



Leinster Townsite Flora, Vegetation and Fauna Assessment



Prepared for BHP Billiton Nickel West

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1.0 Executive Summary

BHP Nickel West Pty Ltd commissioned Biota Environmental Sciences to undertake a single-season reconnaissance flora and vegetation and a single-season basic vertebrate fauna survey at a study area encompassing the Leinster townsite, referred to as the Leinster Townsite study area.

Botanical Survey Methods

Fifteen relevé sites were established in representative vegetation types in the Leinster Townsite study area. The survey botanists also conducted foot and vehicle traverses within the study area to ground truth and determine vegetation boundaries, search for significant flora and record additional flora species.

Vegetation

Eight intact vegetation types were described and mapped for the study area, while a total of 176.7 ha (16% of the study area) was mapped as cleared (largely the townsite). The vegetation of the study area was primarily in Excellent condition (43%), and only 1% was considered to be in Poor condition. None of the vegetation types recorded constitute significant ecological communities, and no such communities are expected to occur in the study area.

Flora

A total of 134 native flora species from 70 genera and 30 families were recorded in the study area. The species richness and composition are typical of the locality and similar to study areas of comparable size. No Threatened or Priority flora were recorded in the study area, and none are expected to occur, however two species of interest were recorded: *Eucalyptus kingsmillii* x *oldfieldii* and *Prostanthera* sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777).

Four weeds were recorded in low densities: **Cenchrus ciliaris*, **Citrullus amarus*, **Digitaria ciliaris* and **Rumex vesicarius*. None of these are Weed of National Significance or Declared pests under the WA Biosecurity and Agriculture Management Act 2007.

Fauna Survey Methods

A desktop review of available databases and literature in relation to vertebrate fauna was undertaken to inform the likely fauna assemblage within the study area. The desktop study identified only a few studies in the local area (within 30 km) but numerous studies in the wider area (30 – 100 km). As such, a conservative approach to significant fauna was taken and all species recorded within 100 km were considered for their likelihood to occur within the study area.

To verify the findings of the desktop study and characterise the fauna habitats of the study area, daytime foot traverses were undertaken over the study area. While conducting foot traverses, fauna observed directly or from secondary evidence (tracks, scats, burrows, diggings etc.) were recorded. Survey effort also included one night of spotlighting, largely from the vehicle with some foot traversing. In areas of prospective habitat for significant fauna more intensive search effort was applied.

Fauna Recorded

Fifty-three vertebrate species were recorded comprising five mammals (two native and three introduced), 45 birds and five reptiles. No species of significance were recorded.

Fauna Habitats

Four naturally occurring and one artificial fauna habitats, were described and mapped within the study area based on the vegetation mapping, landforms and soils:

1. Hardpan mulga shrubland (365.0 ha);
2. Sandplain with *Eucalyptus* and *Acacia* shrublands to woodlands over shrubs and spinifex grassland (308.1 ha);
3. Drainage line mulga shrubland (180.9 ha);

4. Granite outcrop stony mulga shrubland (31.3 ha); and
5. Waterbodies at waste-water treatment facility (10.74 ha).

Fauna Likelihood Assessment

The desktop study identified 167 vertebrate species as having been recorded from the local area (within 30 km of the study area). The assemblage comprises seven native mammals (as well as nine introduced), 114 birds, 32 reptiles and five amphibians. Three species of conservation significance were returned from records within 30 km of the study area, while an additional 16 were returned from the wider area (30 - 100 km) or from the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool database. Taking into consideration the habitats of the study area, the likelihood of occurrence of significant species was assessed as follows:

- one species was considered likely to occur: Brush-tailed Mulgara *Dasycercus blythi* (Department of Biodiveristy, Conservation and Attractions [DBCA] Priority 4);
- two species may occur within the study area: Rufous [Sandhill] Grasswren *Amytornis whitei oweni* (listed DBCA Priority 4 as *A. striatus striatus*) and Long-tailed Dunnart *Sminthopsis longicaudata* (DBCA Priority 4);
- one species may occur as a foraging visitor only: Peregrine Falcon *Falco peregrinus* (BC Act Other Specially Protected Fauna);
- four migratory shorebird species (BC Act Migratory, EPBC Act Marine/Migratory) may occur at the wastewater treatment facility waterbodies or when suitable habitat is available following rainfall: Common Sandpiper *Actitis hypoleucos*, [Australian] Gull-billed Tern (*Gelochelidon [nilotica] macrotarsa*), Oriental Plover *Charadrius veredus* and Common Greenshank *Tringa nebularia*;
- eight species were considered unlikely to occur: Black-footed Rock-wallaby *Petrogale lateralis lateralis* (BC Act/EPBC Act Endangered), Princess Parrot *Polytelis alexandrae* (DBCA Priority 4/EPBC Act Vulnerable), Night Parrot *Pezoporus occidentalis* (BC Act/EPBC Act Critically Endangered), Malleefowl *Leipoa ocellata* (BC Act/EPBC Act Vulnerable), Grey Falcon *Falco hypoleucos* (BC Act/EPBC Act Vulnerable), Pectoral Sandpiper *Calidris melanotos* (BC Act Migratory, EPBC Act Marine/Migratory), Sharp-tailed Sandpiper *Calidris acuminata* and Great Desert Skink *Liopholis kintorei* (BC Act/EPBC Act Vulnerable); and
- three would not occur within the study area: Chuditch *Dasyurus geoffroii* (BC Act/EPBC Act Vulnerable), Grey Wagtail *Motacilla cinerea* (BC Act Migratory, EPBC Act Marine/Migratory) and Eastern Yellow Wagtail *Motacilla tschutschensis* (BC Act Migratory, EPBC Act Marine/Migratory).

2.0 Introduction

2.1 Project Background and Scope

BHP Nickel West Pty Ltd (BHP NiW) commissioned Biota Environmental Sciences (Biota) to undertake a single-season reconnaissance flora and vegetation and a single-season basic vertebrate fauna survey in areas surrounding the Leinster townsite (referred to as the Leinster Townsite study area). The purpose of the surveys was to ensure any ground disturbance required for the maintenance or expansion of the existing townsite may be adequately assessed and survey information is available to support future native vegetation clearing permit (NVCP) applications.

The Leinster Townsite study area was 1,072.6 ha in size, comprising approximately 187.3 ha of existing town infrastructure and associated disturbance, and 885.3 ha of relatively undisturbed native vegetation in the surrounds. The location of the study area is shown in Figure 2.1.

2.2 Objectives of the Study

The overall objective of the study was to provide an evaluation of the flora, vegetation and fauna values of the study area to inform the environmental impact assessment process and specifically any future NVCP application. This study was required to meet the survey and reporting standards of the relevant Environmental Protection Authority (EPA) technical guidance in relation to reconnaissance flora and vegetation surveys (EPA 2016a) and basic vertebrate fauna surveys (EPA 2020). As such, the scope of the study included:

- a desktop study, including database and literature searches, in order to consolidate all available and relevant existing data;
- description and mapping of the vegetation at National Vegetation Information System (NVIS) Level V (Association) level;
- assessment and mapping of the vegetation condition;
- determination of the likelihood that the vegetation present constitutes a Threatened Ecological Community (TEC) or a Priority Ecological Community (PEC), specifically focussing on those TECs or PECs identified in the desktop study as potentially occurring in the study area;
- compilation of a non-exhaustive list of vascular flora species recorded in the study area, to characterise the floristic diversity at the time of the survey;
- completion of targeted searches for significant flora (Threatened or Priority species) in the study area, with recording of numbers and photographs of any such species;
- description and mapping of fauna habitats through on-ground reconnaissance;
- assessment of the likelihood of fauna of significance identified in the desktop study occurring in the study area; and
- searches for secondary evidence (tracks, scats, burrows, remains etc) of significant fauna and recording of opportunistic encounters with all fauna.

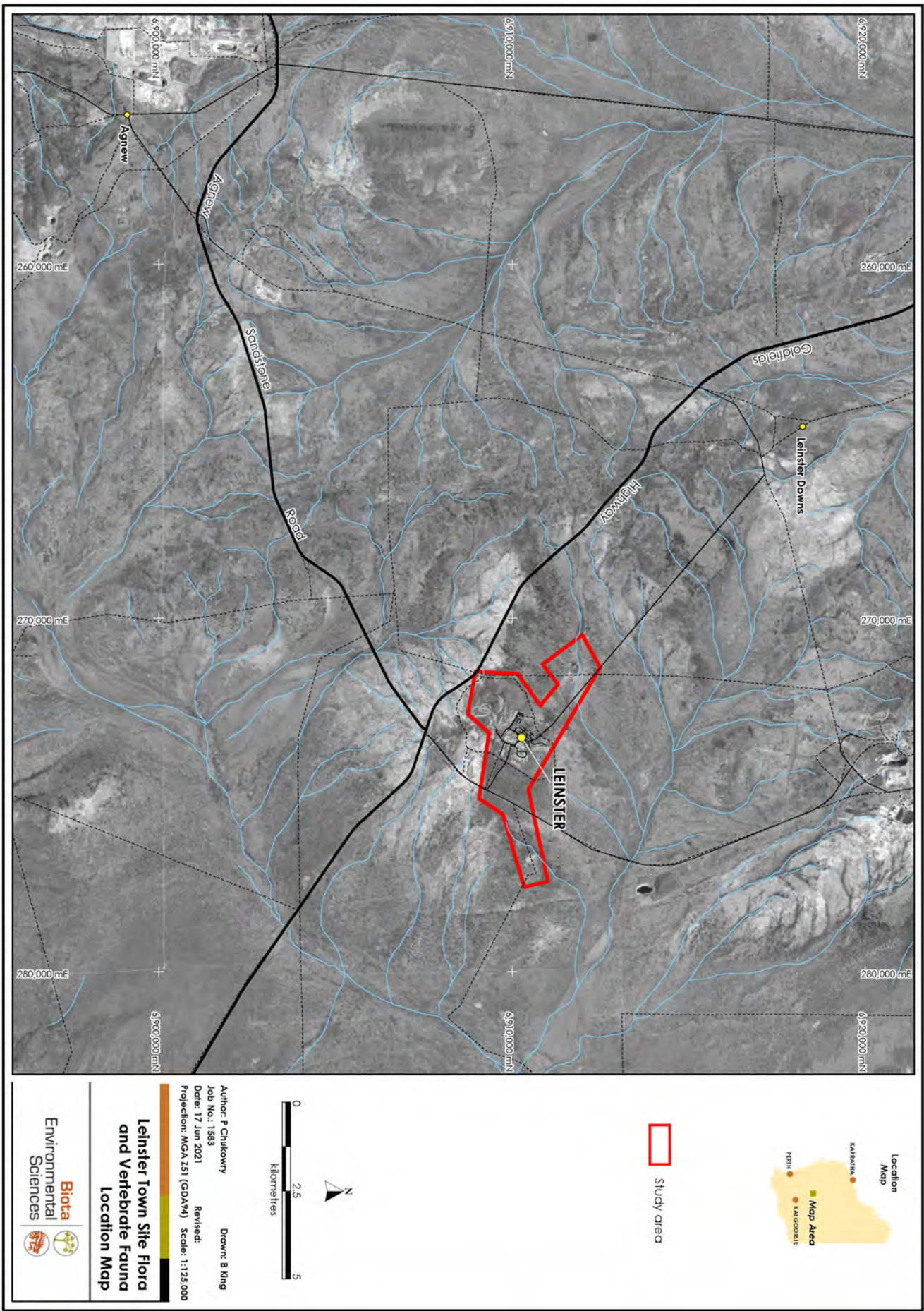


Figure 2.1: Location of the study area.

3.0 Methodology

3.1 Desktop Study

The aim of the desktop study was to compile and review information relevant to the study area, specifically to identify known features of significance (species and/or communities; see Appendix 1), and as a preliminary assessment of potential key issues relating to the flora and vegetation present, and the likely faunal assemblage and habitats. This review considered regional information and previous biological surveys completed in the locality (Section 3.1.1), as well as the results of database searches (Section 3.1.2).

Records from within 30 km of the study area were referred to as being from the "local area", while records from 30 – 100 km were referred to as the "wider area". "Regional" refers to the East Murchison subregion of the Interim Biogeographic Regionalisation of Australia (IBRA).

3.1.1 Literature Review

Published and unpublished reports relevant to the study area were reviewed from the local area and wider area. Several regional-scale reports and data sets were examined, as well as bioregional data, soils (Agriculture Western Australia 1967) and geology (Geological Survey of Western Australia 2011).

3.1.2 Database Searches

The following databases were searched to assist in the determination of flora, vegetation and fauna occurring in the study area:

1. NatureMap¹ is a joint project of the Department of Biodiversity, Conservation and Attractions (DBCA) and the WA Museum (WAM) and represents the most comprehensive source of information on the distribution of WA's fauna and flora. It comprises records from the DBCA Threatened and Priority Flora Database, the WA Herbarium Specimen Database, the DBCA Fauna Survey Returns Database and WA Threatened Fauna Database, the WAM Specimen Database, and BirdLife Australia's Birddata Database. This search was conducted using a 40 km radius around the central point of the study area: 27°54'51.15"S, 120°41'46.82"E.
2. Atlas of Living Australia (ALA)² is a joint project between academic collecting institutions, private individual collectors, and community groups. It contains occurrence records, environmental data and images, and provides the conservation status of species throughout Australia. This database was searched in relation to fauna only using a 30 km radius on the central point 27°54'51.15"S, 120°41'46.82"E.
3. A specific search of the DBCA Threatened and Priority Flora Database was also commissioned to confirm the Threatened and Priority flora species known from the area. This search was conducted using an 80 km radius around the central point 27°54'51.15"S, 120°41'46.82"E.
4. The DBCA database of TECs, PECs and Environmentally Sensitive Areas (ESAs) was searched to identify significant communities. This search was conducted using a 50 km radius around the central point 27°54'51.15"S, 120°41'46.82"E.
5. The Commonwealth EPBC Act Protected Matters Search Tool (PMST) was used to identify flora and fauna species and other matters of national environmental significance (MNES) that may occur. This search was conducted using a 40 km radius around the central point 27°54'51.15"S, 120°41'46.82"E.

¹ <http://naturemap.dbca.wa.gov.au>

² <http://www.ala.org.au>

Results from the NatureMap and the EPBC Act Protected Matters Search Tool are provided in Appendix 2, and results of the TEC, PEC and ESA search are summarised in Section 5.1.1.

3.2 Assessment of Likelihood of Occurrence

For the purposes of this report, the term 'significant' has been applied to plant or animal species, communities and habitats that have been formally assigned a conservation ranking under the *WA Biodiversity Conservation Act 2016* (BC Act), the EPBC Act or the DBCA list of Priority species. These rankings typically recognise rare, unusual, new or poorly sampled species and are detailed in Appendix 1.

In order to determine which significant flora and fauna species had the potential to occur in the study area, consideration was given to:

- the results of the database and literature searches;
- the known habitat preferences against what appeared to be available within the study area; and
- distributions and last known records for the species.

For each conservation significant species see the criteria detailed in Table 3.1 were applied to determine a likelihood of occurrence within the study area. The rankings are provided in Appendix 3 for flora and Table 5.14 for fauna.

Table 3.1: Criteria used to assign the likelihood of occurrence of significant flora and fauna within the study area.

Likelihood	Criteria
Recorded	1. The species was recorded during this study or has been previously recorded in the study area.
Likely to occur	1. There are existing records of the species within 30 km of the study area; and <ul style="list-style-type: none"> • the species is strongly linked to a specific habitat, which is present in the study area; or • the species has more general habitat preferences, and suitable habitat is present.
May occur	1. There are existing records of the species within 30 km of the study area, 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 study area; or • the species has more general habitat preferences, but only some suitable habitat is present. 2. There is suitable habitat in the study area, but the species is recorded infrequently in the wider area (30 – 100 km) or region.
Unlikely to occur	1. The species is linked to a specific habitat, which is absent in the study area; or 2. Suitable habitat is present, however there are no existing records of the species from within 30 km of the study area despite reasonable previous search effort in suitable habitat; or 3. There is some suitable habitat in the study area, however the species is very infrequently recorded in the region.
Would not occur	1. The species is strongly linked to a specific habitat, which is absent from the study area; and/or 2. The species' range is very restricted and would not include the study area.

3.3 Identification of TECs and PECs

TECs are described by DBCA as “biological (flora or fauna) assemblages occurring in a particular habitat, which are under threat of modification or destruction from various processes” (DEC 2010). TECs listed by the Minister for the Environment are protected by law under the *WA Environmental Protection Act 1986* (the EP Act) and the BC Act. Twenty-five of the 69 TECs listed in WA are also

nationally recognised and listed under the Commonwealth EPBC Act. TECs are also considered to be ESAs under section 51B of the EP Act.

PECs include possible TECs that do not meet survey criteria or are not adequately defined. These are added to the DBCA's PEC list under Priorities 1 (highest priority), 2 and 3. Ecological communities that are: 1) adequately known; 2) rare but not threatened, or meet criteria for Near Threatened; or 3) have been recently removed from the Threatened list, are placed in Priority 4. Conservation dependent ecological communities are placed in Priority 5 (see Appendix 1).

3.4 Field Survey

3.4.1 Study Team and Survey Timing

The field survey was conducted from 12 – 15 April 2021 by two botanists, Preeti Chukowry of Biota and Jonathan Warden of Western Botanical, together with zoologist Joshua Keen of Biota. Jonathan was lead botanist for the field survey and has 14 years of experience in the Murchison, having completed field work and reporting on nearby projects including Mt Keith satellite, Cliffs minesite, Yakabindie station, as well as more widely in the Murchison region at Mt Richardson and Windarling. Joshua Keen has six years' experience conducting basic fauna surveys, including nearby surveys at Cliffs Open Pit Project and Mt Keith.

Table 3.2: Summary of personnel involved in the survey.

Name	Position	Qualification	Years of Experience	Survey Role	Licence No. ¹
Jonathan Warden	Senior Botanist	BSc (Env. Biology)	14	Flora and vegetation survey, vegetation mapping	FB62000044
Preeti Chukowry	Senior Botanist	BSc (Env. Sci.)	7	Flora and vegetation survey, reporting	FB62000301
Joshua Keen	Zoologist	BSc (Zool. Bot.)	6	Fauna habitat reconnaissance, reporting	N/A

1. Flora Taking (Biological Assessment) Licence issued by the DBCA.

3.4.2 Weather and Climate

Table 3.3 summarises weather data for the survey period as collected from the nearest Bureau of Meteorology (BoM) station to the study area, Leinster Aero (station number 012314). The weather during the survey was fine and mild with an average overnight temperature of 14.1°C and average daytime maximum of 25.9°C. Showers on days two and three of the trip brought 1.6 mm.

Table 3.3: Survey weather conditions.

	12/04	13/04	14/04	15/04	Mean/Total
Maximum Temperature (°C)	33.7	21.0	23.8	25.0	25.9
Minimum Temperature (°C)	20.1	17.0	10.9	8.2	14.1
Rainfall (mm)	0	1.4	0.2	0	1.6

Longer-term climatological data was available for the BoM's Leinster Aero weather station, although only as far back as 1994. Figure 3.1 illustrates the average monthly minimum and maximum temperatures and rainfall for the year preceding the survey as compared with the long-term averages.

The climate of the study area is typified by arid conditions with hot, dry summers and mild, dry winters. The average maximum temperature for the locality ranges from 37.2°C in January to 18.8°C in July. Most rainfall occurs in the summer months. The year preceding the survey was much drier than usual with an annual total of 132.4 mm compared to the long-term average of 223.5 mm. However, higher than average rain fell in the two months immediately prior to the survey (54.2 mm in February and 40.6 mm in March 2021).

Despite dry conditions in the year preceding the survey, the vegetation was in good condition, and due to the high rainfall events in the two months immediately preceding the survey, conditions were generally good for the collection of most flora. While the survey was conducted in the recommended timeframe of 6 to 8 weeks post-wet season (EPA 2016a), many annual species were germinating or still in a vegetative state. While seasonal conditions were not considered a limitation for the adequacy of the field survey, some annuals were either absent or too immature to identify.

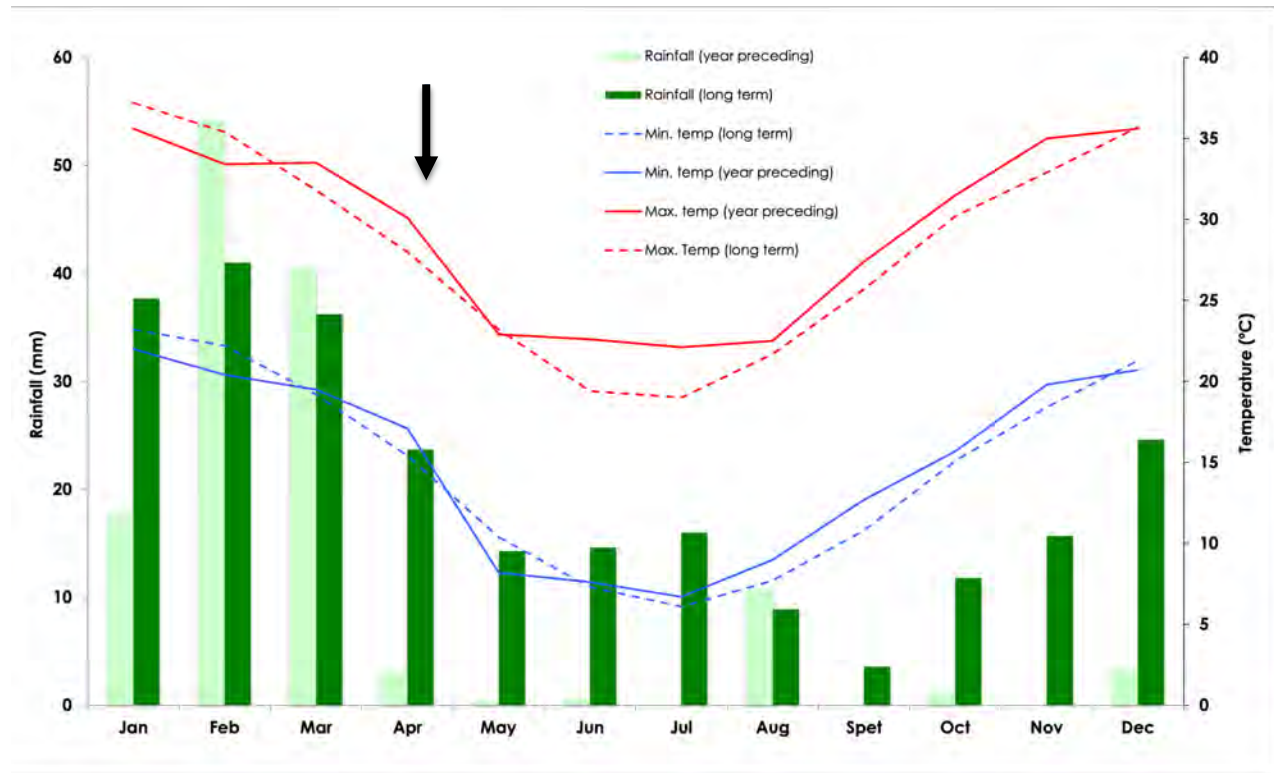


Figure 3.1: Climate graph depicting long-term averages (1994-2021) and year preceding survey. (Arrow indicates survey timing.)

