyphylla</i>	P1	Unlikely- No suitable habitat
<i>Phlegmatospermum eremaum</i>	P3	Unlikely- Potential habitat, habitat extensively searched
<i>Pterostylis xerampelina</i>	P1	Unlikely- No suitable habitat
<i>Rinzia triplex</i>	P3	Unlikely- No suitable habitat
<i>Stylidium choreanthum</i>	P3	Unlikely- Potential habitat, habitat extensively searched
<i>Styphelia saxicola</i>	P3	Unlikely- No suitable habitat
<i>Thryptomene planiflora</i>	P1	Unlikely- No suitable habitat
<i>Thryptomene</i> sp. Coolgardie	P1	Unlikely- No suitable habitat
<i>Xanthoparmelia dayiana</i>	P3	Unlikely- Potential habitat, habitat extensively searched

Appendix 3: Vegetation Definitions

Vegetation Condition Definitions (Keighery, 1994)

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

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

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

Good (4). Vegetation structure significantly altered by very obvious signs of multiple disturbance.

Retains basic vegetation structure or ability to regenerate it.

For example, disturbance to vegetation structure caused by frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.

Degraded (5). Basic vegetation structure severely impacted by disturbance.

Scope for regeneration but not to a state approaching good condition without intensive management.

For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.

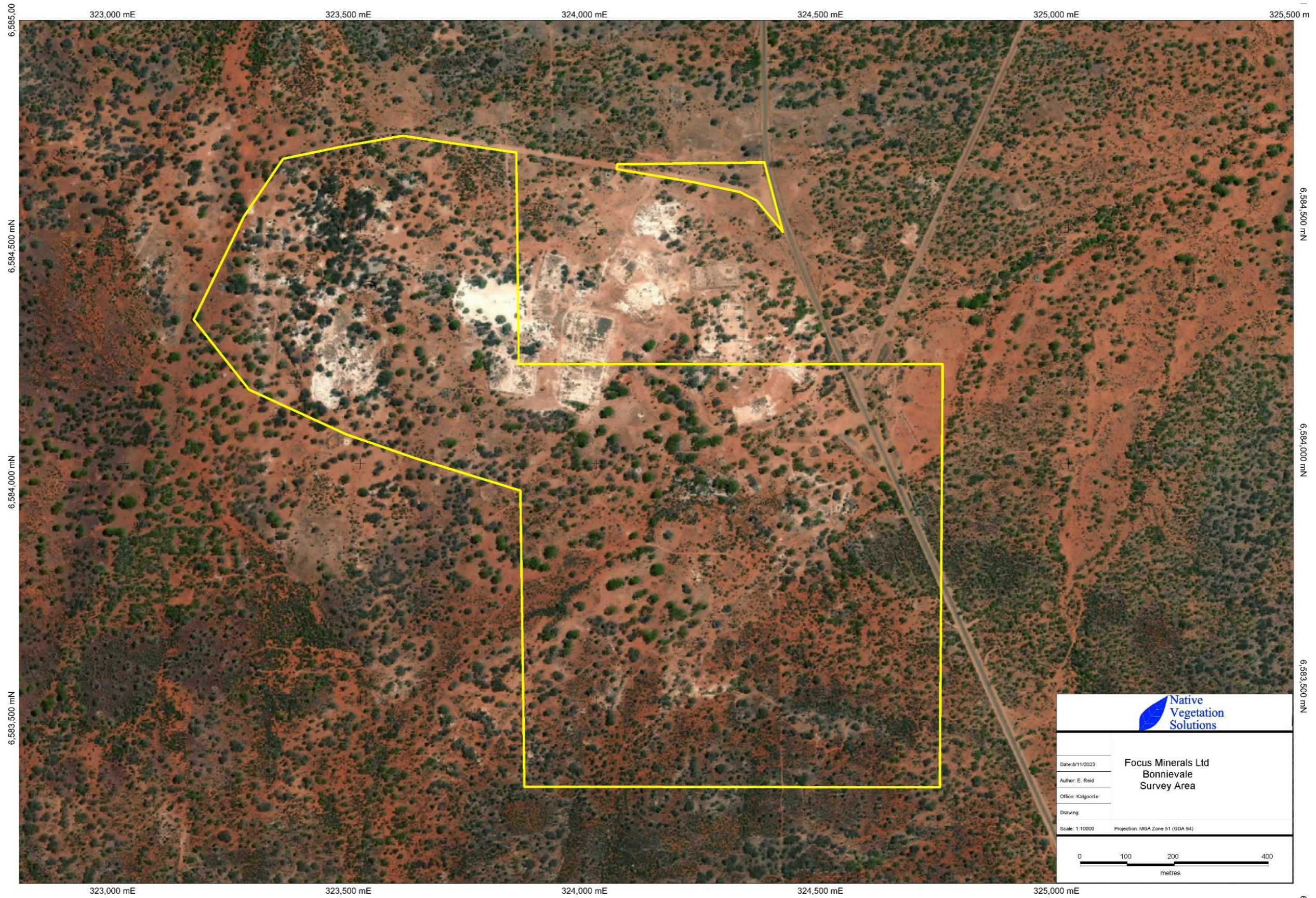
Completely Degraded (6). The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.