3.4.3 Vegetation Description and Mapping

The vegetation of the study area was described at 15 relevés (unbounded flora recording sites), as well as during foot and vehicle traverses throughout the study area (Figure 3.2). Foot and vehicle traverses were also employed to ground truth vegetation boundaries delineated on A3 maps using high resolution aerial imagery.

Relevé size varied and ranged from 20 x 20 m, with the majority being approximately 40 x 40 m. The following parameters were recorded at each site (Appendix 6):

1. Location coordinates (GDA94, zone 51J) recorded with a handheld Global Positioning System (GPS);
2. digital photographs;
3. landform / habitat description;
4. broad description of soil;
5. fire history (approximate time since last fire, where applicable);
6. vegetation description at the association level (NVIS Level V), based on the height and estimated Percentage Foliar Cover (PFC) of dominant species (Appendix 5);
7. other associated species present; and
8. vegetation condition and other disturbance using the ranking adapted from Keighery (1994) and Trudgen (1988) as presented in EPA (2016a) (Appendix 5).

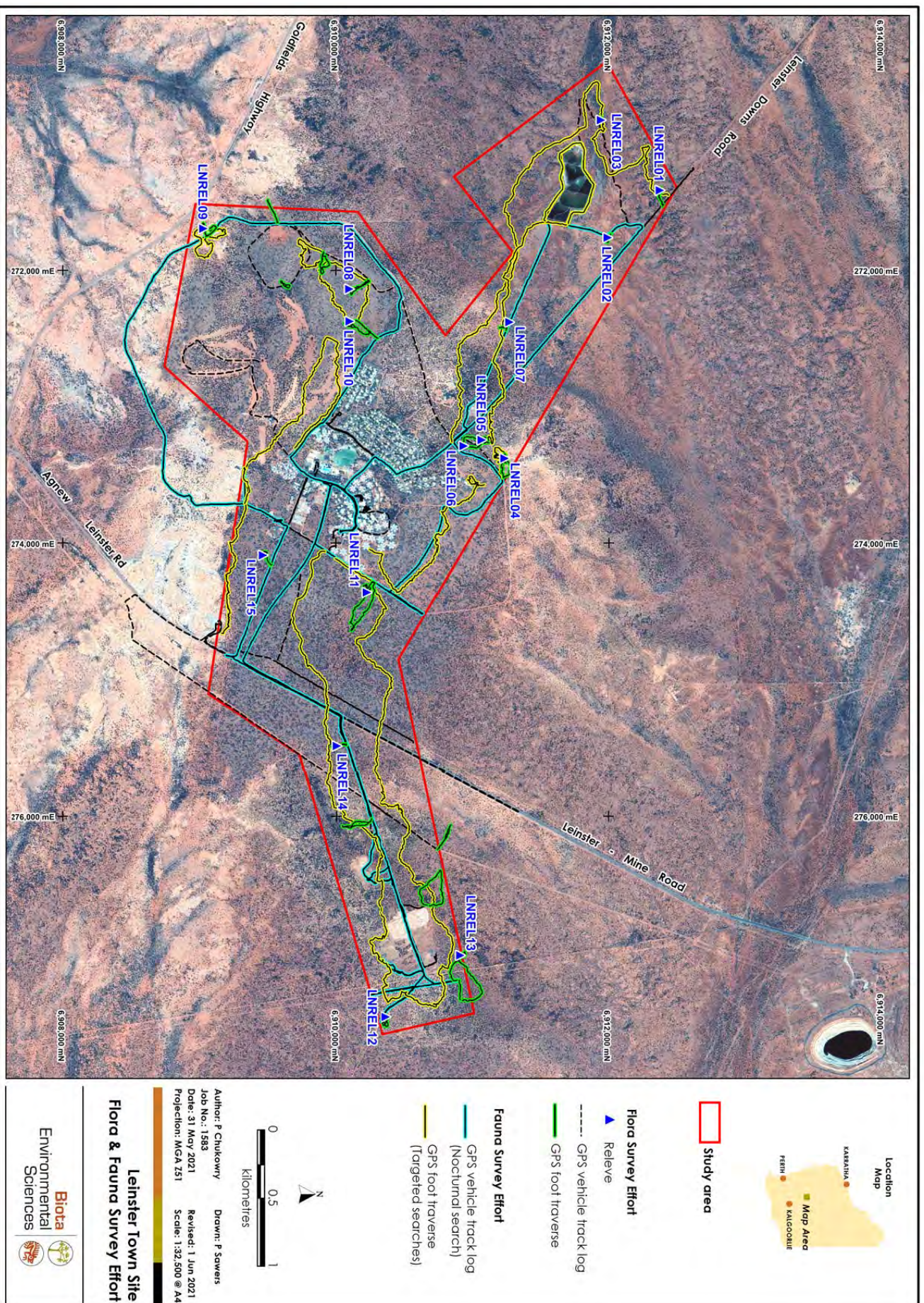


Figure 3.2: Flora and fauna survey effort.

Vegetation maps were created and consolidated using Geographical Information System (GIS) software (QGIS and MapInfo Professional). All maps in this report were produced by Brandon King and Paul Sawers of Biota.

3.4.4 Fauna Habitat Description and Opportunistic Searching

Fauna habitats were assessed on foot wherever possible and habitat descriptions were made wherever a distinct habitat type was observed. Site descriptions were undertaken at 29 locations including where targeted and nocturnal searches were applied. Habitat elements recorded included landscape type, soil type, surface material, landform, any notable microhabitats present, any disturbance (e.g. fire, weeds, grazing, evidence of introduced fauna), broad vegetation characteristics and representative photographs. Site descriptions were then considered in the context of the detailed vegetation mapping descriptions provided in Section 5.2.1.

For those significant species identified as potentially occurring in the study area via the desktop study, an assessment of habitat availability was made in the field. For each species, where habitat was available it was classified as either:

- “core”, equivalent to “habitat critical to the survival of the species” as per Department of the Environment (2013) – this comprised habitat considered to potentially contain roosting, denning or breeding sites, primary foraging areas, or refugia during drought, fire or other stress; or
- “secondary” – habitat which may be used on a transitory, dispersing or occasional basis, but does not represent core habitat.

A total of 28.9 km of daytime foot traverse was completed within the study area, with an additional 330 m conducted in rocky habitats continuous with the study area. Nocturnal searching was conducted on one night of the survey, primarily from the vehicle but also on foot in prospective microhabitat. This totalled 28.8 km within the study area and additional 2.6 km outside the habitat in rocky habitats continuous with the study area. Track-logs of diurnal and nocturnal effort are shown in Figure 3.2.

While conducting foot traverses, fauna observed directly or from secondary evidence (tracks, scats, burrows, diggings etc.) were recorded. In areas of prospective habitat, more intensive search effort was applied. All fauna species were identified in the field at the time of observation by the survey zoologist.

3.5 Flora Specimen Identification, Nomenclature, and Data Entry

Flora species were identified either in the field, or in the office following the field survey. If a species was common and well known to the survey botanists, the identification was confirmed and noted in the field. If the species was difficult to determine without microscopic examination, belonged to a recognised species complex, was poorly collected or otherwise unusual, a voucher specimen was collected. Each voucher specimen was assigned a unique number to facilitate tracking of data. Specimens were pressed in the field, and then dried for further study and confirmation.

Voucher specimens were identified using flora keys, reference to appropriate publications, use of voucher reference collections and comparisons to the collections held at Western Botanical and the WA Herbarium. Botanists Jonathan Warden and Geoff Cockerton of Western Botanical identified and confirmed all of the specimens.

All data were entered into a Microsoft Access Vegetation Database structure held internally at Biota. The database model employed by Biota was developed by Ted Griffin (private consultant) at the request of Malcolm Trudgen (M.E. Trudgen and Associates). Nomenclature and

conservation significance rankings used in this report are in accordance with the current listing of WA flora recognised by the WA Herbarium, as listed on FloraBase³ at the time of reporting.

A non-exhaustive list of vascular flora species recorded from the study area is presented in Appendix 7.

3.6 Limitations of the Study

An assessment of potential limitations of the flora, vegetation and the fauna survey of the Leinster Townsite study area, as detailed in the EPA Guidance Statements (2016a, 2016b, 2020), is provided in Table 3.4. Most limitations in Table 3.4 did not affect the adequacy of this study, given the nature of the surveys as reconnaissance (flora) and basic (fauna). However, the timing of the survey, while meeting the requirements of EPA (2016a), was not optimal for some native annual flora species.

Table 3.4: Assessment of potential limitations to the survey of the study area.

Potential Limitation	Assessment
1. Availability of contextual information at a regional and local scale	<ul style="list-style-type: none"> In the local area (within 30 km), contextual information was limited, however substantial contextual information was available in the wider area (within 100 km). Contextual information was not considered a limitation.
2. Competency/ experience of the team carrying out the survey, including experience in the bioregion surveyed	<ul style="list-style-type: none"> The lead botanist for the reconnaissance survey, Jonathan Warden, has 14 years' experience in the Murchison bioregion. A zoologist with six years' experience undertaking fauna surveys conducted the basic survey. Competency was not considered a limitation.
3. Proportion of flora and fauna recorded and/or collected, any identification issues	<ul style="list-style-type: none"> The species richness for the Leinster Townsite study area was in line with that of previous studies conducted within similar-sized study areas in the region. No issues were encountered with identification of the collected specimens, therefore this factor is not considered to be a limitation.
4. Appropriate area fully surveyed (effort and extent)	<ul style="list-style-type: none"> While the study area was fully surveyed at a reconnaissance or basic level, the entire area was not systematically traversed on foot. As this was not the aim of the survey, survey effort is not considered to be a limitation.
5. Access restrictions within the study area	<ul style="list-style-type: none"> There were no access restrictions in the study area, hence this is not a limitation.
6. Survey timing, rainfall, season of survey	<ul style="list-style-type: none"> Despite high rainfall events resulting in good collecting conditions for most flora species, the timing of the survey meant that many of the annuals were vegetative or only just germinating. Survey timing may have limited the number of annual flora species identified for the study area. Survey time was not considered a limitation to the completion of the basic fauna survey.
7. Disturbance that may have affected the results of survey such as fire, flood or clearing	<ul style="list-style-type: none"> The study area was cleared or heavily disturbed in some parts, which was expected given the location of the study area around an existing townsite. The remnant vegetation (and fauna habitats) around the disturbance areas was largely in Excellent condition, hence disturbance is not considered to be a limitation.

³ <http://florabase.dpaw.wa.gov.au>

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4.0 Existing Environment

4.1 Regional and Local Land Use

IBRA recognises 89 bioregions and 419 subregions (Department of the Environment and Energy 2019) across the country. The study area is located within the East Murchison subregion of the Murchison bioregion, which occupies 211,633.3 km². This bioregion is diverse in both floral and faunal assemblages but is characterised by low levels of endemism; most taxa are widespread through adjacent regions (May and McKenzie 2003). Table 4.1 presents a summary of land use in the East Murchison subregion. The dominant land use in this subregion is grazing, with smaller areas of crown reserves and mining.

Table 4.1: East Murchison land use summary.

Land Use	Area (km ²)	Percentage ¹ of Subregion
Pastoral leases	162,451.2	76.8
Mining lease	11,2269.5	53.0
Other DBCA managed land (including un-gazetted DBCA managed Unallocated Crown Land)	14,385.1	6.8
Formal Conservation Reserve	4,006.3	1.9
Aboriginal Reserve	1,204.2	0.6

¹ Mining and pastoral leases can overlap so percentages add to >100.

Only 1.9% of the subregion is vested within formal conservation reserves (Table 4.1). The single formally gazetted conservation reserve in the locality is the Class A Wanjarri Nature Reserve (53,200 ha), which is located 45 km north of the study area at its closest point. Formerly a pastoral lease, the reserve was purchased and destocked in 1971 and established as a reserve for the purposes of conserving indigenous plant and animal species. At that time, Wanjarri Nature Reserve represented the only reserve within several hundred kilometres.

The poor representation of the Murchison region in reserves made it a high priority area for the Western Australian Government purchase of pastoral stations in 2000. The nearest acquired area is ex Bulga Down station, located 71 km southwest of the study area, but perhaps the most significant is the Matuwa - Kurrara Kurrara Indigenous Protected Area (IPA), located 180 km northeast of the study area, and encompassing 600,000 ha, formed from the ex Lorna Glen and Earaheddy pastoral stations. Since purchase, the IPA has received significant management investment, particularly in relation to the conservation and reintroduction of vertebrate fauna.

The study area is situated amongst numerous operational mine sites, including at Mt Keith, Leinster and Sir Samuel.

4.2 Land Systems

The then Department of Agriculture Western Australia prepared land system mapping for the north-eastern Goldfields region (Pringle et al. 1994). This mapping used broad units, each consisting of a series of "land units" that occur on characteristic physiographic types within the land system. The study area directly intersects four of the 59 land systems occurring in the north-eastern Goldfields (Table 4.2, Figure 4.1) but is dominated by two; Bullimore and Tiger land systems, together comprising 97% of the study area. The study area almost wholly comprises plains; sand plains dominating the centre of the study area (Bullimore) and gravelly hardpan plains occur over much of the eastern and western extent (Tiger and Monk). Gransal is the only exception as it occurs in association with rocky outcropping at the southern boundary of the study area, however, the main body of this breakaway occurs outside the study area.

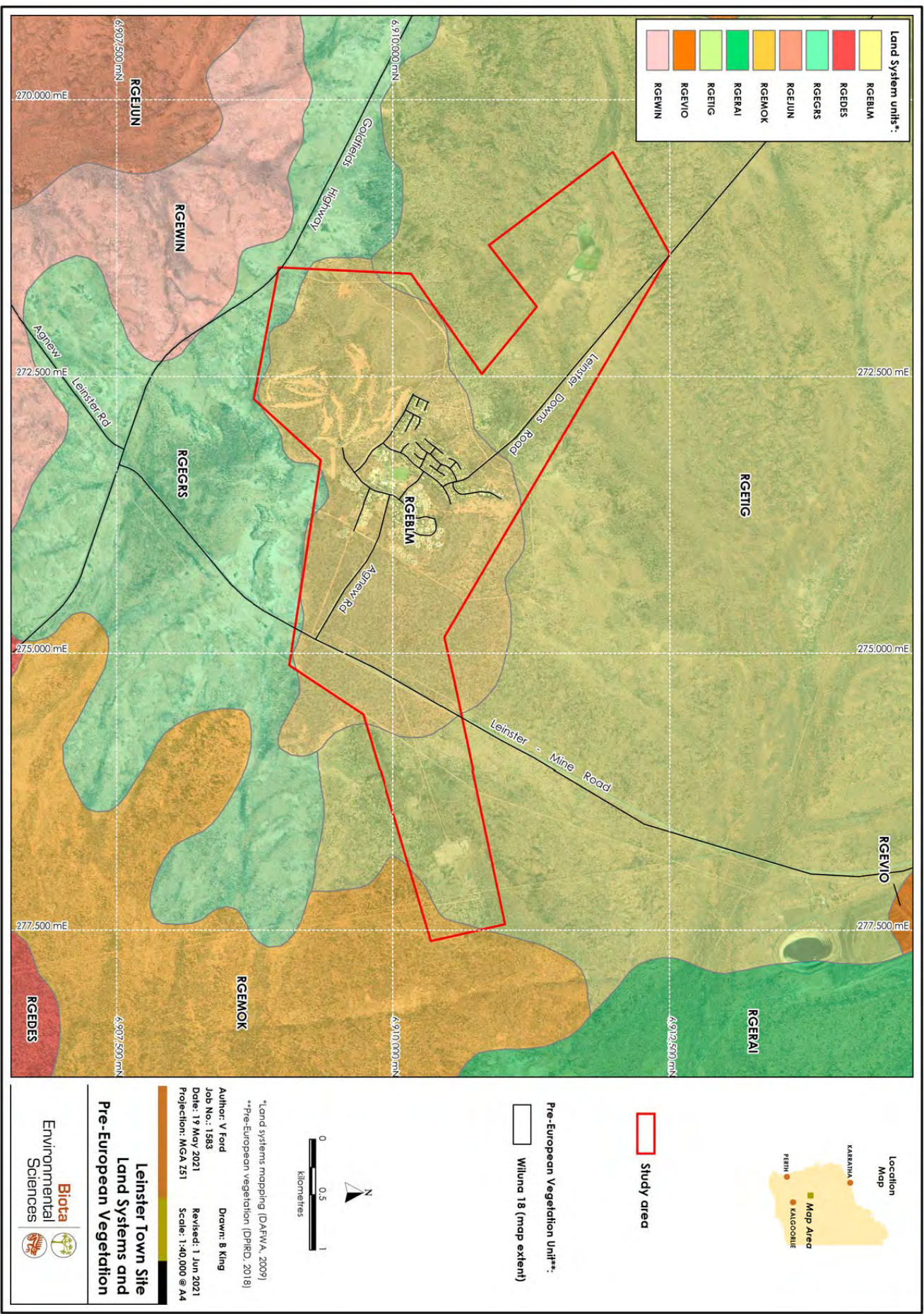


Figure 4.1: Land systems of the study area.

While this mapping is broad, it does offer some opportunity to place the study area within the context of the mapped north-eastern Goldfields and determine if any of the land systems contained in the study area are unusual or rare at this scale. The Bullimore and Monk land systems represent the two most common land systems in the north-eastern Goldfields, Gransal is 11th most common. The proportion of these three land systems represented within the study area is less than 0.03% each. The Tiger land system of hardpan plains is not particularly rare but is proportionally more highly represented in the study area at 0.38% of its occurrence in the north-eastern Goldfields.

Table 4.2: Land systems of the study area.

Land System	Description	Area (ha)	Percentage
Bullimore	Extensive sand plains supporting spinifex hummock grasslands.	619.29	57.7
Tiger	Gravelly hardpan plains and sandy banks with mulga shrublands and wanderie grasses.	421.66	39.3
Gransal	Stony plains and low rises based on granite supporting mainly halophytic shrublands.	20.97	2.0
Monk	Hardpan plains with occasional sandy banks supporting mulga tall shrublands and wanderie grasses.	10.7	1.0
Total		1,072.62	

4.3 Regional Vegetation

Pre-European vegetation of Western Australia has been mapped over the region by Beard et al. (2013). At this broad scale, the study area and surrounds fall within a single vegetation unit; Wiluna 18 Low Mulga Woodlands. The total area of this vegetation unit in Western Australia is 4,313,796 ha so the study area at 1,072.61 ha represents 0.02%. However, it is important to note that Beard's broad scale of mapping, does not equate to vegetation types and, as such, cannot be used to assess potential project impacts.

4.4 Geology and Soils

Seven geological units were mapped over the study area (Figure 4.2) and their descriptions are detailed in Table 4.3. Sandplain deposits dominate the central portion of the study area (Czs/Czl, Czs). Sheetwash and alluvium deposits of higher clay and silt content are included at the eastern and western extents of the study area (Cza, Qa). The remaining three geological units have very small occurrences at the southern boundary of the study area associated with the granitic outcrop found there (Czg, Ag, Czl/Ag).

Table 4.3: Geological units of the study area.

Unit code	Definition	Area (ha)
Czs/Czl	Sandplain deposits - unconsolidated sand and minor silt and clay; includes low vegetated dunes	585.66
Czs	Sandplain deposits - unconsolidated sand and minor silt and clay; includes low vegetated dunes	176.34
Cza	Sheetwash deposits - clay; silt; and sand as extensive fans; commonly ferruginous	220.5
Qa	Alluvium - clay; silt; sand; and gravel in channels and floodplains	68.82
Czg	Sand over granitoid rock - quartzo-feldspathic sand; includes areas of low weathered outcrop	12.42
Ag	Granitoid rock; undivided; mainly monzogranite	5.18
Czl/Ag	Lateritic deposits - lateritic duricrust; massive and rubbly; iron-rich over mafic rock	3.7

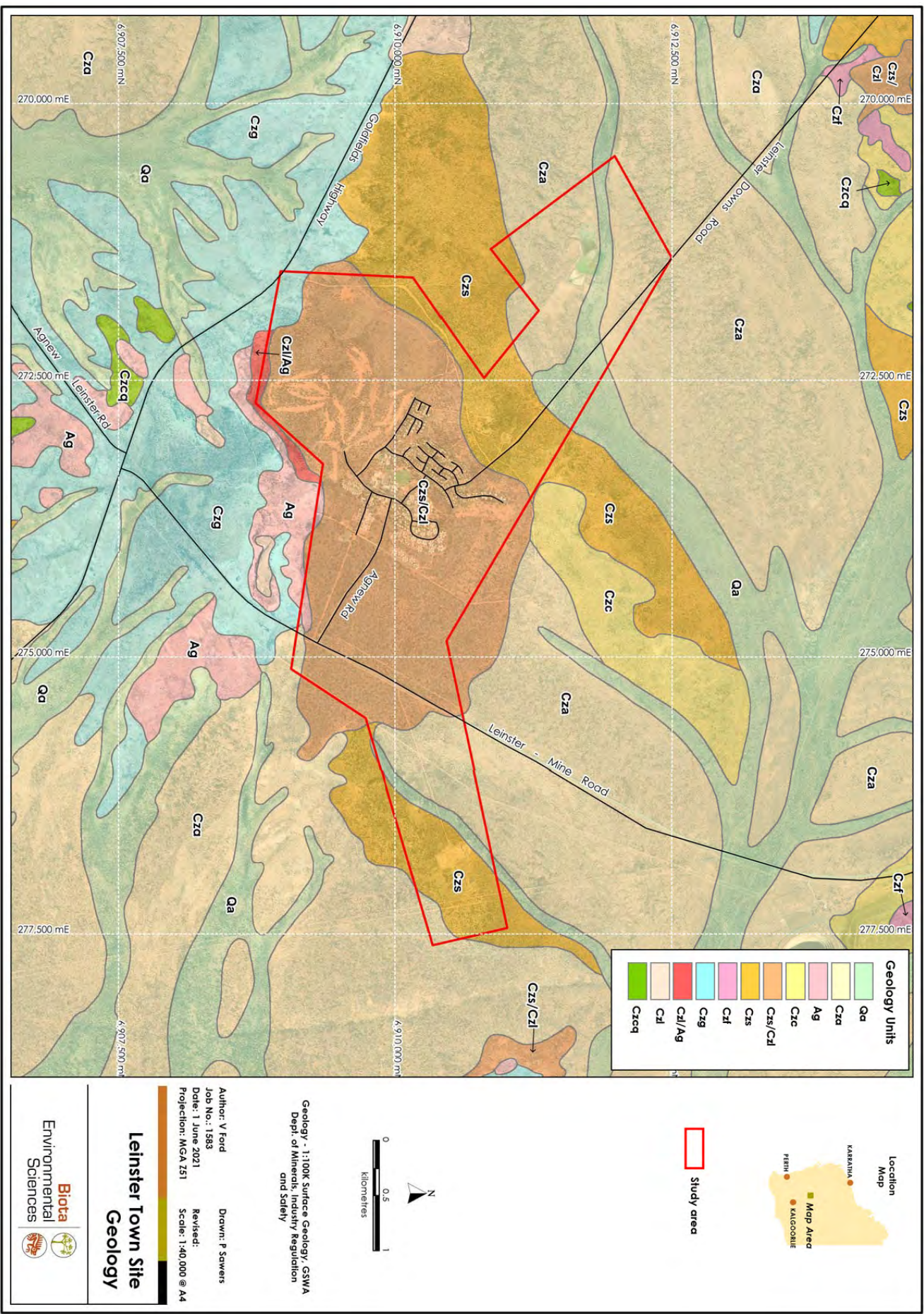


Figure 4.2: Surface geology of the study area.