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

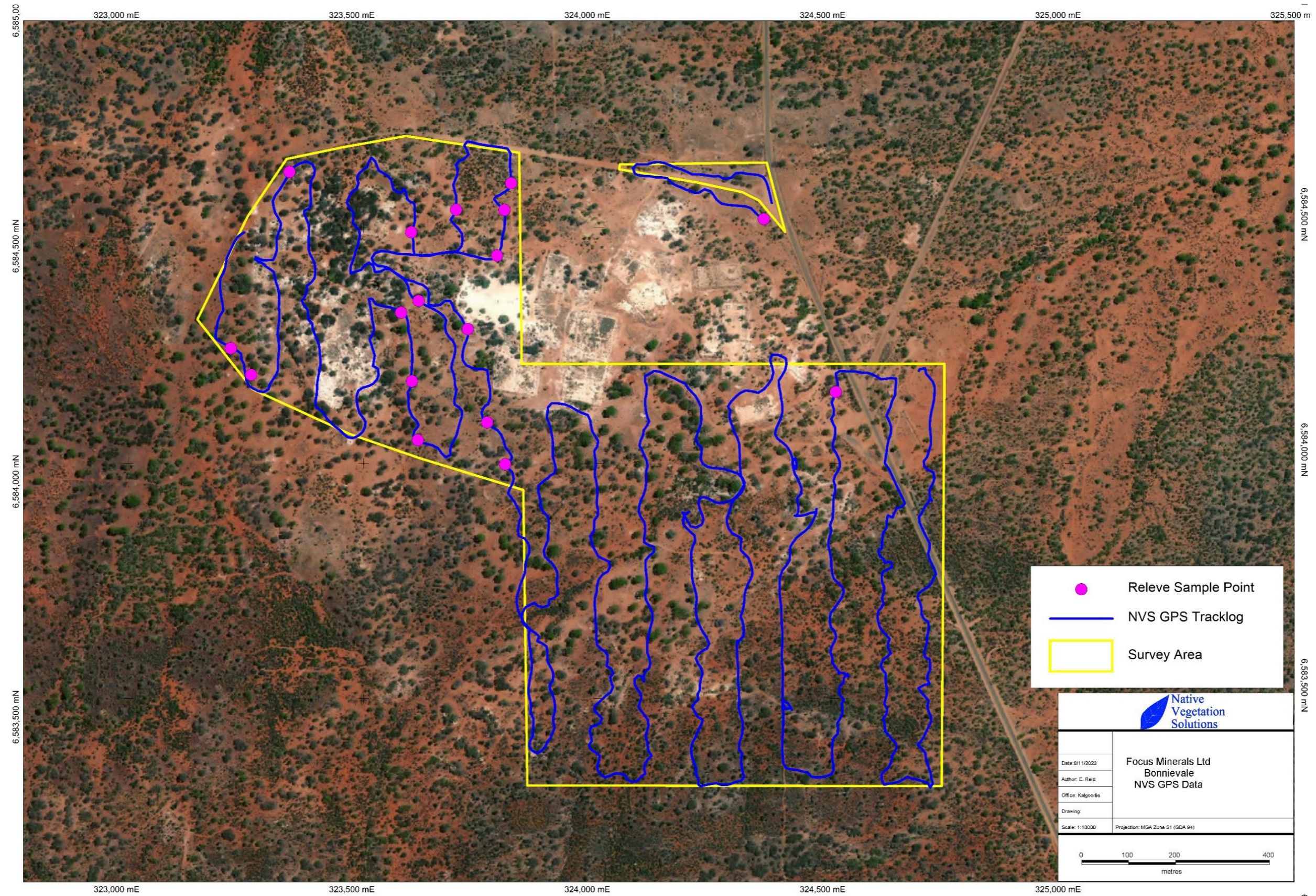
Vegetation Structure Definitions (Muir, 1977)

Life Form/Height Class	Canopy Cover			
	Dense 70-100% d	Mid-Dense 30-70% c	Sparse 10-30% i	Very Sparse 2-10% r
T Trees>30m	Dense Tall Forest	Tall Forest	Tall Woodland	Open Tall Woodland
M Trees 15-30m	Dense Forest	Forest	Woodland	Open 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