5.0 Results

5.1 Desktop Study

5.1.1 Significant Communities

The DBCA TECs and PECs database search identified five State-listed Priority 1 PECs in the vicinity, none of which are intersected by the study area (Table 5.2). No other significant communities were identified in the local area.

None of the PECs would be expected to occur in the study area. Four of the PECs are significant because they comprise unique assemblages of invertebrate fauna living in groundwater calcretes. Such habitat is absent from the study area. The closest occurrence of the 'Violet Range (Perseverance Greenstone Belt) vegetation assemblages (banded ironstone formation)' PEC is 29 km north-northwest of the study area (based on the DBCA management buffer applied to the occurrence). The study area and wider area has seen adequate biological survey effort in the last 20 years (see Table 5.1) and the vegetation assemblages described and mapped have not been found to represent this PEC, hence it is not expected to occur in the study area.

5.1.2 Flora

Five previous biological studies undertaken in the local and wider area were reviewed as part of the desktop study for flora and vegetation (Table 5.1). These were selected based on proximity to the study area, relevance to the current study and the availability of data.

The NatureMap search yielded a total of 379 native flora species known to occur within a 40 km radius of the study area. Twelve of these are listed as Priority species, comprising:

- two Priority 1 species:
 - *Korthalsella leucothrix*, and
 - *Micromyrtus chrysodema*;
- seven Priority 3 species:
 - *Acacia* sp. Marshall Pool (G. Cockerton 3024),
 - *Baeckea* sp. Sandstone (C.A. Gardner s.n. 26 Oct. 1963),
 - *Goodenia modesta*,
 - *Phyllanthus baeckeoides*,
 - *Thryptomene nealensis*,
 - *Thryptomene* sp. Leinster (B.J. Lepschi & L.A. Craven 4362), and
 - *Verticordia jamiesonii*; and
- three Priority 4 species:
 - *Eremophila pungens*,
 - *Grevillea inconspicua*, and
 - *Hemigenia exilis*.

No significant species were returned in the EPBC Protected Matters search, however **Carrichtera annua* and **Cenchrus ciliaris* were listed as invasive (weed) species.

Table 5.1: Previous studies reviewed for the flora and vegetation desktop assessment of the study area.

Project Details	Location Relative to Study Area	Methods and Effort	Significant Species
Targeted Flora and Vegetation Assessment of Koonoonooka Sand Quarry (Western Botanical 2020) – Targeted survey	15 km NE.	9-12 August 2019 Foot traverses, relevé sampling, vegetation mapping, Priority flora searches and counts.	<ul style="list-style-type: none"> • <i>Bossiaea eremaea</i> (P3) • <i>Euryomyrtus inflata</i> (P3) <p><u>Species of Interest</u></p> <ul style="list-style-type: none"> • <i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777) • <i>Eucalyptus kingsmillii</i> x <i>oldfieldii</i>
Flora and Fauna Survey: Agnew Gold Mine Camp, Power Plant, Airport, Wind Farm and Pipeline (Stantec 2018) – Reconnaissance and Detailed surveys of six survey areas	26 km SW.	8-14 of May 2018 <u>Pipeline area 1:</u> 19 quadrats, 4 mapping notes. <u>Other survey areas:</u> 16 relevés, 6 mapping notes in total.	<ul style="list-style-type: none"> • <i>Eremophila pungens</i> (P4) • <i>Grevillea inconspicua</i> (P4)
Flora and Vegetation Assessment of the Mt Keith Satellite Operations Proposal Study Area (Western Botanical 2017) – Detailed survey	60 km N.	6 survey events in: November – December 2016 and August – October 2017 Revisiting 89 previously established quadrats, rescoreing a subset (64 quadrats); 50 new quadrats and 58 relevés established.	<ul style="list-style-type: none"> • <i>Anacampseros</i> sp. Eremaean (F. Hort, J. Hort & J. Shanks 3248) (P1) • <i>Hibbertia</i> sp. Sherwood Breakaways (R.J. Cranfield 6771) (P2) • <i>Aristida</i> ? <i>jerichoensis</i> var. <i>subspinulifera</i> (P3) • <i>Hibiscus krichauffianus</i> (P3) • <i>Hybanthus floribundus</i> subsp. <i>chloroxanthus</i> (P3) • <i>Sida picklesiana</i> (P3) • <i>Thryptomene</i> sp. Leinster (B.J. Lepski & L.A. Craven 4362) (P3) • <i>Tribulus adelcanthus</i> (P3) • <i>Verticordia jamiesonii</i> (P3) • <i>Eremophila pungens</i> (P4) • <i>Grevillea inconspicua</i> (P4) • <i>Hemigenia exilis</i> (P4)

Project Details	Location Relative to Study Area	Methods and Effort	Significant Species
Yeelirie Project Flora and Vegetation Survey Baseline Report (Western Botanical 2011) – Targeted and Detailed surveys, vegetation mapping of 3 separate survey areas, regional surveys of surrounding area	110 km NW	December 2008 – December 2010 <u>Survey area 1:</u> mapping of vegetation communities, mapping distribution and abundance of significant species, assessment of 182 quadrats and 180 relevés. <u>Survey area 2:</u> mapping of vegetation communities, searches for significant species. <u>Survey area 3:</u> flora sampling, mapping of vegetation communities, mapping of the distribution and abundance of significant species. <u>Regional areas:</u> establishing and assessing quadrats in vegetation communities of interest, recording significant flora.	<ul style="list-style-type: none"> • <i>Atriplex yeelirie</i> (T1) • <i>Neurachne lanigera</i> (P1) • <i>Baeckea</i> sp. Sandstone (C.A. Gardner s.n. 26 Oct. 1963) (P3) • <i>Bossiaea eremaea</i> (P3) • <i>Eremophila arachnoides</i> subsp. <i>arachnoides</i> (P3) • <i>Euryomyrtus inflata</i> (P3) • <i>Scaevola</i> sp. Woolgorong (M. Officer s.n. 10/8/94) (P3) • <i>Thryptomene</i> sp. Leinster (B.J. Lepski & L.A. Craven 4362) (P3) • <i>Comesperma viscidulum</i> (P4) • <i>Olearia arida</i> (P4) <p>Species of interest</p> <ul style="list-style-type: none"> • <i>Prostanthera</i> sp. Bullmore Sandplain (G. Cockerton & G. O'Keefe WB32777)
Habitat Mapping Project Leinster Townsite and Borefields (Cockerton and Stratford 1997) – Vegetation mapping	Intersects current study area	13 days in April 1997 Foot traverses, vegetation mapping, Priority flora searches.	<ul style="list-style-type: none"> • <i>Hemigenia exilis</i> (P4)

Table 5.2: Significant ecological communities in the vicinity of the study area.

Community ID	Community Name	State Listing	Commonwealth Listing	Threats	Distance of Buffer from Study Area
Lake Miranda West Calcrete	Lake Miranda west calcrete groundwater assemblage types on Carey palaeodrainage on Yakabindie Station	Priority 1	–	Hydrological changes associated with mining	19 km NW.
Lake Miranda East Calcrete	Lake Miranda east calcrete groundwater assemblage types on Carey palaeodrainage on Yakabindie Station	Priority 1	–	Hydrological changes associated with mining	22 km N.
Violet Range (Perseverance Greenstone) BIF	Violet Range (Perseverance Greenstone Belt) vegetation assemblages (banded ironstone formation)	Priority 1	–	Clearing for mining	29 km NNW.
Yakabindie Calcrete	Yakabindie calcrete groundwater assemblage type on Carey palaeodrainage on Yakabindie Station	Priority 1	–	Hydrological changes associated with mining	30 km NW.
Yandal Calcrete	Yandal calcrete groundwater assemblage type on Carey palaeodrainage on Yandal Station	Priority 1	–	Hydrological changes associated with mining	23 km NE.

From the DBCA database searches and reviewing previous reports, two Threatened and 39 Priority flora species were identified as occurring in the local and wider area (Appendix 2). A preliminary assessment of the likelihood of these significant species occurring within the study area was made prior to the field assessment, based on the proximity and currency of the records, as well as the potential habitats found in the study area as drawn from regional vegetation mapping and aerial imagery (Appendix 3). Based on this, a sub-set of four Priority species was considered to have some potential to occur in the study area (Table 5.3).

Table 5.3: Priority flora species that have the potential to occur in the study area.

Species	Conservation Status	Likelihood of Occurrence
<i>Korthalsella leucothrix</i>	Priority 1	May Occur
<i>Eremophila pungens</i>	Priority 4	May Occur
<i>Grevillea inconspicua</i>	Priority 4	May Occur
<i>Hemigenia exilis</i>	Priority 4	May Occur

5.1.3 Fauna

The desktop study identified 164 vertebrate species as having been recorded from the local area (within 30 km of the study area). The assemblage comprises six native mammals (as well as nine introduced), 112 birds, 32 reptiles and five amphibians. The combined species list is provided in Appendix 4. The literature search indicated that few detailed surveys had been undertaken in the local area, and as such the assemblage returned from the desktop study is likely to largely comprise commonly recorded species. It is also important to note that a 30 km radius of the study area is likely to include habitat types that do not occur in the study area and the search results would therefore likely include habitat specialists that would not occur in the study area.

There have been numerous surveys in the wider area including at Mt Keith, Wanjarri, Cosmos, Bellevue and Yakabindie (all 30 - 55 km from the study area). In addition, although more distant at 100 km west of the study area, the survey work of Cowan et al. (2017) represents some of the most intensive survey effort conducted in the East Murchison bioregion. This two-year intensive study, across five survey phases, was conducted at the ex-Lake Mason and ex-Black Range stations and aimed to address the lack of biodiversity surveys in the Murchison bioregion (Cowan 2003). These additional studies were reviewed to better characterise the occurrence of significant fauna in the bioregion and their potential to occur in the study area. Table 5.4 summarises studies in the local and wider area that were reviewed during the fauna desktop study.

The only significant species returned from the database searches of the local area was the Australian [Gull-billed] Tern, *Gelochelidon [nilotica] macrotarsa* (BC Act Migratory, EPBC Act Migratory/Marine) from the ALA database. The review of literature during the desktop study, however, indicated that the Rufous [Sandhill] Grasswren, *Amytornis whitei oweni* (listed as *A. striatus striatus*) (DBCA Priority 4) (Biologic 2020) and the Brush-tailed Mulgara, *Dasycercus blythi* (DBCA Priority 4) (Halpern Glick Maunsell 2000) have both been recorded locally.

Six species listed as Migratory were returned from the EPBC Act PMST but were not supported by any local records. The intent of the PMST database is to provide an indication of those MNES species that may occur in or near the area of interest, and as such it does not always provide certainty that a species occurs. In this case, none of these six species have been recorded near the study area (i.e. within 30 km) and two of the species would only be considered vagrants to the locality (the Grey Wagtail and Eastern Yellow Wagtail). Similarly, the Grey Falcon, *Falco hypoleucos* (EPBC Act Vulnerable), Malleefowl, *Leipoa ocellata* (EPBC Act Vulnerable), Night Parrot, *Pezoporus occidentalis* (EPBC Act Critically Endangered) and Princess Parrot, *Polytelis alexandrae* (EPBC Act Vulnerable) were returned from the PMST database, however no records of the species were returned from database searches for the local area although there are records of all of species from the wider area or bioregion.

The review of literature from the wider area (30 - 100 km) included two significant species not returned from other sources; Black-footed Rock-Wallaby, *Petrogale lateralis lateralis* (EPBC Act and BC Act Endangered) and the Long-tailed Dunnart, *Sminthopsis longicaudata* (DBCA Priority 4).

Further detail on the likelihood of occurrence of significant fauna species within the study area based on the results of the field reconnaissance survey is provided in Section 5.2.5.

Table 5.4: Previous fauna studies in the local and wider area.

Project Details	Location Relative to Study Area	Survey Type	Methods and Effort	Significant Records
Solar Project Northern Operations Level 1 Terrestrial Vertebrate and SRE Invertebrate Fauna Assessment (Biologic 2020)	12 km NE.	Detailed vertebrate survey and targeted SRE invertebrate survey.	17 motion camera sites, 7 automated recording unit sites, 12 SRE sampling sites, foot traverses, bird censuses.	Rufous [Sandhill] Grasswren (P4)
Flora and Fauna Survey: Agnew Gold Mine Camp, Power Plant, Airport, Wind Farm and Pipeline (Stantec 2018)	23 km SW.	Basic survey: desktop review and site habitat reconnaissance and opportunistic records.	Foot traverses.	-
Camelot Study Area Night Parrot Survey (Biota 2017a)	27 km N.	Targeted Night Parrot survey.	Seven automated recording sites (66 nights of recording), four active listening sites (4.5 hours of effort).	-
Cosmos Nickel Mine Extension Fauna Survey (Biota 2004)	35 km N.	Detailed vertebrate fauna survey.	Five trapping grid sites, nocturnal searching, bird censuses.	-
Lease Wide Mulgara <i>Dasyercus cristicauda</i> survey (Halpern Glick Maunsell 2000)	NiW northern operations tenements and surrounds.	Targeted Mulgara survey.	78 sites across all tenements and pastoral leases; foot traverses, recording of secondary evidence.	Brush-tailed Mulgara (P4)
Bellevue Gold Limited Level 2 Fauna Assessment (Everhard and Bamford 2019)	35 km N.	Detailed inventory and targeted terrestrial fauna survey.	9 trapping grids, automated recording units, foot traverses for Malleefowl, bird censuses.	-
Yakabindie Fauna Assessment (ATA 2005)	45 km NW.	Detailed single phase vertebrate fauna survey. Targeted SRE invertebrate survey.	10 trapping grid sites, bird censuses.	-
Fauna Habitats and Fauna Assemblage Survey of the Albion Downs Borefields Pipeline Area (Biota 2010)	50 – 100 km NW.	Detailed two phases vertebrate fauna survey. Targeted SRE invertebrate survey.	14 trapping grid sites, 2 funnel trapping sites, 2 harp net sites.	Brush-tailed Mulgara (P4) Long-tailed Dunnart (P4)
Part 10 (Sandstone–Sir Samuel and Laverton–Leonora study areas) of the biological survey of the Eastern Goldfields of Western Australia (Hall et al. 1994)	50 km N.	Detailed fauna survey; three phases over two years.	Six trapping sites within the Wanjarri survey area.	Rufous [Sandhill] Grasswren (P4)
Wanjarri Land Swap Proposal (Biota 2006)	55 km N.	Detailed fauna survey; two phases. Targeted SRE invertebrate survey.	7 trapping grid sites, 1 Elliott site, 1 harp net site, bird censuses.	Brush-tailed Mulgara (P4)
Mt Keith Satellite Targeted Black-footed Rock-wallaby Survey (Biota 2017b)	70 km N.	Targeted Black-footed Rock-wallaby.	Walking and driving transects in suitable habitat, 8 camera traps.	Black-footed Rock-wallaby (old scats) (EN)

Project Details	Location Relative to Study Area	Survey Type	Methods and Effort	Significant Records
Biodiversity in the southern rangelands: variation in biota over time and space on the Black Range and Lake Mason stations, Murchison Bioregion, Western Australia (Cowan et al. 2017)	100 km W.	Detailed fauna survey; five phases over two years.	24 trapping grids, visual bird censuses.	Brush-tailed Mulgara (P4) Long-tailed Dunnart (P4) Peregrine Falcon (OS) Malleefowl (VU)

5.2 Survey Results

5.2.1 Vegetation

Eight vegetation units were described and mapped for the study area, with their condition also recorded (Table 5.5, Figure 5.1). For the purpose of consistency with existing vegetation mapping in the area, these units were described according to Western Botanical's (1997, 2011, 2020) adaptation of the Pringle et. al. (1994) and Payne et. al. (1998) descriptions of the vegetation of the northeastern Goldfields and Sandstone-Yalgoo-Paynes Find areas. Vegetation unit descriptions are also provided to NVIS association level (level V).

Table 5.5: Vegetation units occurring in the study area.

Vegetation Unit Code	Vegetation Type	Vegetation Association (NVIS Level V)	Vegetation Condition	Extent (ha) / Proportion
HPMS	Hardpan Mulga shrubland	<i>Eucalyptus leptopoda</i> subsp. <i>elevata</i> scattered low trees over <i>Acacia incurvaneura</i> , <i>A. aneura</i> , <i>A. mulganeura</i> tall shrubland over <i>Emmophila latrobei</i> subsp. <i>latrobei</i> , <i>E. forrestii</i> subsp. <i>forrestii</i> , <i>E. foliosissima</i> open shrubland over <i>Triodia basedowii</i> scattered hummock grasses.	Very Good	303.7 (28%)
SAMA	Sandplain Mulga - Mallee shrubland over <i>Spinifex hummock</i> grassland	<i>Eucalyptus lucasii</i> , <i>E. horistes</i> low woodland over <i>Acacia aneura</i> , <i>A. aptaneura</i> , <i>A. craspedocarpa</i> tall shrubland over <i>Emmophila forrestii</i> subsp. <i>forrestii</i> , <i>E. latrobei</i> subsp. <i>latrobei</i> open shrubland over <i>Triodia basedowii</i> open hummock grassland.	Excellent	117.0 (11%)
WABS	Broad drainage Wanderlie <i>Acacia</i> banks	<i>Acacia incurvaneura</i> , <i>A. mulganeura</i> , <i>A. ramulosa</i> var. <i>linophylla</i> tall shrubland over <i>Emmophila foliosissima</i> , <i>E. forrestii</i> subsp. <i>forrestii</i> , <i>Solanum lasiophyllum</i> low open shrubland over <i>Eragrostis eriopoda</i> , <i>Eriachne helmsii</i> , <i>Thyridolepis mitchelliana</i> very open hummock grassland.	Excellent	97.3 (9%)
SAWS	Sand plain <i>Spinifex hummock</i> grassland with <i>Wattles</i>	<i>Eucalyptus oldfieldii</i> , <i>E. kingmillii</i> low open woodland over <i>Acacia effusifolia</i> , <i>A. longispinea</i> tall shrubland over <i>Triodia basedowii</i> open hummock grassland.	Excellent	95.9 (9%)
SAGS	Sandplain <i>Eucalyptus gongylocarpa</i> woodland over <i>Spinifex hummock</i> grassland	<i>Eucalyptus gongylocarpa</i> , <i>E. oldfieldii</i> low woodland over <i>Acacia effusifolia</i> , <i>A. jamesiana</i> tall open shrubland over <i>Emmophila forrestii</i> subsp. <i>forrestii</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Scaevola spinescens</i> (spiny, narrow leaf variant) open shrubland over <i>Triodia basedowii</i> and <i>Eriachne helmsii</i> open hummock and tussock grassland.	Excellent	95.3 (9%)
SAES	Stony <i>Acacia Emmophila</i> shrubland	<i>Acacia aneura</i> , <i>Emmophila ramiflora</i> , <i>Acacia aptaneura</i> tall open shrubland over <i>Acacia tetragonophylla</i> <i>Emmophila latrobei</i> subsp. <i>latrobei</i> scattered shrubs, over <i>Ptilotus obovatus</i> , <i>Solanum lasiophyllum</i> scattered low shrubs over <i>Eriachne mucronata</i> , <i>Eragrostis eriopoda</i> , <i>Thyridolepis mitchelliana</i> scattered tussock grasses.	Excellent	61.3 (6%)
DRMS	Drainage line Mulga shrubland	<i>Acacia aneura</i> , <i>A. aptaneura</i> tall shrubland over <i>Eriachne pulchella</i> subsp. <i>pulchella</i> , <i>Thyridolepis mitchelliana</i> open tussock grassland and <i>Ptilotus gaudichaudii</i> very open herbland.	Very Good	83.6 (8%)
SMS	Granite outcrop stony Mulga shrubland	<i>Acacia quadrimarginea</i> , <i>A. aneura</i> , <i>A. incurvaneura</i> tall open shrubland over <i>Acacia aneura</i> , <i>Emmophila latrobei</i> subsp. <i>latrobei</i> , <i>Scaevola spinescens</i> spiny, narrow leaf variant) open shrubland over <i>Aristida contorta</i> , <i>Eriachne pulchella</i> subsp. <i>pulchella</i> , <i>McDairea triptera</i> scattered tussock grasses and scattered herbs.	Very Good	31.3 (3%)

In addition, some areas were mapped as Disturbed or Cleared (Table 5.6), but these were not considered as vegetation units.

Table 5.6: Additional codes used for vegetation mapping.

Code	Name	Description	Condition	Extent (ha) / Proportion
CL	Cleared	Cleared	N/A	176.7 (16%)
DIST	Disturbed	Disturbed ground – regenerating or almost cleared of native vegetation	Poor to Degraded	10.6 (1%)

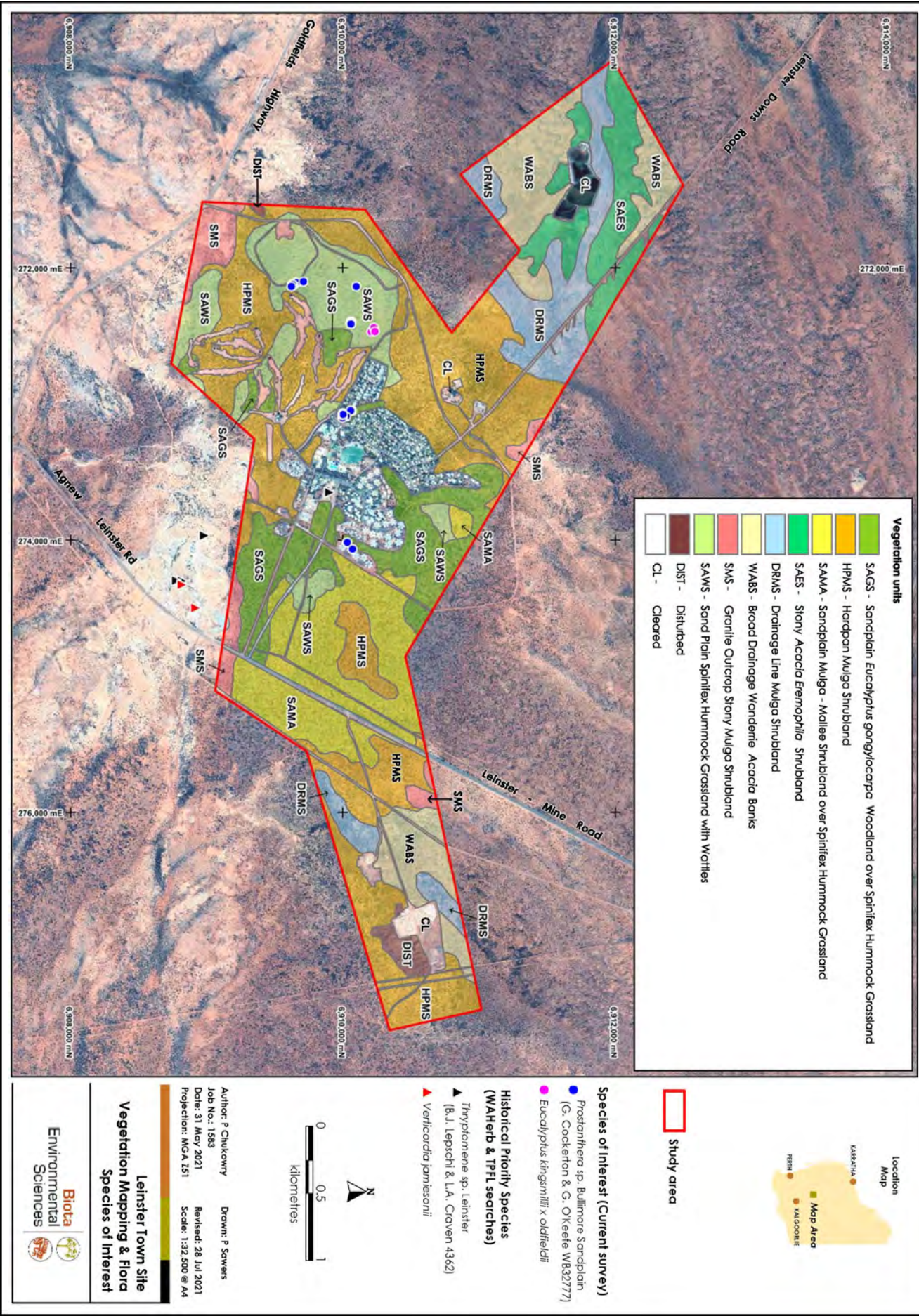


Figure 5.1: Vegetation mapping and locations of flora species of interest.

5.2.1.1 Vegetation Units

Each of the eight vegetation units mapped for the study area is described in more detail below.

SAGS – Sandplain *Eucalyptus gongylocarpa* Woodland over *Spinifex* Hummock Grassland

Eucalyptus gongylocarpa, *E. oldfieldii* low woodland over *Acacia effusifolia*, *A. jamesiana* tall open shrubland over *Eremophila forrestii* subsp. *forrestii*, *Senna artemisioides* subsp. *filifolia*, *Scaevola spinescens* (spiny, narrow leaf variant) open shrubland over *Triodia basedowii* and *Eriachne helmsii* open hummock and tussock grassland. The SAGS vegetation unit occurred over 95.3 ha (9% of the study area) on deep red brown sand on top of a sandy ridge, in minor occurrences around the golf course, and in the central part of the study area. Relevés LNREL10 (Plate 5.1) and LNREL15 (Plate 5.2) were in the SAGS vegetation unit, which was generally in Excellent condition.



Plate 5.1: SAGS vegetation at LNREL10.



Plate 5.2: SAGS vegetation at LNREL15.

SAMA – Sandplain Mulga-Mallee Shrubland over *Spinifex* Hummock Grassland

Eucalyptus lucasii, *E. horistes* low woodland over *Acacia aneura*, *A. aptaneura*, *A. craspedocarpa* tall shrubland over *Eremophila forrestii* subsp. *forrestii*, *E. latrobei* subsp. *latrobei* open shrubland over *Triodia basedowii* open hummock grassland. Relevés LNREL11 (Plate 5.3) and LNREL14 (Plate 5.4) were in this unit, which occurred east of the town site. This vegetation comprised 117.0 ha (11% of the study area) and was in Excellent condition.



Plate 5.3: SAMA vegetation at LNREL11.



Plate 5.4: SAMA vegetation at LNREL14.

SAES – Stony *Acacia* *Eremophila* Shrubland

Acacia aneura, *Eremophila ramiflora*, *Acacia aptaneura* tall open shrubland over *Acacia tetragonophylla* *Eremophila latrobei* subsp. *latrobei* scattered shrubs, over *Ptilotus obovatus*, *Solanum lasiophyllum* scattered low shrubs over *Eriachne mucronata*, *Eragrostis eriodpoda*, *Thyridolepis mitchelliana* scattered tussock grasses. This vegetation unit was encountered on

gently inclined or flat plains in shallow gritty sand with abundant subangular quartz stones in the northwest of the study area. It was in Excellent condition and occurred over 61.3 ha (6% of the study area). Relevé LNREL02 was in the SAES vegetation unit (Plate 5.5).



Plate 5.5: SAES vegetation at LNREL02.

WABS – Broad Drainage Wanderrie Acacia Banks

Acacia incurvaneura, *A. mulganeura*, *A. ramulosa* var. *linophylla* tall shrubland over *Eremophila foliosissima*, *E. forrestii* subsp. *forrestii*, *Solanum lasiophyllum* low open shrubland over *Eragrostis eriopoda*, *Eriachne helmsii*, *Thyridolepis mitchelliana* very open hummock grassland. This vegetation occurred on red-brown loam associated with the drainage interbanks, over 97.3 ha (9% of the study area) in the western and eastern parts of the study area. Relevé LNREL01 was in the WABS vegetation unit (Plate 5.6) which was in Excellent condition.



Plate 5.6: WABS vegetation at LNREL01.

SAWS – Sand Plain Spinifex Hummock Grassland with Wattles

Eucalyptus oldfieldii, *E. kingsmillii* low open woodland over *Acacia effusifolia*, *A. longispinea* tall shrubland over *Triodia basedowii* open hummock grassland. SAWS vegetation was found over 95.9 ha (9% of the study area), occurring on red-brown sand in the central section. Relevés LNREL08 (Plate 5.7) and LNREL13 (Plate 5.8) were in this vegetation unit, which was in Excellent condition.



Plate 5.7: SAWS vegetation at LNREL08.



Plate 5.8: SAWS vegetation at LNREL13.

HPMS – Hardpan Mulga Shrubland

Eucalyptus leptopoda subsp. *elevata* scattered low trees over *Acacia incurvaneura*, *A. aneura*, *A. mulganeura* tall shrubland over *Eremophila latrobei* subsp. *latrobei*, *E. forrestii* subsp. *forrestii*, *E. foliosissima* open shrubland over *Triodia basedowii* scattered hummock grasses. This vegetation unit comprised 303.7 ha (28%) of the study area. It occurred on flat, hard setting, light red-brown clayey sand plains, which were lower in the landscape than other sandy plains. Relevés LNREL05 (Plate 5.9), LNREL06 and LNREL12 (Plate 5.10) were in the HPMS vegetation unit which was in Very Good condition.



Plate 5.9: HPMS vegetation at LNREL05.



Plate 5.10: HPMS vegetation at LNREL12.

SMS – Granite Outcrop Stony Mulga Shrubland

Acacia quadrimarginea, *A. aneura*, *A. incurvaneura* tall open shrubland over *Acacia aneura*, *Eremophila latrobei* subsp. *latrobei*, *Scaevola spinescens* spiny, narrow leaf variant) open shrubland over *Aristida contorta*, *Eriachne pulchella* subsp. *pulchella*, *Maireana triptera* scattered tussock grasses and scattered herbs. This vegetation unit comprised 31.3 ha (3%) of the study area and occurred on skeletal, pale red-brown loamy sand with outcropping granite and laterite, and high gravel and rock cover. Relevés LNREL04 (Plate 5.11) and LNREL09 (Plate 5.12) were in this vegetation unit, which was in Very Good condition.



Plate 5.11: SMS vegetation at LNREL04.



Plate 5.12: SMS vegetation at LNREL09.

DRMS – Drainage Line Mulga Shrubland

Acacia aneura, *A. aptaneura* tall shrubland over *Eriachne pulchella* subsp. *pulchella*, *Thyridolepis mitchelliana* open tussock grassland and *Ptilotus gaudichaudii* very open hermland. This vegetation type was found over 83.6 ha (8% of the study area), associated with drainage lines, both incised and non-incised, with red-brown sandy clay loam. Relevés LNREL03 (Plate 5.13) and LNREL07 (Plate 5.14) were in DRMS vegetation. It was in Very Good condition, with its diminished rating mainly due to signs of grazing and trampling by cattle.



Plate 5.13: DRMS vegetation at LNREL03.



Plate 5.14: DRMS vegetation at LNREL07.

5.2.1.2 Vegetation Condition

The vegetation within the study area was primarily in Excellent condition (43%), with a large proportion of areas given a rating of Very Good (39%) due to signs of grazing by cattle, occasional items of historical rubbish, and some minor historical clearing or vehicle tracks (Figure 5.2; Table 5.7). Areas that were rated as Good (<1%) or Poor (<1%) were either heavily cleared, showing poor species composition and lack of structure, or were historically cleared and had regenerated to a satisfactory state. Vegetation condition ratings were not applied to Cleared areas such as the town or tracks and highways. A small proportion of the study area was rated as

being in Degraded condition (8.6 ha, 1%) due to impacts from heavy disturbance. This area had been extensively cleared as part of the rubbish tip infrastructure and appeared to be in use as part of the rubbish tip footprint. A few scattered natives were seen, however this area would need management to regenerate.

Table 5.7: Vegetation condition of the study area.

Condition Rating	Extent (ha)	Proportion of Study Area
Excellent	462.8	43%
Very Good	418.6	39%
Good	3.9	<1%
Poor	2.1	<1%
Degraded	8.5	1%
(Cleared)	176.7	16%
Total	1,072.6	100%

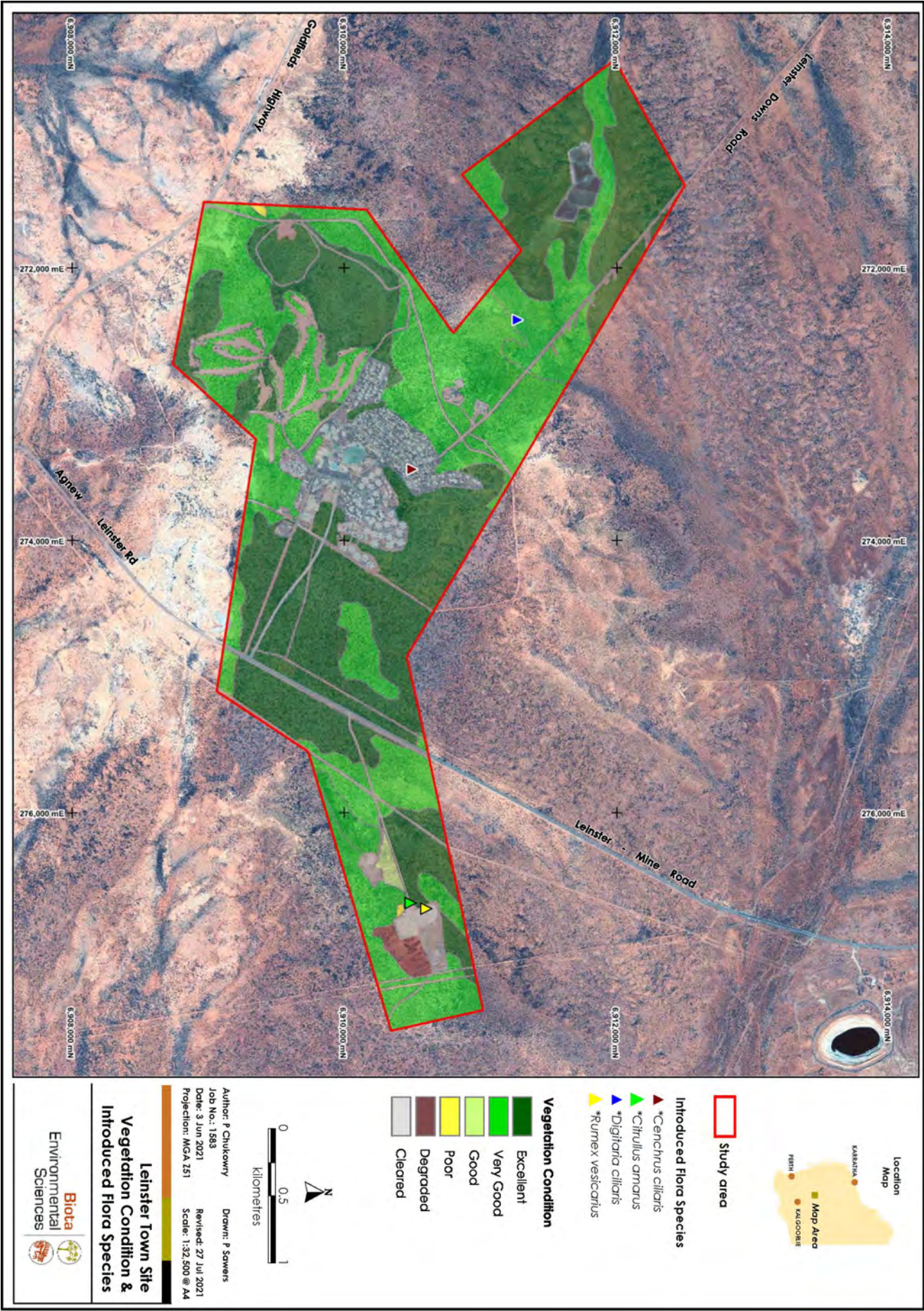


Figure 5.2: Vegetation condition and location of introduced species.

5.2.2 Flora

5.2.2.1 Native Flora

A total of 134 native flora species from 70 genera and 30 families were recorded from the study area. The best represented genera were *Acacia* and *Eremophila*, while the most common families encountered were the Fabaceae and Poaceae (Table 5.8), which is typical for this region. A list of all species recorded in the study area during the survey is presented in Appendix 7.

Table 5.8: Dominant flora genera and families recorded in the study area.

Genera	Number of Species	Family	Number of Species
<i>Acacia</i> (wattles)	17	Fabaceae (peas)	25
<i>Eremophila</i> (poverty-bushes)	10	Poaceae (grasses)	21

5.2.2.2 Species Richness

Species richness typically shows a positive relationship with various factors, including the size of the study area, the diversity of habitats present, the amount of rainfall received in the locality, and the survey effort expended. The NatureMap search results indicated that 379 native flora species have been recorded within a 40 km radius around the study area but that would include habitats not present in the study area. The total number of native species recorded during the current study is shown in Figure 5.3, compared with the studies in the local and wider area that were reviewed as part of the desktop assessment (Table 5.1). The data show that the species richness recorded for the study area was in line with that of previous studies conducted in study areas of similar size in the local and wider area.

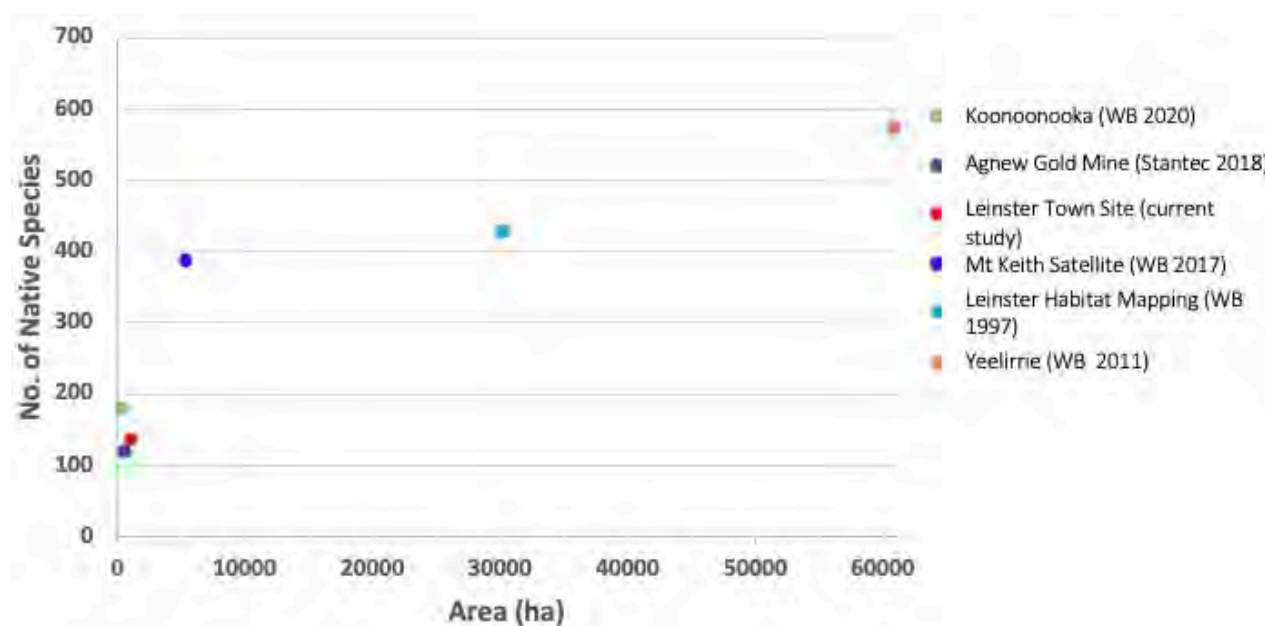


Figure 5.3: Species richness in the study area compared with other studies in the area.

5.2.2.3 Conservation Significant Flora

No significant flora species were recorded in the study area during the survey. Foot traverses were conducted over habitats that had the potential to support Threatened or Priority flora species, but none were located.

An assessment of the likelihood of the four species identified in the desktop assessment as having some potential to occur in the study area was made following the field survey (Table 5.9). None were considered likely to occur; one species, *Korthalsella leucothrix* (P1), may occur. This species is a parasitic aerial plant found in *Acacia acuminata* and *A. craspedocarpa* shrubs, with vegetation units SAMA and SMS potentially providing suitable habitat for this species.

Table 5.9: Significant flora likelihood of occurrence assessment following the field survey.

Species	Conservation Status	Likelihood of Occurrence
<i>Korthalsella leucothrix</i>	Priority 1	May occur; not recorded during the field survey.
<i>Eremophila pungens</i>	Priority 4	Unlikely to occur; species would have been sighted during survey.
<i>Grevillea inconspicua</i>	Priority 4	Unlikely to occur; species would have been sighted during survey.
<i>Hemigenia exilis</i>	Priority 4	Unlikely to occur; species would have been sighted during survey.

5.2.2.4 Flora Species of Interest

While not formally listed as significant species, two species of interest were recorded in the study area: *Eucalyptus kingsmillii* x *oldfieldii* and *Prostanthera* sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777). These are described below and their locations are presented in Table 5.10 and Figure 5.1.

Eucalyptus kingsmillii x *oldfieldii*

Three individuals of a hybrid mallee eucalypt, *Eucalyptus kingsmillii* x *oldfieldii*, were found in SAGS vegetation adjacent to LNREL10 (Table 5.10, Figure 5.1). These mallees represent the second location where these two species have been recorded as hybridising: this cross was previously observed during the Koonoonooka sand quarry development project (Western Botanical 2020), and is considered highly unusual (Plate 5.15 and Plate 5.16).



Plate 5.15: *Eucalyptus kingsmillii* x *oldfieldii* habit.



Plate 5.16: *Eucalyptus kingsmillii* x *oldfieldii* fruit.

Prostanthera sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)

A total of 35 individuals of *Prostanthera* sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777) were recorded, primarily within the deep sands associated with the SAGS and SAWS vegetation units (Table 5.10, Figure 5.1). Previously identified as *Prostanthera althoferi* subsp. *althoferi*, Western Botanical recorded this shrub species extensively around Yeelirrie, Mt Keith and Leinster (Western Botanical 2011). This species is a shrub growing to 2 m and differs from *P. althoferi* subsp. *althoferi* in its taller, more upright branching habit, leaf size and habitat preference (deep sand rather than rock outcrops, chert hills and banded ironstone formation). This species is yet to be formally described and currently still sits within *Prostanthera althoferi*.



Plate 5.17: *Prostanthera* sp. Bullimore Sandplain
(G. Cockerton & G. O'Keefe WB32777) habit.



Plate 5.18: *Prostanthera* sp. Bullimore Sandplain
(G. Cockerton & G. O'Keefe WB32777) leaves and detail.

Table 5.10: Locations of species of interest in the study area.