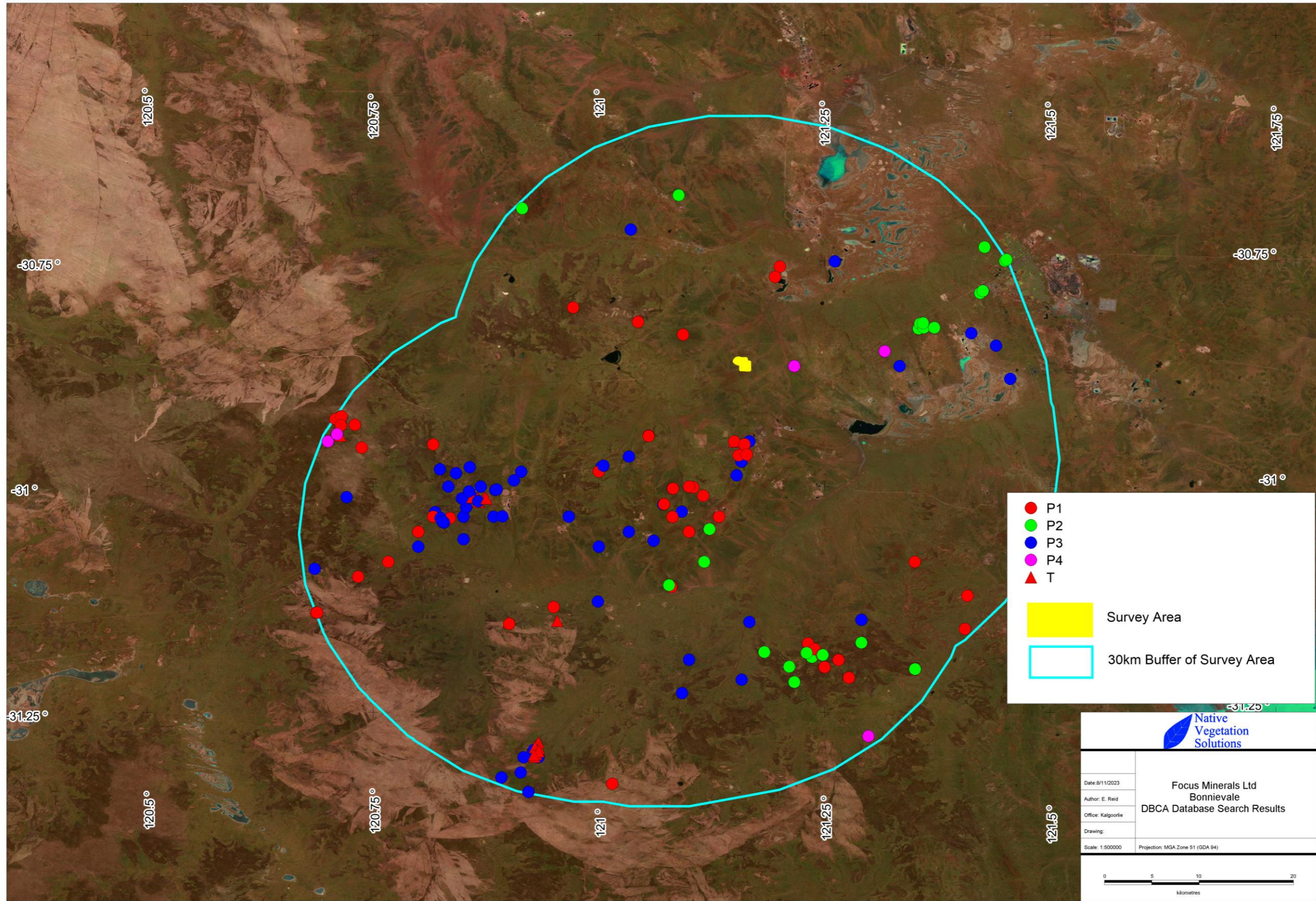
Appendix 4: Vegetation Mapping



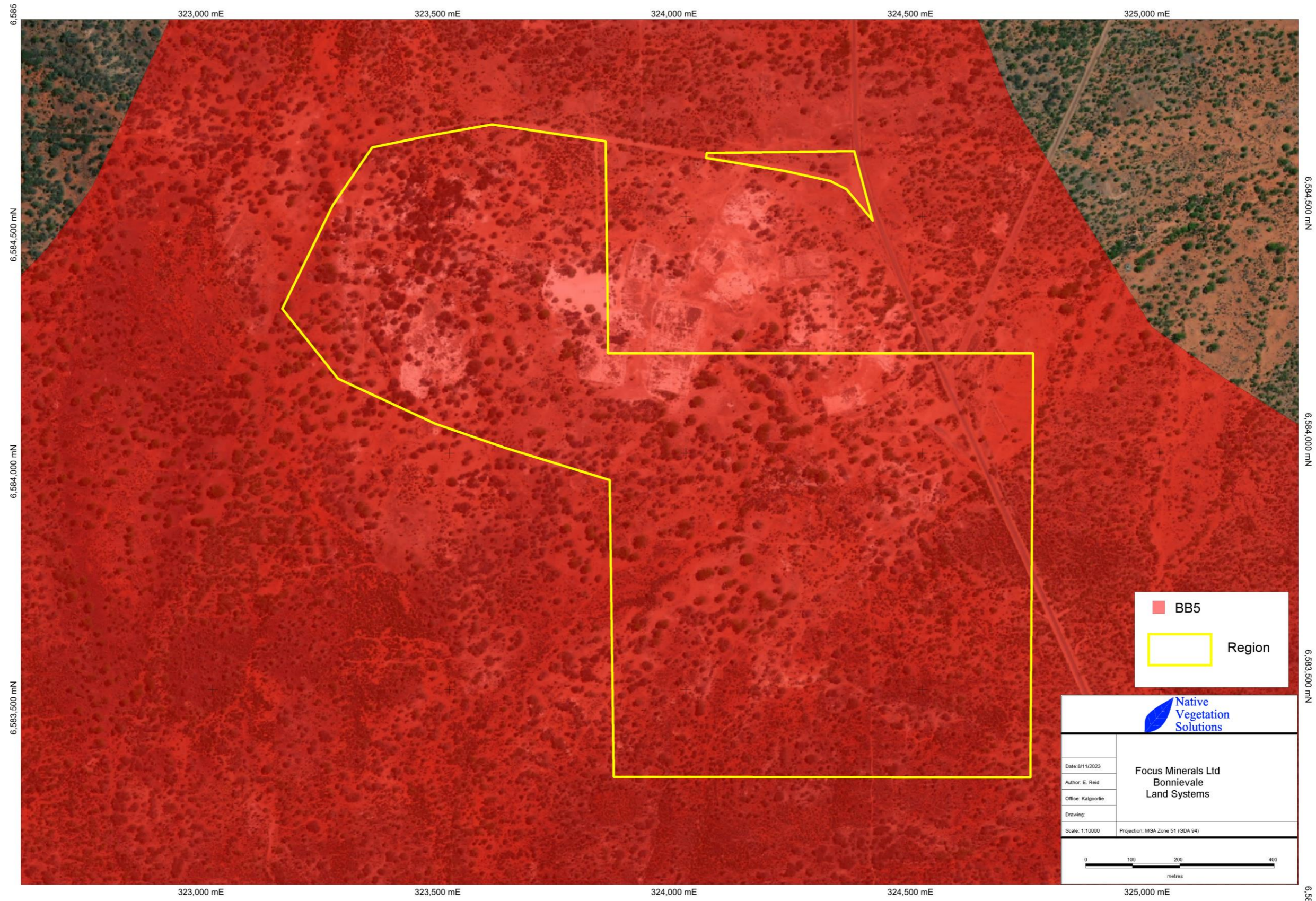
Map 1: Survey Area



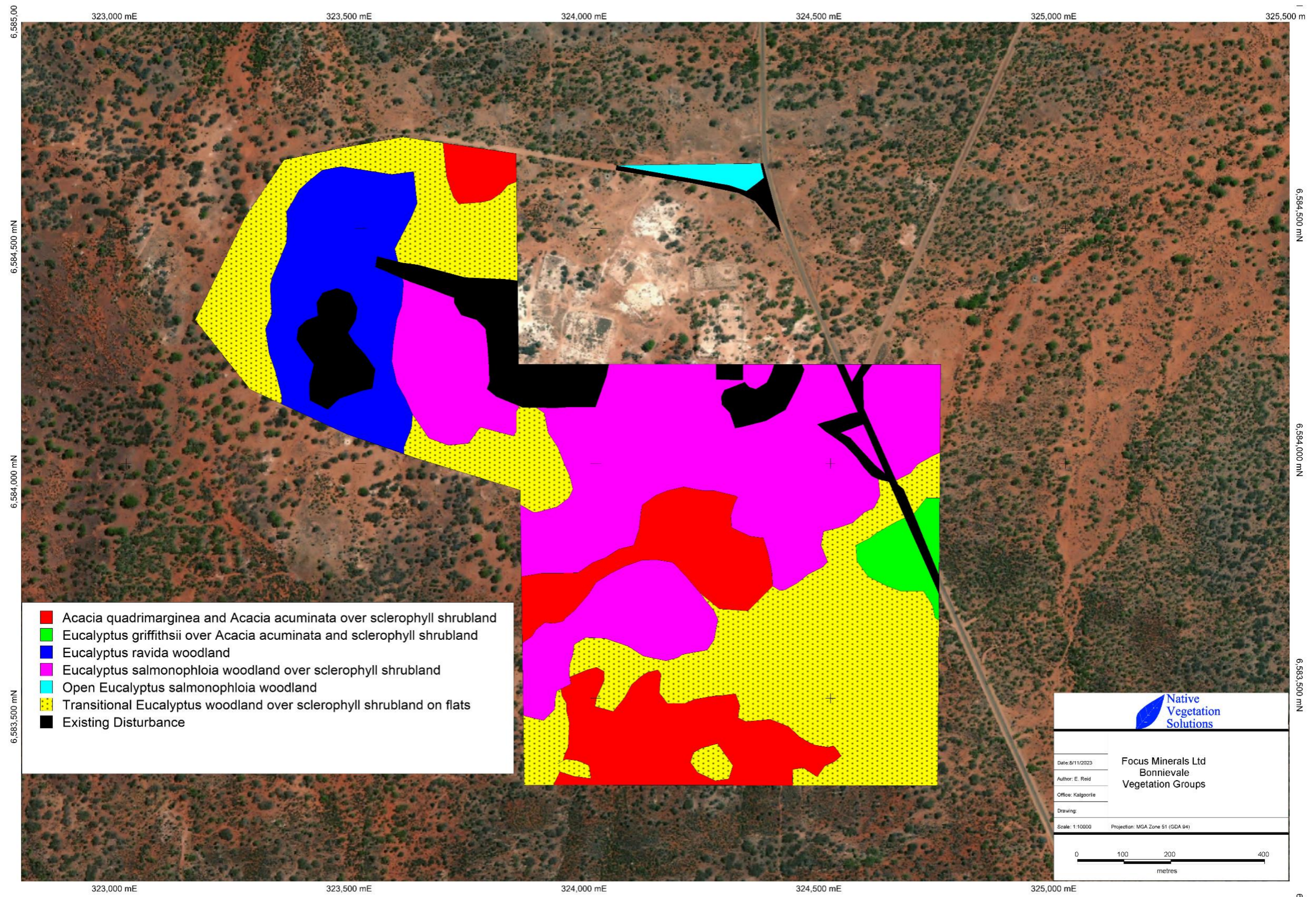
Map 2: NVS GPS Data



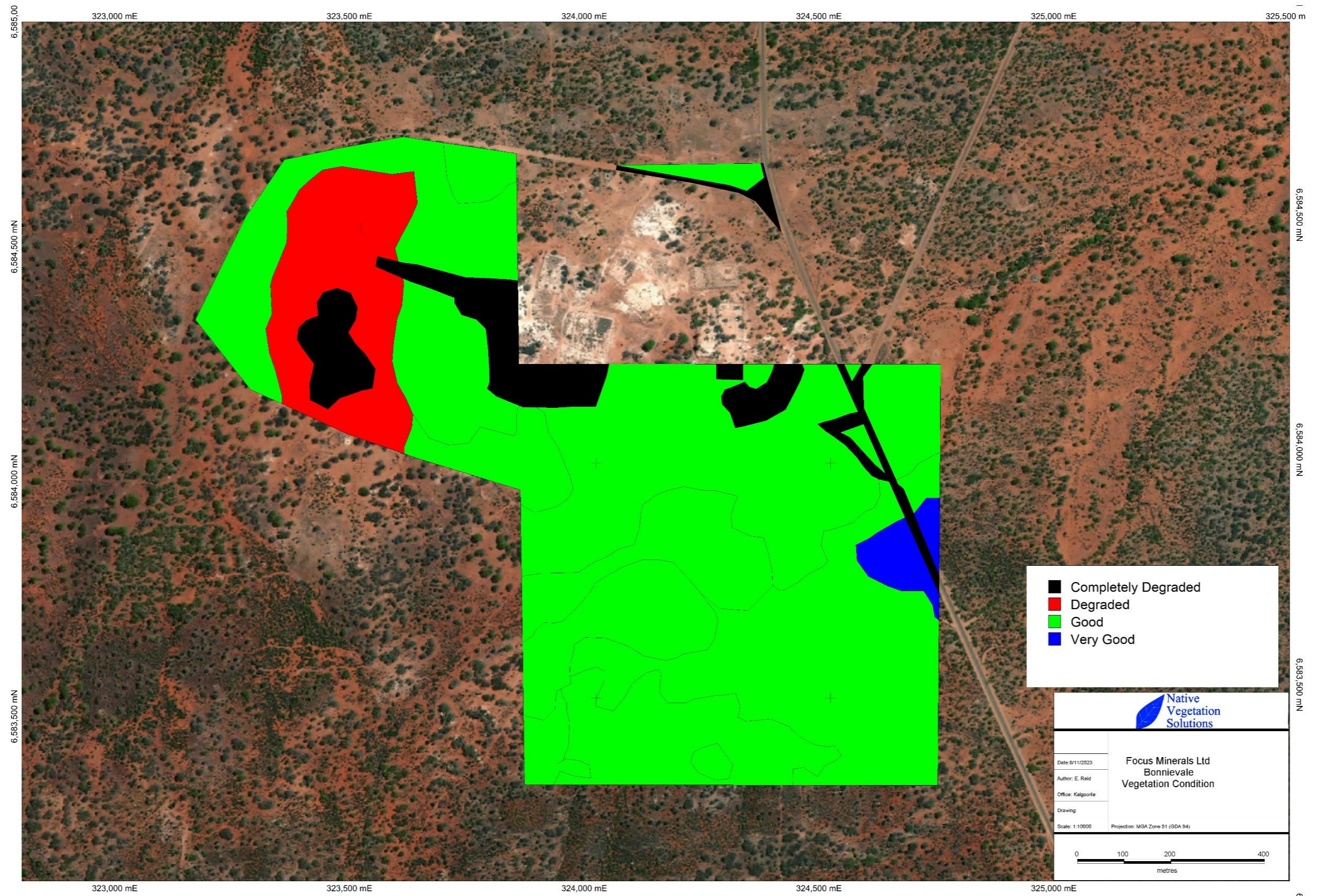
Map 3: DBCA Databases Search Results



Map 4: Land Systems



Map 5: Vegetation Groups



Map 6: Vegetation Condition

Appendix 5: Species List

Species List per Vegetation Group

Family	Genus	Taxon	A	B	C	D	E	F
Amaranthaceae	<i>Ptilotus</i>	<i>Ptilotus aervoides</i>			*			
Amaranthaceae	<i>Ptilotus</i>	<i>Ptilotus exaltatus</i>	*				*	
Amaranthaceae	<i>Ptilotus</i>	<i>Ptilotus obovatus</i>	*	*	*	*	*	*
Anacardiaceae	<i>Schinus</i>	<i>Schinus molle</i> var. <i>areira</i>	*					
Apocynaceae	<i>Alyxia</i>	<i>Alyxia buxifolia</i>	*	*	*	*	*	
Apocynaceae	<i>Leichhardtia</i>	<i>Leichhardtia australis</i>	*	*	*	*	*	
Asparagaceae	<i>Thysanotus</i>	<i>Thysanotus manglesianus</i>		*			*	
Asteraceae	<i>Angianthus</i>	<i>Angianthus tomentosus</i>				*		
Asteraceae	<i>Asteridea</i>	<i>Asteridea athrixoides</i>		*			*	
Asteraceae	<i>Brachyscome</i>	<i>Brachyscome ciliaris</i>				*		
Asteraceae	<i>Centaurea</i>	<i>Centaurea melitensis</i> *					*	
Asteraceae	<i>Cephalopterum</i>	<i>Cephalopterum drummondii</i>					*	
Asteraceae	<i>Cratystylis</i>	<i>Cratystylis conocephala</i>			*			
Asteraceae	<i>Cratystylis</i>	<i>Cratystylis microphylla</i>	*		*		*	
Asteraceae	<i>Olearia</i>	<i>Olearia muelleri</i>	*	*	*	*	*	
Asteraceae	<i>Olearia</i>	<i>Olearia pimeleoides</i>	*					
Asteraceae	<i>Podolepis</i>	<i>Podolepis capillarlis</i>		*	*		*	
Asteraceae	<i>Rhodanthe</i>	<i>Rhodanthe floribunda</i>				*		
Asteraceae	<i>Rhodanthe</i>	<i>Rhodanthe oppositifolia</i> subsp. <i>oppositifolia</i>		*			*	
Asteraceae	<i>Schoenia</i>	<i>Schoenia filifolia</i> subsp. <i>filifolia</i>			*			
Asteraceae	<i>Waitzia</i>	<i>Waitzia acuminata</i> var. <i>acuminata</i>		*				
Boraginaceae	<i>Halgania</i>	<i>Halgania andromedifolia</i>	*		*			
Boraginaceae	<i>Halgania</i>	<i>Halgania integerrima</i>	*					
Brassicaceae	<i>Carrichtera</i>	<i>Carrichtera annua</i> *	*	*	*	*	*	
Casuarinaceae	<i>Allocasuarina</i>	<i>Allocasuarina campestris</i>	*					
Celastraceae	<i>Stackhousia</i>	<i>Stackhousia</i> sp. Mt Keith		*				
Chenopodiaceae	<i>Atriplex</i>	<i>Atriplex nummularia</i> subsp. <i>spathulata</i>	*		*	*	*	*
Chenopodiaceae	<i>Atriplex</i>	<i>Atriplex stipitata</i>	*		*	*		*
Chenopodiaceae	<i>Atriplex</i>	<i>Atriplex vesicaria</i>	*		*	*	*	*
Chenopodiaceae	<i>Chenopodium</i>	<i>Chenopodium gaudichaudianum</i>		*		*		