Species	Easting (mE)	Northing (mN)	Number of Individuals
<i>Eucalyptus kingsmillii</i> x <i>oldfieldii</i>	272470	6910217	1
<i>Eucalyptus kingsmillii</i> x <i>oldfieldii</i>	272440	6910237	1
<i>Eucalyptus kingsmillii</i> x <i>oldfieldii</i>	272469	6910244	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	273046	6910073	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	273051	6910073	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	273048	6910064	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	273090	6910031	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	273100	6910011	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	273101	6910004	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	273069	6910007	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	273071	6910006	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	273072	6910006	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	273076	6910007	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	273079	6910006	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	273080	6910006	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	273081	6910005	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	273082	6910005	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	273076	6910008	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	273078	6910009	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	274066	6910079	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	274016	6910037	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	274016	6910038	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	274017	6910039	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	274017	6910040	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	272107	6909662	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	272109	6909666	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	272102	6909717	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	272126	6909645	1

Species	Easting (mE)	Northing (mN)	Number of Individuals
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	272125	6909644	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	272122	6909638	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	272123	6909636	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	272124	6909638	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	272136	6910107	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	272137	6909630	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	272394	6910070	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	272396	6910064	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	272405	6910063	1
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	272414	6910068	1

5.2.2.5 Introduced Flora

Four introduced flora (weed) species were recorded in the study area: **Cenchrus ciliaris*, **Citrus amarus*, **Digitaria ciliaris* and **Rumex vesicarius* (Table 5.11, Figure 5.2). These were recorded in very low densities, with only one individual noted at each location. None of these species are Weed of National Significance (WoNS) or Declared pests for the region under the WA Biosecurity and Agriculture Management Act 2007 (the BAM Act).

Table 5.11: Locations of weeds in the study area.






Species	Easting (mE)	Northing (mN)	# Individuals
<i>*Cenchrus ciliaris</i> (Buffel Grass)	273478	6910500	1
<i>*Citrus amarus</i> (a melon)	276661	6910486	1
<i>*Digitaria ciliaris</i> (Summer Grass)	272381	6911273	1
<i>*Rumex vesicarius</i> (Ruby Dock)	276704	6910603	1

5.2.3 Fauna Habitats

Four naturally occurring and one artificial fauna habitats, were described and mapped within the study area based on the vegetation mapping, landforms and soils (Table 5.12, Figure 5.4). The study area was dominated by plains that varied in soil property, floristic composition and vegetation structure and by mulga (*Acacia aneura* complex), generally in the form of shrublands but in some areas occurring as woodland. Significant through-drainage was absent but broad shallow drainage tracts represented some of the more densely wooded areas. A small area of low rocky outcropping was identified at the southernmost extent of the study area, which included small overhangs and boulders, but the main body of this breakaway occurred outside the study area.

'Cleared' and 'Disturbed' areas have not been defined as fauna habitat as were entirely clear of vegetation or supported only lone trees or newly regenerating *Triodia* making the areas inhabitable by fauna. The ponds of the waste-water treatment plant representing the only exception (10.7 ha). Remaining 'Cleared' and 'Disturbed' areas represented 176.7 ha or 16% of the study area.

Table 5.12: Fauna habitats within the study area.

Broad Fauna Habitat	Description	Photograph
<p>Hardpan mulga shrubland.</p> <p>Landform Plain and very shallow drainage.</p> <p>Soil/Substrate Sandy loam. Substrate may include gravel of ironstone and quartz.</p> <p>Veg units: HPMS, SAES.</p> <p>Area: 365.0 ha (34.0%).</p>	<p>Stony to hardpan plains with open shrublands, may include tussock grasses.</p> <p>Tall open shrublands dominated by <i>Acacia aneura</i> (sens. lat.) and <i>A. mulganeura</i> over a scattered low shrubland dominated by <i>Eremophila</i> spp. over scattered grasses and herbs (<i>Aristida</i> and <i>Euphorbia</i> sp.).</p>	
<p>Sandplain with <i>Eucalyptus</i> and <i>Acacia</i> woodlands over shrubs and spinifex grassland.</p> <p>Landform Plain.</p> <p>Soil/Substrate Sandy, often with a shallow crust.</p> <p>Veg units: SAWS, SAMA, SAGS.</p> <p>Area: 308.1 ha (28.7%).</p>	<p>Low open woodland of <i>Eucalyptus</i> spp., <i>Acacia aneura</i> and <i>A. quadrimarginea</i> over an open shrubland dominated by <i>Eremophila</i> spp. over <i>Triodia basedowii</i>.</p> <p>Upper strata ranging from woodland to open shrubland.</p>	
<p>Drainage line mulga shrubland.</p> <p>Landform Shallow depression.</p> <p>Soil/Substrate Hardpan with gravel of ironstone and quartz.</p> <p>Veg. Units: DRMS, WABS.</p> <p>Area: 180.9 ha (16.9%).</p>	<p>Low woodland of scattered to moderately close <i>Acacia aneura</i>. Mid-storey of <i>Eremophila</i> spp. and lower stratum of herbs and grasses including Wanderrie <i>Acacia</i> banks.</p>	
<p>Granite outcrop stony mulga shrubland.</p> <p>Landform Breakaway.</p> <p>Soil/Substrate Sandy clay.</p> <p>Veg. Units: SMS.</p> <p>Area: 31.3 ha (2.9%).</p>	<p>For the most part outcrop was limited to gravel and smaller rocks on the surface but included a minor area of more substantial rock habitat on the edge of the study area, south of the townsite (see photograph).</p> <p>Tall <i>Acacia</i> spp. shrubland over scattered other shrub species, herbs and grasses.</p>	
<p>Man-made dam consisting of multiple waterbodies of varying depths.</p> <p>Landform Drainage area/floodplain.</p> <p>Soil/Substrate Clay loam.</p> <p>Veg Units: N/A</p> <p>Area: 10.7 ha (1.0%)</p>	<p>Fringed by low open shrubland of <i>Acacia</i> over scattered grasses and chenopods.</p>	

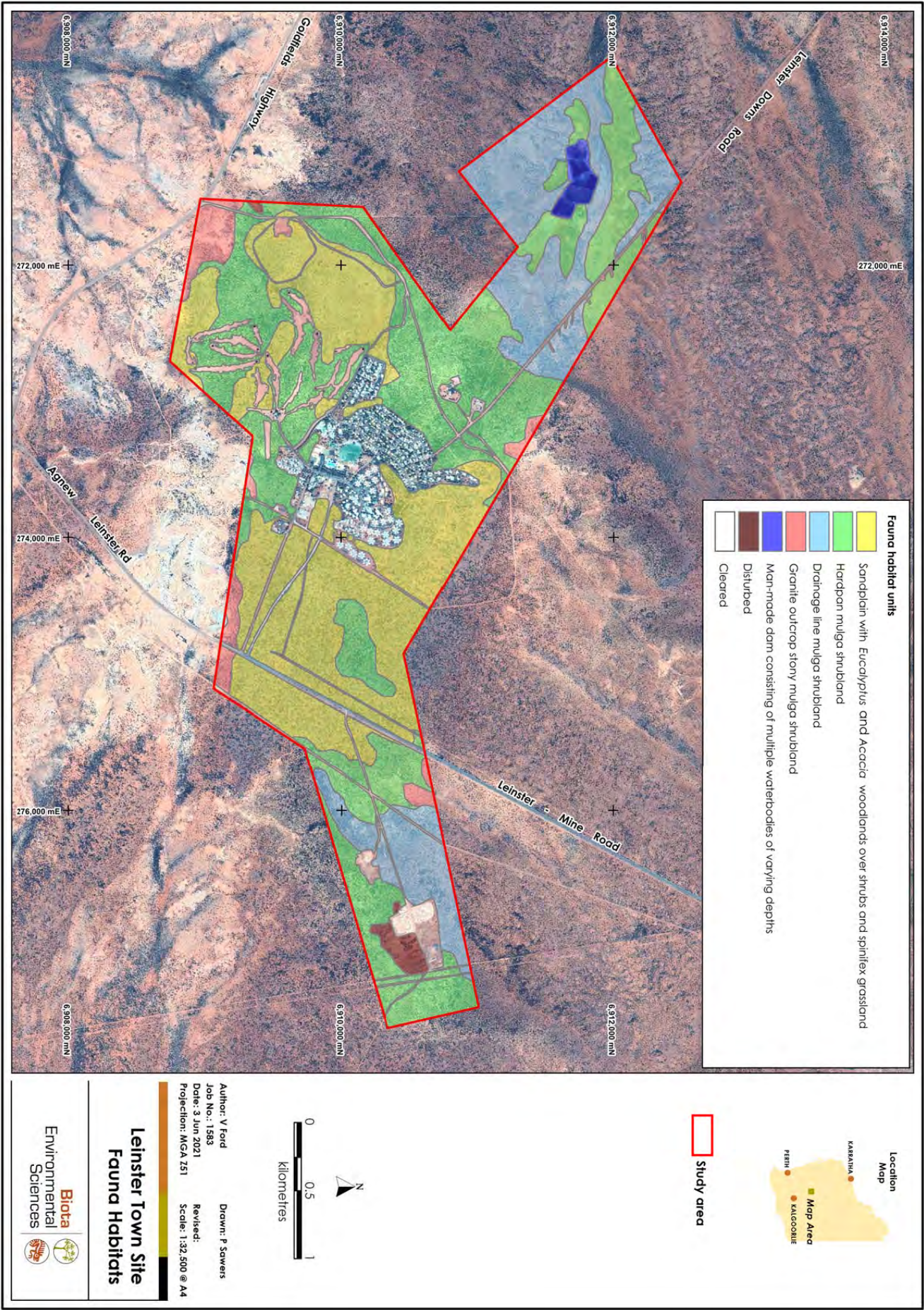


Figure 5.4: Fauna habitats within the study area.

5.2.4 Vertebrate Fauna Recorded

A total of 53 vertebrate fauna species were recorded during the basic survey (Table 5.13). Most records were obtained opportunistically while conducting targeted searches for significant species and fauna habitat ground-truthing. Fauna species presence was recorded either through direct observation or from secondary evidence (e.g. tracks, scats).

Five mammal species were recorded (two native and three introduced). Disturbance by introduced fauna occurred throughout the study area, with numerous rabbit latrines and widespread evidence of cattle grazing observed.

A total of 43 bird species were recorded. The assemblage was typical of open plain to lightly wooded habitat except for eight waterfowl species, which were only recorded in the man-made dam habitat.

Five reptile species were recorded from the study area, primarily species that are common in the wider area. More cryptic species were targeted in areas of suitable habitat, and these searches yielded records of *Egernia depressa* and *Diplodactylus granariensis*. The former species was found sheltering in hollow tree trunks formed in mulga, and the latter in rocky crevices within the 'Granite outcrop stony mulga shrubland' habitat type.

Table 5.13: Vertebrate fauna species recorded within the study area during the basic survey.

* denotes introduced species

Class / Species	Common Name	Record Type	Number
Mammals			
<i>Osphranter robustus</i>	Euro, Biggada	Observation	2
<i>Osphranter rufus</i>	Red Kangaroo, Marlu	Observation	1
<i>Oryctolagus cuniculus</i> *	Rabbit*	Observation	1
<i>Canis familiaris familiaris</i> *	Dog*	Track	1
<i>Bos taurus</i> *	European Cattle*	Observation	1
Birds			
<i>Dromaius novaehollandiae</i>	Emu	Scat	1
<i>Cygnus atratus</i>	Black Swan	Observation	2
<i>Tadorna tadornoides</i>	Australian Shelduck	Observation	14
<i>Malacorhynchus membranaceus</i>	Pink-eared Duck	Observation	6
<i>Anas superciliosa</i>	Pacific Black Duck	Observation	8
<i>Anas gracilis</i>	Grey Teal	Observation	131
<i>Phaps chalcoptera</i>	Common Bronzewing	Observation	1
<i>Ocyphaps lophotes</i>	Crested Pigeon	Observation	2
<i>Geopelia cuneata</i>	Diamond Dove	Observation	1
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe	Observation	2
<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe	Observation	6
<i>Himantopus leucocephalus</i>	Pied Stilt	Observation	3
<i>Egretta novaehollandiae</i>	White-faced Heron	Observation	1
<i>Aquila audax</i>	Wedge-tailed Eagle	Observation	2
<i>Haliastur sphenurus</i>	Whistling Kite	Observation	1
<i>Falco longipennis</i>	Australian Hobby	Observation	2
<i>Nymphicus hollandicus</i>	Cockatiel	Observation	1
<i>Eolophus roseicapilla</i>	Galah	Observation	4
<i>Barnardius zonarius</i>	Australian Ringneck	Observation	4
<i>Neopsephotus bourkii</i>	Bourke's Parrot	Observation	2
<i>Chlamydera guttata</i>	Western Bowerbird	Observation	
<i>Malurus splendens</i>	Splendid Fairywren	Observation	6
<i>Lichmera indistincta</i>	Brown Honeyeater	Observation	1

Class / Species	Common Name	Record Type	Number
<i>Gavicalis virescens</i>	Singing Honeyeater	Observation	1
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater	Observation	1
<i>Manorina flavigula</i>	Yellow-throated Miner	Observation	3
<i>Smicronis brevirostris</i>	Weebill	Observation	5
<i>Pyrholaemus brunneus</i>	Redthroat	Observation	2
<i>Acanthiza apicalis</i>	Inland Thornbill	Observation	4
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler	Observation	2
<i>Pomatostomus superciliosus</i>	White-browed Babbler	Observation	2
<i>Artamus personatus</i>	Masked Woodswallow	Observation	1
<i>Gymnorhina tibicen</i>	Australian Magpie	Observation	5
<i>Cracticus nigrogularis</i>	Pied Butcherbird	Observation	1
<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike	Observation	1
<i>Oreoica gutturalis</i>	Crested Bellbird	Observation	1
<i>Pachycephala rufiventris</i>	Rufous Whistler	Observation	1
<i>Rhipidura leucophrys</i>	Willie Wagtail	Observation	1
<i>Grallina cyanoleuca</i>	Magpie-lark	Observation	1
<i>Corvus orru</i>	Torresian Crow	Observation	1
<i>Petroica goodenovii</i>	Red-capped Robin	Observation	1
<i>Hirundo neoxena</i>	Welcome Swallow	Observation	30
<i>Petrochelidon nigricans</i>	Tree Martin	Observation	15
Reptiles			
<i>Diplodactylus granariensis</i>		Observation	1
<i>Heteronotia binoei</i>	Bynoe's Gecko	Observation	8
<i>Ctenophorus isolepis</i>	Military Dragon	Observation	1
<i>Egernia depressa</i>	Southern Pygmy Spiny-tailed Skink	Observation	2
<i>Tiliqua occipitalis</i>	Western Bluetongue	Observation	1

5.2.5 Conservation Significant Fauna

No conservation significant fauna species were recorded in the study area during the survey. Targeted searches were conducted in suitable habitat for species identified from the desktop study, but none were recorded.

Table 5.14 summarises the habitat preferences and previous records for those species listed under the EPBC Act, BC Act and/or DBCA Priority list identified in the desktop study, together with the availability of habitat within the study area in order to establish a likelihood of occurrence for each species (see Table 3.1).

For those species considered to have some potential to occur, more detailed likelihood assessments are given in Section 5.2.5.1 - 5.2.5.11. Species that assessed as 'Would not occur' have not been discussed further. This includes the Chuditch/Western Quoll (*Dasyurus geoffroii*), which was returned from the PMST database but is generally considered to be locally extinct and there is no suitable habitat for this species in the study area. Two species of migratory bird, the Grey Wagtail (*Motacilla cinerea*) and Eastern Yellow Wagtail (*Motacilla tschutschensis*) occur predominantly in northern Australia (with the Grey Wagtail a rare migrant even there). Further south in Western Australia, these species are considered vagrants, and would not occur within the study area.

A considerable number of bird species are currently erroneously classified as 'Marine' under the EPBC Act, despite not using marine habitats. In fact, fewer than half of the 293 taxa listed by the EPBC Act as Marine gain all or most of their food at sea (Garnett 2013). As can be seen in Appendix 4, the Marine classification has been applied to numerous species returned from the desktop study, however all except one of these species are in no way reliant on marine habitats. The Sooty Tern was recorded near Lawlers Mine in 2012, a very unusual sighting of this pelagic

species thought to have been blown inland with a cyclonic event. Furthermore, all of these species are widespread and common and as such have not been considered to be of genuine significance and they have not been discussed further.

Table 5.14: Conservation significant vertebrate fauna and their likelihood of occurrence within the study area.

Fauna Group / Species	State (BC Act/DBCA)	Commonwealth (EPBC Act)	Preferred Habitat	Suitable Habitat in Study Area?	Records in the Locality/Region	Likelihood of Occurrence
Mammals						
Brush-tailed Mulgara (<i>Dasymercus blythi</i>)	Priority 4	-	Hummock grass plains, sand ridges, mulga shrubland on loamy sand.	Sandplain with <i>Eucalyptus</i> and <i>Acacia</i> woodlands over shrubs and spinifex grassland.	Widespread: Leinster Downs, Wanjarri, Mt Keith.	Likely to occur
Long-tailed Dunnart (<i>Sminthopsis longicaudata</i>)	Priority 4	-	Rocky habitats (hills and slopes, Sclerophyll Shrublands).	Marginal outcropping at southern extreme of study area.	Mt Keith and Albion Downs Borefield.	May occur.
Black-footed Rock-wallaby (<i>Petrogale lateralis lateralis</i>)	Endangered	Endangered	Areas containing caves, cliffs and significant boulder outcropping.	Marginal outcropping at southern extreme of study area.	Barr Smith Range – South Albion Downs Borefield.	Unlikely to occur.
Western Quoll, Chuditch (<i>Dasyurus geoffroii</i>)	Vulnerable	Vulnerable	Eucalypt forest and woodland, heathland and mallee.	Marginal only – as Eucalypt woodland patchy in study area.	None in local or wider area; one scat record of uncertain ID from Menzies represents closest record. Thought extinct in subregion.	Would not occur.
Birds						
Rufous [Sandhill] Grasswren (<i>Amytornis whitei oweni</i>)	Priority 4	-	Spinifex-dominated sandplains, often with scattered trees, particularly mallee.	Sandplain with <i>Eucalyptus</i> and <i>Acacia</i> woodlands over shrubs and spinifex grassland.	15 km NE Leinster, Wanjarri Nature Reserve.	May occur.
Peregrine Falcon (<i>Falco peregrinus</i>)	Other Specially Protected Fauna	-	Wide range of habitats including forest, woodlands, wetlands and open country.	No core habitat but all habitat units suitable for foraging.	Mt Keith, Wanjarri Nature Reserve.	May occur (foraging visitor only).
Malleefowl (<i>Leipoa ocellata</i>)	Vulnerable	Vulnerable	Closed mix species shrubland with dense groundcover.	Hardpan mulga shrubland (where densest). Patches of mallee eucalypt thickets present.	None local. Wanjarri Nature Reserve and numerous locations at Yeelirrie (90 km NW), Black Range/Lake Mason.	Unlikely to occur.

Fauna Group / Species	State (BC Act/DBCA)	Commonwealth (EPBC Act)	Preferred Habitat	Suitable Habitat in Study Area?	Records in the Locality/Region	Likelihood of Occurrence
Princess Parrot (<i>Polytelis alexandroe</i>)	Priority 4	-	Open woodland and shrubland in swales between sand dunes, typically vegetated with <i>Trodia</i> spp. and a variety of shrubs and scattered trees, particularly marble gum and Desert Oak.	Sandplain with <i>Eucalyptus</i> and <i>Acacia</i> woodlands over shrubs and spinifex grassland.	None local. Records from Wanjarri.	Unlikely to occur; Sporadically recorded in the region.
Grey Falcon (<i>Falco hypoleucos</i>)	Vulnerable	-	Lightly treed inland areas, sand ridges, gibber deserts, pastoral land, timbered watercourses.	No core breeding habitat but suitable for foraging.	Sporadically recorded in the region (e.g. Murrin Murrin, 145 km SE).	Unlikely to occur. Foraging visitor if at all.
Night Parrot (<i>Pezoporus occidentalis</i>)	Critically Endangered	Endangered	Arid or semi-arid spinifex grasslands with large, established and unburnt hummocks. Foraging habitat includes areas of samphire, bluebush and saltbush.	Sandplain with spinifex and shrublands.	Records from Murchison bioregion but precise location unknown.	Unlikely to occur; no spinifex hummocks of a size suitable for nesting.
Common Sandpiper (<i>Actitis hypoleucos</i>)	Migratory	Marine/Migratory	Shallows and margins of coastal and inland wetlands.	Man-made dam provides marginal habitat.	Small number of records from near Leonora (120 km south).	May occur (transient).
Common Greenshank (<i>Tringa nebularia</i>)	Migratory	Marine/Migratory	Coast to freshwater with open mudflats or still shallow water.	Man-made dam provides marginal habitat.	10 km NE.	May occur (transient).
[Australian] Gull-billed Tern (<i>Gelochelidon [nilotica] macrotarsa</i>)	Migratory	Marine/Migratory	Most commonly coastal but also inland on large ephemeral lakes and wetlands.	Man-made dam provides marginal habitat.	Records from Lake Miranda in 2015 and 2017 (approx. 25 km NW).	May occur (transient).
Oriental Plover (<i>Charadrius veredus</i>)	Migratory	Marine/Migratory	Grasslands and thinly vegetated plains, often near water.	Man-made dam provides marginal habitat.	Regularly through Murchison/Goldfields in recent years, including 20 at Leonora.	May occur (transient).
Sharp-tailed Sandpiper (<i>Calidris acuminata</i>)	Migratory	Migratory	Shallows and margins of coastal and inland wetlands, preferring freshwater.	Man-made dam provides marginal habitat.	None local or sub-region (NatureMap). Closest are from near Kalgoorlie.	Unlikely to Occur.
Pectoral Sandpiper (<i>Calidris melanotos</i>)	Migratory	Marine/Migratory	Freshwater but also brackish wetlands.	Man-made dam provides marginal habitat.	None local or within sub-region (NatureMap).	Unlikely to occur.

Fauna Group / Species	State (BC Act/DBCA)	Commonwealth (EPBC Act)	Preferred Habitat	Suitable Habitat in Study Area?	Records in the Locality/Region	Likelihood of Occurrence
Grey Wagtail (<i>Motacilla cinerea</i>)	Migratory	Marine/Migratory	Usually close to water including rockpools and beaches.	Man-made dam provides marginal habitat.	None local or within region.	Would not occur (except as a vagrant).
Eastern Yellow Wagtail (<i>Motacilla tschutschensis</i>)	Migratory	Marine/Migratory	Open moist, grassy or muddy areas, sewage treatment ponds.	Man-made dam provides marginal habitat.	None local or within region.	Would not occur (except as a vagrant).
Reptiles						
Great Desert Skink (<i>Liopholis kintorei</i>)	Vulnerable	Vulnerable	Sandplains and swales dominated by <i>Triodia</i> spp. Hummocks.	Sandplain with spinifex and shrublands.	A single historical record from the sub-region (Wanjari Nature Reserve).	Unlikely to occur.