Chenopodiaceae	<i>Enchylaena</i>	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	*	*	*	*	*	
Chenopodiaceae	<i>Eriochiton</i>	<i>Eriochiton sclerolaenoides</i>			*	*		
Chenopodiaceae	<i>Maireana</i>	<i>Maireana georgei</i>	*		*	*	*	
Chenopodiaceae	<i>Maireana</i>	<i>Maireana pentatropis</i>	*		*			
Chenopodiaceae	<i>Maireana</i>	<i>Maireana pyramidata</i>	*		*			
Chenopodiaceae	<i>Maireana</i>	<i>Maireana sedifolia</i>			*	*	*	
Chenopodiaceae	<i>Maireana</i>	<i>Maireana tomentosa</i>	*			*	*	
Chenopodiaceae	<i>Maireana</i>	<i>Maireana trichoptera</i>	*		*	*	*	
Chenopodiaceae	<i>Maireana</i>	<i>Maireana triptera</i>	*		*	*	*	
Chenopodiaceae	<i>Rhagodia</i>	<i>Rhagodia drummondii</i>	*	*	*	*	*	*
Chenopodiaceae	<i>Sclerolaena</i>	<i>Sclerolaena cuneata</i>	*	*	*	*	*	
Chenopodiaceae	<i>Sclerolaena</i>	<i>Sclerolaena densiflora</i>	*	*	*	*	*	
Chenopodiaceae	<i>Sclerolaena</i>	<i>Sclerolaena diacantha</i>	*	*	*	*	*	*
Chenopodiaceae	<i>Sclerolaena</i>	<i>Sclerolaena ericantha</i>			*	*	*	
Chenopodiaceae	<i>Sclerolaena</i>	<i>Sclerolaena eurotioides</i>				*		
Chenopodiaceae	<i>Sclerolaena</i>	<i>Sclerolaena patentiscuspis</i>	*	*	*	*	*	
Convolvulaceae	<i>Cuscuta</i>	<i>Cuscuta planiflora</i> *				*		
Euphorbiaceae	<i>Beyeria</i>	<i>Beyeria sulcata</i> var. <i>sulcata</i>	*					
Fabaceae	<i>Acacia</i>	<i>Acacia acuminata</i>	*	*		*	*	
Fabaceae	<i>Acacia</i>	<i>Acacia andrewsii</i>	*					
Fabaceae	<i>Acacia</i>	<i>Acacia camptoclada</i>			*			
Fabaceae	<i>Acacia</i>	<i>Acacia colletioides</i>			*		*	
Fabaceae	<i>Acacia</i>	<i>Acacia enervia</i> subsp. <i>enervia</i>	*					
Fabaceae	<i>Acacia</i>	<i>Acacia enervia</i> subsp. <i>explicata</i>			*			
Fabaceae	<i>Acacia</i>	<i>Acacia erinacea</i>	*	*	*		*	
Fabaceae	<i>Acacia</i>	<i>Acacia hemiteles</i>	*		*	*	*	
Fabaceae	<i>Acacia</i>	<i>Acacia ligulata</i>				*	*	
Fabaceae	<i>Acacia</i>	<i>Acacia nyssophylla</i>	*					
Fabaceae	<i>Acacia</i>	<i>Acacia oswaldii</i>				*		
Fabaceae	<i>Acacia</i>	<i>Acacia quadrimarginea</i>		*				
Fabaceae	<i>Acacia</i>	<i>Acacia tetragonophylla</i>	*	*		*	*	
Fabaceae	<i>Eutaxia</i>	<i>Eutaxia leptophylla</i>	*		*			
Fabaceae	<i>Senna</i>	<i>Senna artemisioides</i> subsp. <i>artemisioides</i>		*	*	*	*	
Fabaceae	<i>Senna</i>	<i>Senna artemisioides</i> subsp. <i>filifolia</i>	*	*	*	*	*	
Fabaceae	<i>Senna</i>	<i>Senna cardiosperma</i>			*			
Fabaceae	<i>Swainsona</i>	<i>Swainsona canescens</i>					*	
Frankeniaceae	<i>Frankenia</i>	<i>Frankenia interioris</i>				*		*
Frankeniaceae	<i>Frankenia</i>	<i>Frankenia setosa</i>					*	