5.2.5.1 **Brush-tailed Mulgara (*Dasycercus blythi*), DBCA Priority 4**

The Brush-tailed Mulgara, *Dasycercus blythi*, is a medium sized (60-120 g) carnivorous marsupial exhibiting a wide but patchy distribution throughout arid south-west Queensland, southern Northern Territory, northern South Australia and northern Western Australia (Woolley et al. 2013). Based on our current understanding of the distribution of the two mulgara species (Crest-tailed and Brush-tailed), only Brush-tailed Mulgara is likely to occur in the locality.

An assessment of the habitat preferences of the mulgara on parts of the Mt Keith, Albion Downs, Tarmoola, Weebo and Yeelirrie pastoral leases indicates that the Spinifex Sandplain unit of the Bullimore land system (Pringle et al. 1994) was their primary habitat (Halpern Glick Maunsell 2000). As such, the occurrence of the spinifex sandplains provide a general indication of habitat availability. The study area contained 308.1 ha spinifex sandplain habitat, with targeted effort searching for secondary evidence comprising 8.1 km of foot traverses in the most prospective areas of this habitat type (Figure 3.2) looking for secondary evidence of the species, however, none was recorded.

Likelihood of Occurrence: Likely to occur. The Brush-tailed Mulgara has been recorded on Leinster Downs (Halpern Glick Maunsell 2000) and in the wider locality including from Mt Keith, Yakabindie and Wanjarri. Spinifex sandplain habitat for the species occurs in the study area and was searched for the secondary evidence but without any record. However, given previous records and the known fluctuations in population size with short and long-term climate for the species (Woolley 2008), species absence cannot be inferred.

For mammal taxa that have highly dynamic populations correlated with seasonal or even longer temporal scales associated with rainfall, absence or rarity cannot necessarily be inferred from non-detection or low abundance.

5.2.5.2 **Long-tailed Dunnart (*Sminthopsis longicaudata*), DBCA Priority 4**

This species is distributed in the Pilbara, north-eastern Goldfields and Gibson Desert in Western Australia with a small localised population in the Northern Territory (Menkhorst and Knight 2011). The preferred habitat of *S. longicaudata* is sparsely vegetated stony substrates, including gibber fields, breakaways and rocky ranges.

Likelihood of Occurrence: The species has sporadically been recorded in the north-eastern Goldfields with a number of records from the wider area including Mt Keith Mine, Albion Downs Borefield (Biota 2010) and ex-Black Range and Lake Mason stations (Cowan et al. 2017). Small areas of suitable habitat occur at the southern boundary of the southern area and so this species may occur at times when conditions are favourable and abundance is high.

5.2.5.3 **Black-footed Rock-wallaby (*Petrogale lateralis lateralis*), BC Act Endangered, EPBC Act Endangered**

The Black-footed Rock-wallaby is known from a series of isolated, patchily distributed populations in Western Australia and the Northern Territory (Pearson 2013, Woinarski et al. 2014). The species has been recorded from the Barr Smith Range at a location approximately 7.5 km north-west of the study area via both observation and the collection of scats later genetically verified (BCE 2011, 2015). As part of a separate assessment in 2017, Biota completed a targeted survey along the Barr Smith Range where scats consistent with rock-wallaby were again collected from the known locality. However, no fresh scats were present (Biota 2017b) and no additional rock-wallaby scat sites were found despite extensive searching of the breakaway landform. Numerous latrines are generally evident in the refuge areas of rock-wallabies (Jarman and Caprararo 1997).

This nocturnal species requires shelter in the form of caves, cliffs and boulder scree during the day. Habitat critical to survival requires sufficient cave and crevice development to provide shelter from extremes of temperature and predators (Pearson 2013). Free water is usually not required unless the animals are occupying sub-optimal habitat that has inferior thermal refuges (Pearson 2013). The species is susceptible to predation by foxes and cats and habitat degradation by introduced herbivores.

Likelihood of Occurrence: Very little core Black-footed Rock-wallaby habitat is present within the study area but does exist adjacent to the study area in the south. The Black-footed Rock-wallaby is assessed as unlikely to occur based on the absence of suitable habitat and records, however, the status of the rock-wallaby in the wider area also seems uncertain given that recent survey work has failed to record the species (Biota 2017b).

5.2.5.4 Rufous Grasswren (*Amytornis whitei oweni*), DBCA Priority 4

The taxonomy of "Striated Grasswrens" is currently in a state of flux, with the taxon in the central arid zone of Western Australia (commonly known as Sandhill Grasswren) most recently considered subspecies *oweni* of the newly-described Rufous Grasswren (*Amytornis whitei*), which also includes the Pilbara birds (*A. whitei whitei*) and Cape Range birds. However, it is currently still listed as nominate Striated Grasswren on the DBCA list of priority fauna. We treat it as Rufous [Sandhill] Grasswren *Amytornis whitei oweni* as per the WA Museum. This taxon occurs from the central arid zone of Western Australia to the southwestern Northern Territory and down through central South Australia.

The taxon occurs in *Triodia*-dominated habitat on sandy to loamy plains, where it feeds on insects and seeds, but may also be found in shrubby *Acacia* on dunes and inter-dunes. Typically occurring in pairs or family groups, it can be locally common but is normally scarce to moderately common.

Likelihood of Occurrence: May occur. Recently recorded near Leinster (Biologic 2020) and there are several records from Wanjarri Nature Reserve. Suitable habitat is available within the study area in habitats containing spinifex sandplain, particularly where this is interspersed with low shrubs or mallee.

5.2.5.5 Peregrine Falcon (*Falco peregrinus*), BC Act Other Specially Protected Fauna

The Peregrine Falcon has an almost cosmopolitan distribution, but is absent from most deserts and the Nullarbor Plain (Johnstone and Storr 2004). The resident subspecies in Australia (*macropus*) is widespread throughout Australia (Marchant and Higgins 1993) and is not considered threatened (Garnett et al. 2011).

This species inhabits a wide range of habitats including forest, woodlands, wetlands and open country (Pizzey and Knight 2007). Home ranges are probably defended year round and are variable in size, though not typically less than 480 ha (Marchant and Higgins 1993). The species typically nests in recesses of cliff faces, granite outcrops and quarries, but also in hollow trees and in old nests constructed by other species such as Wedge-tailed Eagles and Ravens (Marchant and Higgins 1993). The Peregrine Falcon, like other birds of prey, is a relatively long-lived species, with low reproductive rates and low population density.

Likelihood of Occurrence: The desktop study identified no local records of the species but there are records from the wider area. The species was recorded by Moriarty (1972) within the Wanjarri Nature Reserve who reported seeing it occasionally in good seasons, and it has been recorded over the Mt Keith mine office (Roy Teale pers. comm., 2019) and from the Barr Smith Range. No core habitat, such as breakaways or significant drainages, occur within the study area. However, given the records from the wider area, and suitable foraging habitat within the study area, it may occur within the study area as a foraging visitor.

5.2.5.6 Malleefowl (*Leipoa ocellata*), BC Act Vulnerable, EPBC Act Vulnerable

The Malleefowl was once broadly distributed across the southern half of the Australian continent but has undergone significant range reduction over recent decades. It is now restricted to the southwest of Western Australia, and to southern areas of South Australia and New South Wales (Burbidge 2004, Garnett et al. 2011). Populations are scattered throughout the southern portion of mainland Australia with the largest section of contiguous habitat occurring east of the Wheatbelt in Western Australia. A large portion of suitable habitat in this region has been cleared for agriculture (Burbidge 2004).

Malleefowl are mainly found in the semi-arid and arid zones of Australia in mallee dominated shrublands or low woodlands (Benshemesh 2007). To breed, Malleefowl require a sandy substrate and abundant source of leaf litter to build up a mound used to incubate their eggs (Benshemesh 2007).

Likelihood of Occurrence: No evidence of the species, even old mounds, was recorded in the study area. The lack of records from the local area in databases and from other local studies at Bellevue (Everhard and Bamford 2019) and Agnew (Stantec 2018) would indicate a low abundance. Evidence of feral predator species and heavy grazing of shrubland within the study area both reduce the likelihood of Malleefowl occurrence. Mallee eucalypts and mulga woodlands on sandy loam soils were present in the study area but rarely with a canopy cover that would provide adequate leaf litter for nesting material. We consider that the Malleefowl is unlikely to occur within the study area given the lack of recent local records and the current condition of habitat.

5.2.5.7 Princess Parrot (*Polytelis alexandrae*), DBCA Priority 4

Distribution: The core distribution of the species is described as the Great Sandy Desert but with scattered records across much of arid west and central Australia. There are records from as far west as Wiluna, Wanjarri Nature Reserve, Sandstone and Laverton.

This highly nomadic species prefers lightly wooded habitat including open mallee/spinifex desert and open marble gum woodland.

Likelihood of Occurrence: Moriarty (1972) collected one specimen from near the Wanjarri shearing shed in 1964 and S. Thompson reports having seen the species near Wanjarri in 2006 (cited in Terrestrial Ecosystems 2020) but despite numerous more recent surveys, the species has not been recorded locally or in the wider area. Potentially suitable habitat for the species occurred within the study area such as the SAGS vegetation unit of Marble Gum over spinifex and Sandplain Mulga-Mallee shrubland over spinifex grasslands. The study area occurs on the edge of the species' secondary distribution and it is considered unlikely to occur except as an occasional nomadic visitor when conditions dictate (e.g. when local conditions are particularly good, or when conditions in their core range are particularly poor).

5.2.5.8 Grey Falcon (*Falco hypoleucos*), BC Act Vulnerable, EPBC Act Vulnerable

The Grey Falcon is endemic to Australia, where it is widespread but rare throughout the arid zone. This species occurs in the northern half of Western Australia, typically north of 26°S. It is a resident or nomadic visitor to inland parts of Australia but its movements are poorly understood.

The Grey Falcon mainly inhabits lightly wooded coastal and riverine plains (Johnstone and Storr 1998) and may also occur near wetlands where surface water attracts prey, primarily birds, especially parrots and pigeons. It breeds in trees, such as *Eucalyptus* spp., typically in the abandoned nests of crows and butcherbirds (Marchant and Higgins 1993, Johnstone and Storr 1998). Eggs have been recorded in July and August but its breeding season is not certain.

Likelihood of occurrence: The study area does not occur within the species' published distribution and it is very rarely recorded within the Murchison; the closest records from the study area being 145 km south-east at Murrin Murrin. The study area also lacks the species' preferred habitat type of well-treed drainage lines in inland areas. It is considered unlikely to occur.

5.2.5.9 Night Parrot (*Pezoporus occidentalis*), BC Act Critically Endangered, EPBC Act Endangered

Historical records indicate that the Night Parrot was widespread and relatively common in the arid zone until late in the 19th century (DBCA 2017) but then a hiatus in confirmed records of almost 100 years followed, despite considerable search effort. Then in 1990 and 2006, two specimens were collected in the southwest Queensland with the first photographic evidence presented in 2013 (Dooley 2013) and in March 2017 a confirmed record came from the Murchison region in Western Australia (Jackett et al. 2017). A number of sightings have also been reported in

the Lorna Glen and Milrose Station area, which straddles the Murchison/Gascoyne bioregions (Hamilton et al. 2017).

The current descriptions of the species' habitat preferences are broad, reflecting the wide variety of habitats from which the species was historically known. The DBCA (2017) interim guideline for the survey of Night Parrots details old-growth spinifex (*Triodia* spp.) as habitat for roosting and nesting in western Queensland. The habitat from which two Night Parrots were recorded in the East Murchison (Jackett et al. 2017) included old-growth ring-forming *Triodia* spp. In association with halophytic shrubland plain. Subsequent confirmed records in Western Australia have thus far all been associated with ring-forming *Triodia* spp. and areas of halophytic shrubland in association with drainage and palaeodrainage systems (N. Jackett pers. comm. 2020).

Habitat Assessment: Spinifex within the study area may represent potential foraging habitat at times of seeding. However, we estimate the spinifex in the study area to be functionally too small for nesting based on available information on Night Parrot nest characteristics. The study of Murphy et. al. (2017) describes three nests each consisting of a hollow chamber ranging in size from 20 – 28 cm in a spinifex hummock with each chamber leading to the outside via a tunnel of length 20 – 33 cm. The size of the hummocks was not stated but we infer that they must have been at least 40 - 50 cm in size. We assume, based on this information, that the structural elements of a chamber and tunnel are required for nest success and although perhaps the tunnel and chamber size may be tailored somewhat to the size of hummock, a minimum size of hummocks of 40 – 50 cm seems reasonable. Very little spinifex of this size was found within the study area although it is possible that it may occur with future growth.

Likelihood of Occurrence: Until recently, the likelihood of the Night Parrot occurring within the study area would reasonably be assessed as 'Would not occur' based purely on the absence of records in recent decades. However, the recent rediscovery of the species, including from the Murchison region of WA, gives pause for further consideration. The study area did not contain old-growth spinifex hummocks sufficiently large to provide suitable breeding habitat at the time of survey, though this may reflect burn history. Other preferred habitat types including halophytic vegetation do not occur within the study area. As such, the Night Parrot was assessed as unlikely to occur in the study area.

5.2.5.10 Migratory Shorebirds BC Act Migratory, EPBC Act Marine/Migratory

Six Migratory-listed shorebird species were returned from the desktop study. Four of these were returned from the Protected Matters database search without any associated records in the locality (Sharp-tailed Sandpiper, Pectoral Sandpiper, Common Sandpiper and Oriental Plover). The [Australian] Gull-billed Tern was returned from the ALA database via e-Bird records from Lake Miranda (25 km NW of the study area) while the Common Greenshank was recorded from calls only using a recorder approximately 10 km NE of the study area, however, the bird may have been overflying. The study area contains no naturally occurring habitat for any shorebird species with the waste-water treatment ponds representing marginal habitat. However, the situation of the study area amongst several Murchison salt-lakes including Lake Miranda and Lake Darlot, provides some possibility of shorebirds occurring in the locality on occasions when these lakes are supporting water following heavy rainfall.

Likelihood of Occurrence: The following species returned from the desktop study have been assessed as having potential to occur (may occur) within the study area based on habitat preferences and records from the broader region of central Western Australia. These are Common Sandpiper, Oriental Plover, [Australian] Gull-billed Tern and Common Greenshank. If they were to occur, these species would be found at the waste-water treatment ponds but it is also possible that they may occur wherever there is temporary surface water in the study area. None of the species would rely on habitats within the study area. The Sharp-tailed Sandpiper hasn't been recorded from the region while the Pectoral Sandpiper is rarely recorded from inland WA, both are considered unlikely to occur.

5.2.5.11 Great Desert Skink (*Liopholis kintorei*), BC Act Vulnerable

This species is patchily distributed in the Great Sandy Desert, Gibson Desert and Tanami Desert. The western extremity of its range approaches the study area.

Liopholis kintorei occurs in a variety of desert habitats on sandy, clay and loamy soils (Storr et al. 1999). This species inhabits sandplains, paleodrainage lines and undulating gravelly downs (McAlpin et al. 2011). The Great Desert Skink exhibits limited dispersal ability (typically 0-4 km, up to 9 km), excavating extensive burrow systems, which are occupied by a breeding pair of adults and their offspring continuously for up to seven years (McAlpin et al. 2011). Active burrow systems can be identified by the presence of communal latrines in close proximity to the burrow system.

Likelihood of Occurrence: Unlikely to occur. Potentially suitable habitat for the species occurs within the study area in Sandplain with *Eucalyptus* and *Acacia* woodlands over shrubs and spinifex grassland. However, the distinctive burrow complexes formed by the species were not recorded and the species has not been recently recorded in the wider area, despite numerous Mulgara targeted surveys that include searches for burrow formations superficially similar to those of this skink. The only record from the wider area comes from Wanjarri Nature Reserve in 1964.

6.0 Summary and Discussion

6.1 Vegetation and Flora

Eight intact vegetation types were described and mapped for the study area, while a total of 176.7 ha, or 16% (largely the townsite), was mapped as Cleared (Figure 5.1; Section 5.2.1.1). Despite its location around an existing town and the current and historical land uses in the area (mining and pastoral), 43% of the vegetation of study area was in Excellent condition. A high proportion of the vegetation of the study area (39%) was in Very Good condition (see Section 5.2.1.2). Areas that were rated as Good (<1%) or Poor (<1%) were either heavily cleared, lacking diversity and structure, or were historically cleared and had regenerated to a satisfactory state. A total of 2.1 ha (<1%), comprising an area in the southwest of the survey area and an area near the rubbish tip, was rated as being in Poor condition. The latter was adjacent to an 8.6 ha (1%) area near the rubbish tip rated as being in Degraded condition as there was evidence of heavy clearing here. The main disturbance factors were clearing for infrastructure, historical minor rubbish dumping and some effects from cattle grazing.

None of the vegetation types recorded during the survey constitute significant ecological communities (TECs, PECs or ESAs) and no such communities are expected to occur in the study area (Section 5.1.1).

A total of 134 native flora species from 70 genera and 30 families were recorded in the study area. The species richness and composition within the study area are typical of the region and similar to other study areas of comparable size (Section 5.2.2.2). No Threatened or Priority flora were recorded in the study area, and none are expected to occur.

Two species of interest, *Eucalyptus kingsmillii* x *oldfieldii*, and *Prostanthera* sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777), were recorded from the SAWS and SAGS vegetation units (Figure 5.1; Section 5.2.2.4). The *Eucalyptus kingsmillii* x *oldfieldii* mallees found in the study area represent the second location where these two species have been recorded as hybridising. This cross and is considered highly unusual was previously observed during the Koonoonooka sand quarry development project (Western Botanical 2020). *Prostanthera* sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777) is yet to be formally described and named. Previously known as *Prostanthera althoferi* subsp. *althoferi*, Western Botanical recorded this shrub species extensively around Yeelirie, Mt Keith and Leinster (Western Botanical 2011). *P.* sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777) is a shrub growing to 2 m and differs from *P. althoferi* subsp. *althoferi* in its taller, more upright branching habit, leaf size and habitat preference (deep sand rather than rock outcrops, chert hills and banded ironstone formation).

Four introduced species were also recorded in low densities (one individual at each location): **Cenchrus ciliaris*, **Citrullus amarus*, **Digitaria ciliaris* and **Rumex vesicarius*. None of these species are WoNS or Declared pests under the BAM Act (Figure 5.2; Section 5.2.2.5).

6.2 Fauna

The four (natural) broad fauna habitats within the study area were all continuous beyond the study area and consisted of land types that are very common in the north-eastern Goldfields region. None of the fauna habitats within the study area are restricted, based on the broader distribution of vegetation communities and land types (Pringle et al. 1994) (with the exception of artificial ponds). Substantial context for habitats within the study area is also provided by habitat mapping that BHP NiW has undertaken over all of its Northern Operations tenements spanning from Wiluna to south of Leinster (Biota 2020). This mapping delineated 13 habitats at a relatively broad scale given the extent of the area mapped (55,302 ha). The habitats within the study area show closest affinities with four of the broad habitat types; the Acacia on Sandy Flats and Stony Acacia Shrublands, which across the Northern Operations tenements together spanned 28,183

ha, Mixed Mallee and Mulga over Spinifex Sandplain habitat type was mapped at 3,060 ha and Rocky Breakaways and Boulder Piles were mapped over 619 ha over the Northern Operations tenements.

Sandy substrates with spinifex cover are favoured by many reptile and mammal species of the study area including *Strophurus eldери*, *Delma butleri*, *Ctenotus pantherinus*, *C. aff. quattordecimlineatus*, *Dasycercus blythi*, *Ningaui ridei* and *Sminthopsis hirtipes*. Cowan et al. (2017) found this habitat type to support the highest species diversity in their study. In areas where there is a further overstorey of shrubland and/or woodland (mulga and eucalypt) even higher species richness is expected. Woodland habitats are favoured particularly by birds for their complex strata, but also ground-dwelling reptile and mammal species reliant on fallen debris for refuge. These woodland areas also represent a retreat during drought conditions allowing local persistence of species (Morton et al. 1995). The inclusion of rock outcropping is likely to increase biodiversity by the inclusion of specialists to this habitat type, which include the Long-tailed Dunnart and Woolley's *Pseudantechinus*. The hardpan plains of the study area, generally with lower vegetation cover, are expected to support lower biodiversity.

The fauna of the East Murchison is diverse but typified by low levels of endemism (Cowan 2003); the only vertebrate species considered endemic to the Murchison bioregion is the Spotted Mulga Snake (*Pseudechis butleri*) (Storr et al. 2002). Approximately 40% of the mammals of the Murchison are thought to be regionally extinct since European settlement, including the large majority of medium weight-range species such as the Bilby *Macrotis lagotis*, Burrowing Bettong *Bettongia lesueur*, and Chuditch *Dasyurus hallucatus*.

Nineteen significant species were identified in the desktop study, but only the Brush-tailed Mulgara was considered likely to occur within the study area. It was not recorded during the field survey, however the relatively frequent records of the species locally and existence of suitable habitat within the study area (Spinifex sandplain habitat) indicate it would likely be present at times. Two additional species were considered to have potential to occur as residents (Rufous [Sandhill] Grasswren, and Long-tailed Dunnart) and one (Peregrine Falcon) may utilise the study area for foraging.

Several of the listed species have been recorded very rarely within the East Murchison subregion, including the Night Parrot, Black-footed Rock-Wallaby and Great Desert Skink. Other species are sporadically recorded in the north-eastern Goldfields and their presence may be contingent on very favourable seasonal conditions, such as Princess Parrot and Long-tailed Dunnart. For some of species (Great Desert Skink, Night Parrot, Grey Falcon), suitable habitat occurs within the study area, however, the paucity of records in the region suggests these species are unlikely to occur except as occasional visitors.

In the case of the Malleefowl, the study area contains little core habitat for the species as the shrubland is rarely thick enough to provide the necessary leaf litter for nesting. However, the degraded state of the habitat for this species also reflects recent anthropogenic impacts, particularly from grazing and fire to which mulga is particularly sensitive and can require many decades to become viable as nesting habitat (Benshemesh 2007). It is notable in the case of the Malleefowl that records from the wider area (Yeelirrie, Mt Keith, and Albion Downs) represent the majority of records of the species from the Murchison bioregion while work in the local area has consistently found no evidence of the species (Everhard and Bamford 2019, Terrestrial Ecosystems 2020).