Family	Genus	Taxon	A	B	C	D	E	F
Geraniaceae	<i>Erodium</i>	<i>Erodium crinitum</i>		*		*		
Goodeniaceae	<i>Goodenia</i>	<i>Goodenia berardiana</i>			*			
Goodeniaceae	<i>Goodenia</i>	<i>Goodenia havilandii</i>		*				
Goodeniaceae	<i>Scaevola</i>	<i>Scaevola spinescens</i>	*	*	*	*	*	
Lamiaceae	<i>Salvia</i>	<i>Salvia verbenaca*</i>	*			*	*	
Lamiaceae	<i>Westringia</i>	<i>Westringia cephalantha</i>	*					
Lamiaceae	<i>Westringia</i>	<i>Westringia rigida</i>	*	*				
Loranthaceae	<i>Amyema</i>	<i>Amyema preissii</i>					*	
Malvaceae	<i>Abutilon</i>	<i>Abutilon cryptopetalum</i>	*					
Malvaceae	<i>Sida</i>	<i>Sida calyxhymenia</i>		*				
Malvaceae	<i>Sida</i>	<i>Sida ectogama</i>		*				
Myrtaceae	<i>Eucalyptus</i>	<i>Eucalyptus campaspe</i>			*		*	
Myrtaceae	<i>Eucalyptus</i>	<i>Eucalyptus celastroides</i> subsp. <i>celastroides</i>			*	*		
Myrtaceae	<i>Eucalyptus</i>	<i>Eucalyptus clelandiorum</i>		*	*	*		
Myrtaceae	<i>Eucalyptus</i>	<i>Eucalyptus griffithsii</i>	*	*	*	*		
Myrtaceae	<i>Eucalyptus</i>	<i>Eucalyptus oleosa</i> subsp. <i>oleosa</i>	*		*			
Myrtaceae	<i>Eucalyptus</i>	<i>Eucalyptus orbifolia</i>	*					
Myrtaceae	<i>Eucalyptus</i>	<i>Eucalyptus ravida</i>			*			*
Myrtaceae	<i>Eucalyptus</i>	<i>Eucalyptus salmonophloia</i>			*	*	*	
Myrtaceae	<i>Eucalyptus</i>	<i>Eucalyptus salubris</i>			*	*	*	
Myrtaceae	<i>Eucalyptus</i>	<i>Eucalyptus torquata</i>				*		
Myrtaceae	<i>Eucalyptus</i>	<i>Eucalyptus transcontinentalis</i>			*			
Myrtaceae	<i>Eucalyptus</i>	<i>Eucalyptus websteriana</i> subsp. <i>websteriana</i>	*	*				
Myrtaceae	<i>Eucalyptus</i>	<i>Eucalyptus yilgarnensis</i>			*	*	*	
Myrtaceae	<i>Melaleuca</i>	<i>Melaleuca eleuterostachya</i>	*					
Myrtaceae	<i>Melaleuca</i>	<i>Melaleuca hamata</i>	*					
Pittosporaceae	<i>Pittosporum</i>	<i>Pittosporum angustifolium</i>					*	
Poaceae	<i>Austrostipa</i>	<i>Austrostipa elegantissima</i>	*	*	*	*	*	
Poaceae	<i>Austrostipa</i>	<i>Austrostipa nitida</i>	*	*	*			
Poaceae	<i>Austrostipa</i>	<i>Austrostipa</i> sp. (sterile)		*				
Poaceae	<i>Austrostipa</i>	<i>Austrostipa</i> sp2. (sterile)		*				
Poaceae	<i>Eragrostis</i>	<i>Eragrostis setifolia</i>	*					
Poaceae	<i>Eriachne</i>	<i>Eriachne helmsii</i>					*	
Poaceae	<i>Eriachne</i>	<i>Eriachne pulchella</i> subsp. <i>pulchella</i>	*	*				
Poaceae	<i>Monachather</i>	<i>Monachather paradoxus</i>	*	*			*	
Proteaceae	<i>Grevillea</i>	<i>Grevillea acuaria</i>	*		*			
Proteaceae	<i>Grevillea</i>	<i>Grevillea nematophylla</i> subsp. <i>nematophylla</i>	*					
Pteridaceae	<i>Cheilanthes</i>	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>		*				