Migratory bird species were generally considered unlikely to occur except as transient visitors using the water treatment ponds or following considerable rainfall events that cause inundation of the saline lakes in the region. These types of rainfall events occur every 4 – 5 years.

All the species of significance having potential to occur within the study area have large distributions, generally extending outside the East Murchison subregion. Persistence of these species locally is not dependent on habitats within the study area, which are all continuous beyond its boundary.

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Appendix 1

Framework for Significance Ranking of Species and Communities in WA



A. Categories for Threatened and Priority Ecological Communities

A1. Categories and Criteria for Threatened Ecological Communities under the BC Act

Division 2

Subdivision 1 — Threatened ecological communities

27. Listing of threatened ecological communities

- (1) The Minister may, by order, list an ecological community as a threatened ecological community in one of the following categories —
 - (a) critically endangered ecological community;
 - (b) endangered ecological community;
 - (c) vulnerable ecological community.
- (2) An ecological community is not eligible for listing as a threatened ecological community if it is a collapsed ecological community.
- (3) When deciding whether or not to list an ecological community as a threatened ecological community or to amend or repeal such a listing, the Minister must have regard only to matters relating to the survival of the ecological community.
- (4) An order made under subsection (1) may describe or identify an ecological community by reference to a map or plan held in the Department.
- (5) Section 258 applies to an order made under subsection (1).

28. Criteria for categorisation as critically endangered ecological community

An ecological community is eligible for listing in the category of critically endangered ecological community at a particular time if, at that time —

- (a) it is facing an extremely high risk of becoming eligible for listing as a collapsed ecological community in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines; and
- (b) listing in that category is otherwise in accordance with the ministerial guidelines.

29. Criteria for categorisation as endangered ecological community

An ecological community is eligible for listing in the category of endangered ecological community at a particular time if, at that time —

- (a) it is not a critically endangered ecological community; and
- (b) it is facing a very high risk of becoming eligible for listing as a collapsed ecological community in the near future, as determined in accordance with criteria set out in the ministerial guidelines; and
- (c) listing in that category is otherwise in accordance with the ministerial guidelines.

30. Criteria for categorisation as vulnerable ecological community

An ecological community is eligible for listing in the category of vulnerable ecological community at a particular time if, at that time —

- (a) it is not a critically endangered ecological community or an endangered ecological community; and
- (b) it is facing a high risk of becoming eligible for listing as a collapsed ecological community in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines; and
- (c) listing in that category is otherwise in accordance with the ministerial guidelines.

Subdivision 2 — Collapsed ecological communities

31. Listing of collapsed ecological communities

- (1) The Minister may, by order, list an ecological community as a collapsed ecological community.
- (2) Section 258 applies to an order made under subsection (1).

32. Criteria for listing as collapsed ecological community

An ecological community is eligible for listing as a collapsed ecological community at a particular time if, at that time —

- (a) there is no reasonable doubt that the last occurrence of the ecological community has collapsed; or
- (b) the ecological community has been so extensively modified throughout its range that no occurrence of it is likely to recover —
 - (i) its species composition or structure; or
 - (ii) its species composition and structure.

33. Rediscovered ecological communities

If a collapsed ecological community is discovered in a state that no longer makes it eligible for listing as a collapsed ecological community, it is to be regarded as a threatened ecological community for the purposes of this Act until —

- (a) it is listed as a threatened ecological community; or
- (b) the Minister declares, by instrument published in the Gazette, that it is not to be so listed.

A2. Categories and Criteria for Priority Ecological Communities (DEC 2010)

Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the DBCA Priority Ecological Community Lists 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 threatened ecological communities. 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.

Priority One: Poorly-known ecological communities

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.

Priority Two: Poorly-known ecological communities

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.

Priority Three: Poorly known ecological communities

- (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.

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.

Priority Five: Conservation Dependent ecological communities

Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

B. Categories for Flora and Fauna Species

B1. Western Australian BC Act, and Priority Species Classification

In Western Australia, 'Threatened', 'Extinct' and 'Specially Protected' fauna and flora species are protected under the *Biodiversity Conservation Act 2016* (the BC Act), making it an offence to take or disturb these species without Ministerial approval. The definition of 'take' is broad, and includes killing, injuring, harvesting or capturing fauna, and gathering, cutting, destroying, harvesting or damaging flora.

Such species are classified within a framework of several categories.

Species of the highest significance are designated as Threatened species and are protected under sections 19(1)(a), 19(1)(b) and 19(1)(c) of the BC Act. Species are listed within one of three categories:

- Critically endangered (CR), Endangered (EN), or Vulnerable (V), representing those species listed in Schedules 1 to 3 respectively of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* or the *Wildlife Conservation (Rare Flora) Notice 2018*.

Presumed extinct species are protected under sections 24 and 25 of the BC Act and are listed in one of two categories:

- Extinct (EX), representing those species listed in Schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* or the *Wildlife Conservation (Rare Flora) Notice 2018*; or
- Extinct in the wild (EW); there are currently no listed species under this category.

Specially protected species are protected under section 13(1) of the BC Act, and include species of special conservation interest, migratory species, cetaceans, species subject to international agreement, or species otherwise in need of special protection. Of these:

- Migratory species (MI) are those listed under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*;
- Species of special conservation interest (conservation dependent fauna) (CD) are those listed under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*; and
- Other specially protected fauna (OS) are those listed under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*;

In addition to the species formally designated as protected under the BC Act, the WA Department of Biodiversity, Conservation and Attractions (DBCA) also maintains a list of 'Priority species'.

Species that appear to be rare or threatened, but for which there is insufficient information to properly evaluate their significance, are assigned to one of three Priority categories (Priority 1 to Priority 3), while species that are adequately known but require regular monitoring are assigned to Priority 4.

Note that of the above classifications, only 'Threatened', 'Extinct' and 'Specially Protected' species have statutory standing. The Priority flora and fauna classifications are employed by the WA DBCA to manage and classify their database of species considered potentially rare or at risk, but these categories have no legislative status.

Further explanations of the categories is provided in more detail in the following pages.



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).

B2. Commonwealth Environment Protection and Biodiversity Conservation Act 1999

Many of the species that are specially protected at State level are also listed as Threatened species at the Federal level, as one of the Matters of National Environmental Significance (MNES) identified under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act). These may be classified as 'critically endangered', 'endangered', 'vulnerable' or 'lower risk', consistent with IUCN categories:

1. **Critically Endangered (CR):** a taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future.
2. **Endangered (EN):** a taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future.
3. **Vulnerable (VU):** a taxon is Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future.
4. **Lower Risk (LR):** a taxon is Lower Risk when it has been evaluated, does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable. Taxa included in the Lower Risk category can be separated into three subcategories:
 - **Conservation Dependent (CD).** Taxa which are the focus of a continuing taxon-specific or habitat-specific conservation program targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years.
 - **Near Threatened (NT).** Taxa which do not qualify for Conservation Dependent, but which are close to qualifying for Vulnerable.
 - **Least Concern (LC).** Taxa which do not qualify for Conservation Dependent or Near Threatened.

In addition, numerous **Migratory (MI)** species are listed as MNES under the EPBC Act (some of which are also listed as Threatened). Migratory species are those animals that migrate to Australia and its external territories, or pass through or over Australian waters during their annual migrations. The list of migratory species consists of those species listed under the following international conventions:

1. Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention);
2. China-Australia Migratory Bird Agreement (CAMBA);
3. Japan-Australia Migratory Bird Agreement (JAMBA); and,
4. Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

Marine (MA) species are also protected under the EPBC Act, and are listed to ensure the long-term conservation of the species. Marine species include all Australian sea snakes, seals, crocodiles, dugongs, marine turtles, seahorses and seabirds that naturally occur in the Commonwealth marine area.

Under the terms of the EPBC Act, an action (e.g. a project or development) is required to be referred to the Australian Government Environment Minister for approval if it has, will have, or is likely to have, a significant impact on an MNES. The term 'action' includes projects and developments subsequent to commencement of the Act, however there are a number of exemptions (e.g. projects in Commonwealth areas). According to Department of the Environment (2013), a 'significant impact' is an impact which is important, notable, or of consequence, having regard to its context or intensity. 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.

References:

Department of the Environment (2013). Matters of National Environmental Significance - Significant Impact Guidelines 1.1 *Environment Protection and Biodiversity Conservation Act 1999*. Department of the Environment, Canberra, Australia.

Appendix 2

EPBC Act Protected Matters and NatureMap Database Searches





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: 08/04/21 11:25:31

[Summary](#)

[Details](#)

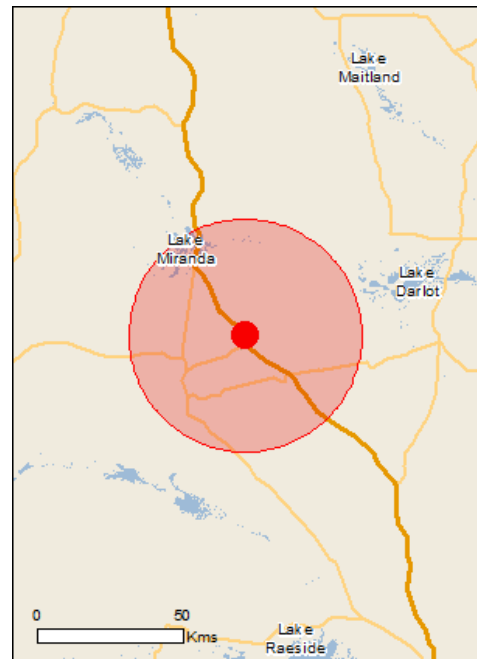
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



This map may contain data which are
©Commonwealth of Australia
(Geoscience Australia), ©PSMA 2015

[Coordinates](#)

Buffer: 40.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	5
Listed Migratory Species:	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:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	10
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	10
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Polytelis alexandrae Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat may occur within area
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	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
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species	[Resource Information]	
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area

Extra Information

Invasive Species

[[Resource Information](#)]

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

Name	Status	Type of Presence
Mammals		
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area
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
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 may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may 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

-27.91399 120.698

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.

NatureMap Species Report

Created By Guest user on 08/04/2021

Kingdom Plantae
Current Names Only Yes
Core Datasets Only Yes
Species Group All Plants
Method 'By Circle'
Centre 120° 41' 53" E, 27° 54' 50" S
Buffer 40km

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	4896 <i>Abutilon leucopetalum</i> (Desert Chinese Lantern)			
2.	3217 <i>Acacia aneura</i> (Mulga, Wanari)			
3.	3232 <i>Acacia ayersiana</i>			
4.	14622 <i>Acacia balsamea</i>			
5.	3248 <i>Acacia burkittii</i> (Sandhill Wattle)			
6.	36417 <i>Acacia caesaneura</i>			
7.	3264 <i>Acacia colletioides</i> (Wait-a-while)			
8.	3273 <i>Acacia craspedocarpa</i> (Hop Mulga)			
9.	16120 <i>Acacia donaldsonii</i>			
10.	44536 <i>Acacia doreta</i>			
11.	32118 <i>Acacia effusifolia</i>			
12.	3355 <i>Acacia grasbyi</i> (Miniritchie)			
13.	36418 <i>Acacia incurvaneura</i>			
14.	3392 <i>Acacia jamesiana</i>			
15.	3399 <i>Acacia kempeana</i> (Witchetty Bush, Ilykuwara)			
16.	3419 <i>Acacia ligulata</i> (Umbrella Bush, Watarka)			
17.	12952 <i>Acacia minyura</i>			
18.	36416 <i>Acacia mulganeura</i>			
19.	3452 <i>Acacia murrayana</i> (Sandplain Wattle)			
20.	3463 <i>Acacia nyssophylla</i>			
21.	3473 <i>Acacia oswaldii</i> (Miljee, Nelia)			
22.	36800 <i>Acacia pteraneura</i>			
23.	3507 <i>Acacia quadrimarginea</i>			
24.	3510 <i>Acacia ramulosa</i> (Horse Mulga)			
25.	19483 <i>Acacia ramulosa</i> var. <i>linophylla</i>			
26.	3545 <i>Acacia sibina</i>			
27.	18424 <i>Acacia</i> sp. Marshall Pool (G. Cockerton 3024)		P3	
28.	13070 <i>Acacia synchronicia</i>			
29.	3577 <i>Acacia tetragonophylla</i> (Kurara, Wakalpuka)			
30.	29531 <i>Acacia thoma</i>			
31.	3595 <i>Acacia victoriae</i> (Bramble Wattle, Ngatunpa)			
32.	19901 <i>Actinobole oldfieldianum</i>			
33.	4907 <i>Alyogyne pinoniana</i> (Sand Hibiscus)			
34.	2379 <i>Amyema microphylla</i>			
35.	2382 <i>Amyema nestor</i>			
36.	40917 <i>Androcalva loxophylla</i>			
37.	40910 <i>Androcalva luteiflora</i> (Yellow-flowered Rulingia)			
38.	6952 <i>Anthotroche pannosa</i> (Felted Anthotroche)			
39.	207 <i>Aristida contorta</i> (Bunched Kerosene Grass)			
40.	218 <i>Aristida obscura</i> (Brush Threawn)			
41.	1364 <i>Asphodelus fistulosus</i> (Onion Weed)	Y		
42.	<i>Asterella drummondii</i>			
43.	7846 <i>Asteridea athrixioides</i>			
44.	2451 <i>Atriplex bunburyana</i> (Silver Saltbush)			
45.	2453 <i>Atriplex codonocarpa</i> (Flat-topped Saltbush)			
46.	2459 <i>Atriplex holocarpa</i> (Pop Saltbush)			
47.	2478 <i>Atriplex spongiosa</i> (Pop Saltbush)			
48.	2479 <i>Atriplex stipitata</i> (Mallee Saltbush)			
49.	2481 <i>Atriplex vesicaria</i> (Bladder Saltbush)			
50.	17237 <i>Austrostipa elegantissima</i>			
51.	17238 <i>Austrostipa eremophila</i>			

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
52.	17246	<i>Austrostipa nitida</i>			
53.	17247	<i>Austrostipa platychaeta</i>			
54.	17251	<i>Austrostipa scabra</i>			
55.	17255	<i>Austrostipa trichophylla</i>			
56.	14473	<i>Baeckea</i> sp. Sandstone (C.A. Gardner s.n. 26 Oct. 1963)		P3	
57.	4591	<i>Bertya dimerostigma</i>			
58.	2774	<i>Boerhavia repleta</i>			
59.	11167	<i>Bonamia erecta</i>			
60.	7871	<i>Brachyscome ciliaris</i>			
61.	7413	<i>Brunonia australis</i> (Native Cornflower)			
62.	750	<i>Bulbostylis barbata</i>			
63.	2844	<i>Calandrinia balonensis</i> (Broadleaf Parakeelya)			
64.	2853	<i>Calandrinia eremaea</i> (Twining Purslane)			
65.	2860	<i>Calandrinia polyandra</i> (Parakeelya)			
66.	30396	<i>Calandrinia translucens</i>			
67.	7891	<i>Calocephalus francisii</i> (Fine-leaf Beauty-heads)			
68.	7893	<i>Calocephalus knappii</i>			
69.	7895	<i>Calocephalus multiflorus</i> (Yellow-top)			
70.	7903	<i>Calotis hispidula</i> (Bindy Eye)			
71.	7905	<i>Calotis multicaulis</i> (Many-stemmed Burr-daisy)			
72.	5446	<i>Calytrix carinata</i>			
73.	5451	<i>Calytrix desolata</i>			
74.	5456	<i>Calytrix erosipetala</i>			
75.	12373	<i>Calytrix uncinata</i>			
76.	1742	<i>Casuarina obesa</i> (Swamp Sheoak, Kuli)			
77.	12658	<i>Casuarina pauper</i> (Black Oak)			
78.	7922	<i>Cephalopterum drummondii</i> (Pompom Head)			
79.	37	<i>Cheilanthes lasiophylla</i> (Woolly Cloak Fern)			
80.	12613	<i>Chrysocephalum eremaeum</i>			
81.	12619	<i>Chthonocephalus viscosus</i>			
82.	7369	<i>Citrullus colocynthis</i>	Y		
83.	6612	<i>Convolvulus clementii</i>			
84.	11709	<i>Crassula colorata</i> var. <i>acuminata</i>			
85.	7951	<i>Cratystylis subspinescens</i> (Australian Sage, Spiny Grey Bush)			
86.	13471	<i>Cryptandra connata</i>			
87.	794	<i>Cyperus gymnocaulos</i> (Spiny Flat-sedge)			
88.	290	<i>Dactyloctenium radulans</i> (Button Grass)			
89.	7433	<i>Dampiera dentata</i>			
90.	7469	<i>Dampiera royeri</i>			
91.	6753	<i>Dicrastylis brunnea</i>			
92.	6759	<i>Dicrastylis flexuosa</i>			
93.	6774	<i>Dicrastylis sessilifolia</i>			
94.	311	<i>Digitaria ciliaris</i> (Summer Grass)	Y		
95.	2499	<i>Dissocarpus paradoxus</i> (Curious Saltbush)			
96.	4752	<i>Dodonaea adenophora</i>			
97.	4773	<i>Dodonaea petiolaris</i>			
98.	4779	<i>Dodonaea rigida</i>			
99.	11247	<i>Dodonaea viscosa</i> subsp. <i>angustissima</i>			
100.	11674	<i>Dodonaea viscosa</i> subsp. <i>mucronata</i>			
101.	11202	<i>Dodonaea viscosa</i> subsp. <i>spatulata</i> (Sticky Hop-bush)			
102.	6966	<i>Duboisia hopwoodii</i> (Pituri, Kundugu)			
103.	31274	<i>Duperreya commixta</i>			
104.	33501	<i>Dysphania cristata</i> (Crested Goosefoot)			
105.	2502	<i>Dysphania kalpari</i> (Rat's Tail, Kalpari)			
106.	33479	<i>Dysphania melanocarpa</i> (Black Crumbweed)			
107.	33597	<i>Dysphania melanocarpa</i> forma <i>melanocarpa</i> (Black Goosefoot)			
108.	33483	<i>Dysphania saxatilis</i>			
109.	12064	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i> (Barrier Saltbush)			
110.	19846	<i>Enekbatus eremaeus</i>			
111.	357	<i>Enneapogon caeruleus</i> (Limestone Grass)			
112.	365	<i>Enneapogon polyphyllus</i> (Leafy Nineawn)			
113.	378	<i>Eragrostis dielsii</i> (Mallee Lovegrass)			
114.	380	<i>Eragrostis eriopoda</i> (Woollybutt Grass, Wangurnu)			
115.	391	<i>Eragrostis parviflora</i> (Weeping Lovegrass)			
116.	392	<i>Eragrostis pergracilis</i>			
117.	36640	<i>Eragrostis</i> sp. Yeelirrie Calcrete (S. Regan LCH 26770)			
118.	2513	<i>Eremophea spinosa</i>			
119.	7180	<i>Eremophila alternifolia</i> (Poverty Bush)			
120.	7189	<i>Eremophila clarkei</i> (Turpentine Bush)			
121.	18054	<i>Eremophila conglomerata</i>			

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
122.	14895	<i>Eremophila decipiens</i> subsp. <i>decipiens</i>			
123.	7204	<i>Eremophila ericocalyx</i> (Desert Pride)			
124.	7205	<i>Eremophila exillifolia</i>			
125.	7206	<i>Eremophila falcata</i>			
126.	7207	<i>Eremophila foliosissima</i>			
127.	7208	<i>Eremophila forrestii</i> (Wilcox Bush)			
128.	15052	<i>Eremophila forrestii</i> subsp. <i>forrestii</i>			
129.	29532	<i>Eremophila galeata</i>			
130.	7219	<i>Eremophila granitica</i> (Thin-leaved Poverty Bush)			
131.	7221	<i>Eremophila homoplastica</i>			
132.	17189	<i>Eremophila hygrophana</i>			
133.	17169	<i>Eremophila latrobei</i> subsp. <i>glabra</i>			
134.	17576	<i>Eremophila latrobei</i> subsp. <i>latrobei</i>			
135.	7234	<i>Eremophila longifolia</i> (Berrigan, Tulypurpa)			
136.	16363	<i>Eremophila maculata</i> subsp. <i>brevifolia</i> (Native Fuchsia)			
137.	7239	<i>Eremophila margarethae</i> (Sandbank Poverty Bush)			
138.	7240	<i>Eremophila metallicorum</i>			
139.	15003	<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>			
140.	18570	<i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>			
141.	7250	<i>Eremophila pantonii</i>			
142.	48949	<i>Eremophila platycalyx</i> subsp. <i>Granites</i> (D.J. Edinger & G. Marsh DJE 4782)			
143.	48951	<i>Eremophila platycalyx</i> subsp. <i>Leonora</i> (J. Morrissey 252)			
144.	15055	<i>Eremophila platythamnus</i> subsp. <i>platythamnus</i>			
145.	16793	<i>Eremophila pungens</i>		P4	
146.	7269	<i>Eremophila serrulata</i> (Serrate-leaved Eremophila)			
147.	15163	<i>Eremophila shonae</i> subsp. <i>shonae</i>			
148.		<i>Eremophila</i> sp.			
149.	17163	<i>Eremophila spectabilis</i> subsp. <i>brevis</i>			
150.	15168	<i>Eremophila spuria</i>			
151.	17162	<i>Eremophila subfloccosa</i> subsp. <i>lanata</i>			
152.	408	<i>Eriachne flaccida</i> (Claypan Grass)			
153.	411	<i>Eriachne helmsii</i> (Buck Wanderrie Grass)			
154.	413	<i>Eriachne mucronata</i> (Mountain Wanderrie Grass)			
155.	417	<i>Eriachne pulchella</i> (Pretty Wanderrie)			
156.	2514	<i>Eriochiton sclerolaenoides</i> (Woolly Bindii)			
157.	7970	<i>Erodium phyllanthi</i> subsp. <i>acanthocephalum</i>			
158.	4331	<i>Erodium aureum</i>	Y		
159.	4334	<i>Erodium cicutarium</i> (Corkscrew)			
160.	4335	<i>Erodium cicutarium</i> (Blue Heronsbill)			
161.	14377	<i>Erymophyllum ramosum</i> subsp. <i>ramosum</i>			
162.	35345	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusata</i> (Blunt-budded River Red Gum)			
163.	5583	<i>Eucalyptus carlei</i> (Carle's Blackbutt)			
164.	48436	<i>Eucalyptus clelandiorum</i>			
165.	5636	<i>Eucalyptus eremicola</i>			
166.	20300	<i>Eucalyptus eremicola</i> subsp. <i>peeneri</i>			
167.	5660	<i>Eucalyptus gongylocarpa</i> (Marble Gum, Baarla)			
168.	18057	<i>Eucalyptus gypsophila</i>			
169.	5684	<i>Eucalyptus kingsmillii</i> (Kingsmill's Mallee)			
170.	5701	<i>Eucalyptus longicornis</i> (Red Morrel, Moril)			
171.	5703	<i>Eucalyptus lucasii</i> (Barlee Box)			
172.	5725	<i>Eucalyptus oldfieldii</i> (Oldfield's Mallee)			
173.	5779	<i>Eucalyptus striatocalyx</i> (Cue York Gum)			
174.	29733	<i>Eucalyptus trivalva</i> (Victoria Spring Mallee)			
175.	5803	<i>Eucalyptus youngiana</i> (Large-fruited Mallee, Yarlalbarba)			
176.	4626	<i>Euphorbia drummondii</i> (Caustic Weed, Piwi)			
177.	42869	<i>Euphorbia porcata</i>			
178.	12097	<i>Euphorbia tannensis</i> subsp. <i>eremophila</i> (Desert Spurge)			
179.	16722	<i>Euryomyrtus maidenii</i>			
180.	10977	<i>Exocarpos aphyllus</i> (Leafless Ballart)			
181.	851	<i>Fimbristylis dichotoma</i> (Eight Day Grass)			
182.	6143	<i>Glischrocaryon aureum</i> (Common Popflower)			
183.	3938	<i>Glycine canescens</i> (Silky Glycine)			
184.	7988	<i>Gnephosis arachnoidea</i> (Cobwebby-headed Gnephosis)			
185.	7525	<i>Goodenia maideniana</i>			
186.	7527	<i>Goodenia mimuloides</i>			
187.	7528	<i>Goodenia modesta</i>		P3	
188.	7529	<i>Goodenia mueckeana</i>			
189.	7533	<i>Goodenia peacockiana</i>			
190.	7558	<i>Goodenia triodiophila</i>			
191.	1963	<i>Grevillea berryana</i>			