Rhamnaceae	<i>Trymalium</i>	<i>Trymalium myrtillus</i> subsp. <i>myrtillus</i>	*	*				
Santalaceae	<i>Exocarpos</i>	<i>Exocarpos aphyllus</i>	*	*	*	*	*	*
Santalaceae	<i>Santalum</i>	<i>Santalum acuminatum</i>	*		*	*	*	*
Santalaceae	<i>Santalum</i>	<i>Santalum spicatum</i>	*	*			*	
Sapindaceae	<i>Dodonaea</i>	<i>Dodonaea lobulata</i>	*	*	*	*	*	*
Sapindaceae	<i>Dodonaea</i>	<i>Dodonaea microzyga</i> subsp. <i>acrolobata</i>	*	*	*			
Sapindaceae	<i>Dodonaea</i>	<i>Dodonaea stenozyga</i>	*	*				
Scrophulariaceae	<i>Eremophila</i>	<i>Eremophila alternifolia</i>	*	*	*		*	
Scrophulariaceae	<i>Eremophila</i>	<i>Eremophila caerulea</i> subsp. <i>caerulea</i>			*			
Scrophulariaceae	<i>Eremophila</i>	<i>Eremophila caperata</i>	*					
Scrophulariaceae	<i>Eremophila</i>	<i>Eremophila decipiens</i> subsp. <i>decipiens</i>	*	*	*	*	*	
Scrophulariaceae	<i>Eremophila</i>	<i>Eremophila dempsteri</i>	*		*		*	*
Scrophulariaceae	<i>Eremophila</i>	<i>Eremophila georgei</i>	*	*				
Scrophulariaceae	<i>Eremophila</i>	<i>Eremophila glabra</i> subsp. <i>glabra</i>	*	*	*	*	*	
Scrophulariaceae	<i>Eremophila</i>	<i>Eremophila granitica</i>	*	*				
Scrophulariaceae	<i>Eremophila</i>	<i>Eremophila interstans</i> subsp. <i>interstans</i>		*	*		*	
Scrophulariaceae	<i>Eremophila</i>	<i>Eremophila interstans</i> subsp. <i>virgata</i>	*		*	*	*	
Scrophulariaceae	<i>Eremophila</i>	<i>Eremophila ionantha</i>	*		*	*	*	
Scrophulariaceae	<i>Eremophila</i>	<i>Eremophila maculata</i> subsp. <i>brevifolia</i>			*			
Scrophulariaceae	<i>Eremophila</i>	<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	*	*	*	*	*	
Scrophulariaceae	<i>Eremophila</i>	<i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>	*	*	*			
Scrophulariaceae	<i>Eremophila</i>	<i>Eremophila parvifolia</i> subsp. <i>auricampa</i>			*			
Scrophulariaceae	<i>Eremophila</i>	<i>Eremophila scoparia</i>	*		*	*	*	
Scrophulariaceae	<i>Eremophila</i>	<i>Eremophila</i> sp. Mt Jackson	*					
Scrophulariaceae	<i>Myoporum</i>	<i>Myoporum platycarpum</i> subsp. <i>platycarpum</i>					*	
Solanaceae	<i>Lycium</i>	<i>Lycium australe</i>	*		*	*	*	*
Solanaceae	<i>Solanum</i>	<i>Solanum ferocissimum</i>		*				
Solanaceae	<i>Solanum</i>	<i>Solanum lasiophyllum</i>	*	*	*	*	*	
Solanaceae	<i>Solanum</i>	<i>Solanum orbiculatum</i>	*		*	*		
Thymelaeaceae	<i>Pimelea</i>	<i>Pimelea microcephala</i> subsp. <i>microcephala</i>		*	*		*	
Violaceae	<i>Pigea</i>	<i>Pigea curvifolia</i>	*		*			

Family	Genus	Taxon	A	B	C	D	E	F
Zygophyllaceae	<i>Roepera</i>	<i>Roepera aurantiaca</i>		*				
Zygophyllaceae	<i>Roepera</i>	<i>Roepera eremaea</i>	*					