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
192.	2019	<i>Grevillea inconspicua</i> (Cue Grevillea)		P4	
193.	13461	<i>Grevillea sarissa</i> subsp. <i>anfractifolia</i>			
194.	12822	<i>Grevillea sarissa</i> subsp. <i>bicolor</i>			
195.	13458	<i>Grevillea sarissa</i> subsp. <i>sarissa</i>			
196.	2806	<i>Gunniopsis propinqua</i>			
197.	2808	<i>Gunniopsis rodwayi</i>			
198.	16921	<i>Hakea leucoptera</i> subsp. <i>sericipes</i>			
199.	19137	<i>Hakea lorea</i> subsp. <i>lorea</i>			
200.	2182	<i>Hakea minyma</i>			
201.	6687	<i>Halgania cyanea</i> (Rough Halgania)			
202.	6176	<i>Haloragis odontocarpa</i> (Mulga Nettle)			
203.	16371	<i>Haloragis odontocarpa</i> forma <i>pterocarpa</i>			
204.	6180	<i>Haloragis trigonocarpa</i>			
205.	17722	<i>Hannafordia bissillii</i> subsp. <i>bissillii</i>			
206.	17307	<i>Heliotropium inexplicitum</i>			
207.	8045	<i>Helipterum craspedioides</i> (Yellow Billy Buttons)			
208.	6853	<i>Hemigenia exilis</i>		P4	
209.	5815	<i>Homalocalyx thryptomenoides</i>			
210.	48648	<i>Hysterobaeckea occlusa</i>			
211.	3974	<i>Indigofera georgei</i> (Bovine Indigo)			
212.	8087	<i>Isoetopsis graminifolia</i> (Cushion Grass)			
213.	6500	<i>Jasminum calcareum</i>			
214.	1176	<i>Juncus aridicola</i>			
215.	4043	<i>Kennedia prorepens</i>			
216.	2402	<i>Korthalsella leucothrix</i>		P1	
217.	13289	<i>Lawrencella davenportii</i>			
218.	4953	<i>Lawrenzia densiflora</i>			
219.	4956	<i>Lawrenzia helmsii</i> (Dunna Dunna)			
220.	19727	<i>Leiocarpa semicalva</i> subsp. <i>semicalva</i>			
221.	12628	<i>Lemooria burkittii</i>			
222.	3033	<i>Lepidium oxytrichum</i>			
223.	3037	<i>Lepidium phlebopetalum</i> (Veined Peppergrass)			
224.	4055	<i>Leptosema chambersii</i>			
225.	13258	<i>Leucochrysum stipitatum</i>			
226.	6967	<i>Lycium australe</i> (Australian Boxthorn)			
227.	2398	<i>Lysiana murrayi</i> (Mistletoe, Parka-Parka)			
228.	2533	<i>Maireana amoena</i>			
229.	2538	<i>Maireana carnosa</i> (Cottony Bluebush)			
230.	2539	<i>Maireana convexa</i> (Mulga Bluebush)			
231.	2544	<i>Maireana georgei</i> (Satiny Bluebush)			
232.	2545	<i>Maireana glomerifolia</i> (Ball Leaf Bluebush)			
233.	2555	<i>Maireana pentatropis</i>			
234.	2556	<i>Maireana planifolia</i> (Low Bluebush)			
235.	2560	<i>Maireana pyramidata</i> (Sago Bush)			
236.	2566	<i>Maireana thesioides</i> (Lax Bluebush)			
237.	2568	<i>Maireana trichoptera</i> (Downy Bluebush)			
238.	2569	<i>Maireana triptera</i> (Threewinged Bluebush)			
239.	2571	<i>Maireana villosa</i>			
240.	12949	<i>Marsdenia australis</i>			
241.	19486	<i>Melaleuca hamata</i>			
242.	20288	<i>Melaleuca interioris</i>			
243.	5991	<i>Melaleuca xerophila</i>			
244.	3050	<i>Menkea australis</i> (Fairy Spectacles)			
245.	3053	<i>Menkea sphaerocarpa</i>			
246.	29554	<i>Micromyrtus chrysodema</i>		P1	Y
247.	5995	<i>Micromyrtus flaviflora</i>			
248.	8107	<i>Minuria cunninghamii</i> (Bush Minuria)			
249.	8108	<i>Minuria gardneri</i>			
250.	8109	<i>Minuria integerrima</i> (Smooth Minuria)			
251.	8110	<i>Minuria leptophylla</i> (Minnie Daisy)			
252.	490	<i>Monachather paradoxus</i>			
253.	8116	<i>Myriocephalus guerinae</i>			
254.	11734	<i>Nicotiana rosulata</i> subsp. <i>rosulata</i>			
255.	8151	<i>Olearia stuartii</i>			
256.	17	<i>Ophioglossum lusitanicum</i> (Adders Tongue)			
257.	504	<i>Panicum effusum</i> (Hairy Panic Grass)			
258.	513	<i>Paractaenum novae-hollandiae</i> (Reflexed Panic Grass)			
259.	10975	<i>Paspalidium basicladum</i>			
260.	518	<i>Paspalidium clementii</i> (Clements Paspalidium)			
261.	519	<i>Paspalidium constrictum</i> (Knottybutt Grass)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
262.	546 <i>Perotis rara</i> (Comet Grass)			
263.	18506 <i>Philotheca tomentella</i>			
264.	17619 <i>Phyllanthus baeckeoides</i>		P3	
265.	5256 <i>Pimelea microcephala</i> (Shrubby Riceflower, Banjine)			
266.	11185 <i>Pimelea microcephala</i> subsp. <i>microcephala</i>			
267.	5267 <i>Pimelea subvillifera</i>			
268.	5271 <i>Pimelea trichostachya</i> (Spiked Riceflower)			
269.	19744 <i>Pittosporum angustifolium</i>			
270.	8167 <i>Pluchea dentex</i>			
271.	45238 <i>Podolepis aristata</i> subsp. <i>affinis</i>			
272.	8173 <i>Podolepis capillaris</i> (Wiry Podolepis)			
273.	8188 <i>Pogonolepis stricta</i>			
274.	4572 <i>Polygala isingii</i>			
275.	29098 <i>Poranthera leisperma</i>			
276.	2884 <i>Portulaca oleracea</i> (Purslane, Wakati)			
277.	12707 <i>Prostanthera albiflora</i>			
278.	15822 <i>Prostanthera althoferi</i> subsp. <i>althoferi</i>			
279.	18210 <i>Psydrax rigidula</i>			
280.	2690 <i>Ptilotus aervoides</i>			
281.	2708 <i>Ptilotus chamaecladus</i>			
282.	2721 <i>Ptilotus exaltatus</i> (Tall Mulla Mulla)			
283.	2727 <i>Ptilotus gaudichaudii</i>			
284.	2731 <i>Ptilotus helipteroides</i> (Hairy Mulla Mulla)			
285.	2747 <i>Ptilotus obovatus</i> (Cotton Bush)			
286.	11396 <i>Ptilotus obovatus</i> var. <i>obovatus</i>			
287.	2751 <i>Ptilotus polystachyus</i> (Prince of Wales Feather)			
288.	2754 <i>Ptilotus roei</i>			
289.	2755 <i>Ptilotus rotundifolius</i> (Royal Mulla Mulla)			
290.	2757 <i>Ptilotus schwartzii</i>			
291.	8196 <i>Quinqueremulus linearis</i>			
292.	2581 <i>Rhagodia drummondii</i>			
293.	2582 <i>Rhagodia eremaea</i> (Thorny Saltbush)			
294.	2584 <i>Rhagodia preissii</i>			
295.	13308 <i>Rhodanthe charsleyae</i>			
296.	13242 <i>Rhodanthe chlorocephala</i> subsp. <i>splendida</i>			
297.	13300 <i>Rhodanthe citrina</i>			
298.	13246 <i>Rhodanthe humboldtiana</i>			
299.	13238 <i>Rhodanthe maryonii</i>			
300.	42011 <i>Rhodanthe polakii</i>			
301.	13303 <i>Rhodanthe sterilesceus</i>			
302.	45148 <i>Roebuckiella ciliocarpa</i>			
303.	48884 <i>Roepera aurantiaca</i>			
304.	46434 <i>Rumex hypogaeus</i>	Y		
305.	30434 <i>Salsola australis</i>			
306.	2357 <i>Santalum lanceolatum</i> (Northern Sandalwood, Yarnguli)			
307.	2359 <i>Santalum spicatum</i> (Sandalwood, Wilarak)			
308.	7644 <i>Scaevola spinescens</i> (Currant Bush, Maroon)			
309.	13285 <i>Schoenia ayersii</i>			
310.	2606 <i>Sclerolaena cuneata</i> (Yellow Bindii)			
311.	2607 <i>Sclerolaena densiflora</i>			
312.	2608 <i>Sclerolaena deserticola</i>			
313.	2609 <i>Sclerolaena diacantha</i> (Grey Copperburr)			
314.	2611 <i>Sclerolaena eriacantha</i> (Tall Bindii)			
315.	2612 <i>Sclerolaena eurotioides</i> (Fluffy Bindii)			
316.	2613 <i>Sclerolaena fimbriolata</i>			
317.	8877 <i>Sclerolaena gardneri</i>			
318.	2625 <i>Sclerolaena obliquicuspis</i> (Limestone Bindii)			
319.	8207 <i>Senecio glossanthus</i> (Slender Groundsel)			
320.	9366 <i>Senecio gregorii</i> (Fleshy Groundsel)			
321.	8213 <i>Senecio magnificus</i> (Showy Groundsel)			
322.	17645 <i>Senna artemisioides</i>			
323.	12276 <i>Senna artemisioides</i> subsp. <i>filifolia</i>			
324.	17558 <i>Senna artemisioides</i> subsp. <i>x artemisioides</i>			
325.	12283 <i>Senna artemisioides</i> subsp. <i>x sturtii</i>			
326.	18444 <i>Senna charlesiana</i>			
327.	18449 <i>Senna glaucifolia</i>			
328.	12305 <i>Senna glutinosa</i> subsp. <i>chatelainiana</i>			
329.	18440 <i>Senna manicula</i>			
330.	14577 <i>Senna</i> sp. <i>Meekatharra</i> (E. Bailey 1-26)			
331.	18446 <i>Senna stowardii</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
332.	46816 <i>Seringia elliptica</i> (Showy fire-bush)			
333.	46824 <i>Seringia velutina</i> (Velvet firebush)			
334.	613 <i>Setaria verticillata</i> (Whorled Pigeon Grass)	Y		
335.	4966 <i>Sida arenicola</i>			
336.	31759 <i>Sida ectogama</i>			
337.	31854 <i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925)			
338.	19712 <i>Sida</i> sp. dark green fruits (S. van Leeuwen 2260)			
339.	16924 <i>Sida spodochroma</i>			
340.	<i>Solanum chrysotrichum</i>			Y
341.	6998 <i>Solanum cleistogamum</i>			
342.	7018 <i>Solanum lasiophyllum</i> (Flannel Bush, Mindjulu)			
343.	7022 <i>Solanum nigrum</i> (Black Berry Nightshade)	Y		
344.	7023 <i>Solanum nummularium</i> (Money-leaved Solanum)			
345.	7026 <i>Solanum orbiculatum</i> (Wild Tomato)			
346.	7030 <i>Solanum plicatile</i>			
347.	4732 <i>Stackhousia megaloptera</i>			
348.	19555 <i>Stackhousia muricata</i> subsp. <i>annual</i> (W.R. Barker 2172)			
349.	3076 <i>Stenopetalum filifolium</i>			
350.	7740 <i>Stylidium induratum</i> (Desert Triggerplant)			
351.	4217 <i>Swainsona beasleyana</i>			
352.	13590 <i>Swainsona halophila</i>			
353.	4230 <i>Swainsona incei</i>			
354.	4231 <i>Swainsona kingii</i>			
355.	4233 <i>Swainsona leeana</i>			
356.	4238 <i>Swainsona oroboides</i> (Variable Swainsona)			
357.	13581 <i>Swainsona paradoxa</i>			
358.	12357 <i>Swainsona purpurea</i>			
359.	13585 <i>Swainsona tenuis</i>			
360.	33319 <i>Tecticornia indica</i> subsp. <i>bidens</i>			
361.	31835 <i>Tecticornia laevigata</i>			
362.	33216 <i>Tecticornia</i> sp. <i>Dennys Crossing</i> (K.A. Shepherd & J. English KS 552)			
363.	31717 <i>Tecticornia undulata</i>			
364.	2822 <i>Tetragonia eremaea</i>			
365.	48603 <i>Teucrium teucriiflorum</i>			
366.	673 <i>Themeda triandra</i>			
367.	6054 <i>Thryptomene decussata</i>			
368.	6062 <i>Thryptomene nealensis</i>		P3	
369.	20826 <i>Thryptomene</i> sp. <i>Leinster</i> (B.J. Lepschi & L.A. Craven 4362)		P3	
370.	675 <i>Thyridolepis multiculmis</i> (Soft Wanderrie Grass)			
371.	1343 <i>Thysanotus patersonii</i>			
372.	29457 <i>Thysanotus</i> sp. <i>Eremaean</i> (S. van Leeuwen 1067)			
373.	6268 <i>Trachymene cyanopetala</i>			
374.	4374 <i>Tribulus astrocarpus</i>			
375.	4380 <i>Tribulus occidentalis</i> (Perennial Caltrop)			
376.	4383 <i>Tribulus terrestris</i> (Caltrop)	Y		
377.	6727 <i>Trichodesma zeylanicum</i> (Camel Bush, Kumbalin)			
378.	4316 <i>Trigonella suavissima</i> (Sweet Fenugreek)			
379.	680 <i>Triodia basedowii</i> (Lobed Spinifex)			
380.	48319 <i>Tripogonella loliiformis</i>			
381.	7656 <i>Velleia cynopotamica</i>			
382.	7660 <i>Velleia glabrata</i> (Pee the Bed)			
383.	7664 <i>Velleia rosea</i> (Pink Velleia)			
384.	6092 <i>Verticordia jamiesonii</i>		P3	
385.	8273 <i>Vittadinia sulcata</i>			
386.	8275 <i>Waitzia acuminata</i> (Orange Immortelle)			
387.	1392 <i>Wurmbea deserticola</i>			

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.

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Created By Victoria Ford on 17/03/2021

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 120° 41' 58" E, 27° 54' 50" S
Buffer 40km
Group By Kingdom

Kingdom	Species	Records
Animalia	151	623
TOTAL	151	623

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Animalia				
1.	24559 <i>Acanthagenys rufogularis</i> (Spiny-cheeked Honeyeater)			
2.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
3.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
4.	24264 <i>Acanthiza robustirostris</i> (Slaty-backed Thornbill)			
5.	24265 <i>Acanthiza uropygialis</i> (Chestnut-rumped Thornbill)			
6.	25544 <i>Aegotheles cristatus</i> (Australian Owlet-nightjar)			
7.	24301 <i>Aegotheles cristatus</i> subsp. <i>cristatus</i> (Australian Owlet-nightjar)			
8.	24312 <i>Anas gracilis</i> (Grey Teal)			
9.	<i>Anidiops villosus</i>			
10.	24087 <i>Antechinomys laniger</i> (Kultarr)			
11.	24561 <i>Anthochaera carunculata</i> (Red Wattlebird)			
12.	25528 <i>Aphelocephala leucopsis</i> (Southern Whiteface)			
13.	24268 <i>Aphelocephala nigricincta</i> (Banded Whiteface)			
14.	24285 <i>Aquila audax</i> (Wedge-tailed Eagle)			
15.	24341 <i>Ardea pacifica</i> (White-necked Heron)			
16.	24610 <i>Ardeotis australis</i> (Australian Bustard)			
17.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
18.	<i>Barnardius zonarius</i>			
19.	24725 <i>Cacatua roseicapilla</i> subsp. <i>assimilis</i> (Galah)			
20.	42307 <i>Cacomantis pallidus</i> (Pallid Cuckoo)			
21.	24269 <i>Calamanthus campestris</i> (Rufous Fieldwren)			
22.	24377 <i>Charadrius ruficapillus</i> (Red-capped Plover)			
23.	24321 <i>Chenonetta jubata</i> (Australian Wood Duck, Wood Duck)			
24.	47909 <i>Cheramoeca leucosterna</i> (White-backed Swallow)			
25.	25580 <i>Cinclosoma castaneothorax</i> (Chestnut-breasted Quail-thrush)			
26.	24774 <i>Cladorhynchus leucocephalus</i> (Banded Stilt)			
27.	25581 <i>Climacteris affinis</i> (White-browed Treecreeper)			
28.	24393 <i>Climacteris affinis</i> subsp. <i>superciliosa</i> (White-browed Treecreeper)			
29.	25675 <i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
30.	24361 <i>Coracina maxima</i> (Ground Cuckoo-shrike)			
31.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
32.	24416 <i>Corvus bennetti</i> (Little Crow)			
33.	25593 <i>Corvus orru</i> (Torresian Crow)			
34.	24420 <i>Cracticus nigrogularis</i> (Pied Butcherbird)			
35.	25595 <i>Cracticus tibicen</i> (Australian Magpie)			
36.	25596 <i>Cracticus torquatus</i> (Grey Butcherbird)			
37.	<i>Cryptoerithus occultus</i>			
38.	24875 <i>Ctenophorus isolepis</i> subsp. <i>gularis</i> (Central Military Dragon)			
39.	24886 <i>Ctenophorus reticulatus</i> (Western Netted Dragon)			
40.	24888 <i>Ctenophorus salinarum</i> (Salt Pan Dragon)			
41.	25025 <i>Ctenotus ariadnae</i>			
42.	25041 <i>Ctenotus grandis</i> subsp. <i>grandis</i>			
43.	25045 <i>Ctenotus helenae</i>			
44.	25052 <i>Ctenotus leonhardii</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
45.	24322 <i>Cygnus atratus</i> (Black Swan)			
46.	24997 <i>Delma butleri</i>			
47.	24930 <i>Diplodactylus granariensis</i> subsp. <i>rex</i>			
48.	24940 <i>Diplodactylus pulcher</i>			
49.	24470 <i>Dromaius novaehollandiae</i> (Emu)			
50.	<i>Elanus axillaris</i>			
51.	47937 <i>Elseya melanops</i> (Black-fronted Dotterel)			
52.	<i>Eolophus roseicapillus</i>			
53.	24568 <i>Epthianura aurifrons</i> (Orange Chat)			
54.	24570 <i>Epthianura tricolor</i> (Crimson Chat)			
55.	24379 <i>Erythronyx cinctus</i> (Red-kneed Dotterel)			
56.	24368 <i>Eurostopodus argus</i> (Spotted Nightjar)			
57.	25621 <i>Falco berigora</i> (Brown Falcon)			
58.	24471 <i>Falco berigora</i> subsp. <i>berigora</i> (Brown Falcon)			
59.	25622 <i>Falco cenchroides</i> (Australian Kestrel, Nankeen Kestrel)			
60.	25623 <i>Falco longipennis</i> (Australian Hobby)			
61.	25624 <i>Falco peregrinus</i> (Peregrine Falcon)		S	
62.	25301 <i>Furina ornata</i> (Moon Snake)			
63.	42314 <i>Gavicalis virescens</i> (Singing Honeyeater)			
64.	24959 <i>Gehyra variegata</i>			
65.	25530 <i>Gerygone fusca</i> (Western Gerygone)			
66.	24443 <i>Grallina cyanoleuca</i> (Magpie-lark)			
67.	24295 <i>Haliastur sphenurus</i> (Whistling Kite)			
68.	24297 <i>Hamirostra melanosternon</i> (Black-breasted Buzzard)			
69.	24961 <i>Heteronotia binoei</i> (Bynoe's Gecko)			
70.	<i>Heteropoda hermitis</i>			
71.	25734 <i>Himantopus himantopus</i> (Black-winged Stilt)			
72.	24491 <i>Hirundo neoxena</i> (Welcome Swallow)			
73.	24557 <i>Leipoa ocellata</i> (Malleefowl)		T	
74.	25130 <i>Lerista desertorum</i>			
75.	42411 <i>Lerista timida</i>			
76.	25661 <i>Lichmera indistincta</i> (Brown Honeyeater)			
77.	41411 <i>Liopholis inornata</i> (Desert Skink)			
78.	41420 <i>Lucasium bungabinna</i> (Southern Sand Plain Gecko)			
79.	42415 <i>Lucasium squarrosum</i>			
80.	<i>Lycosa woonda</i>			
81.	25652 <i>Malurus leucopterus</i> (White-winged Fairy-wren)			
82.	24583 <i>Manorina flavigula</i> (Yellow-throated Miner)			
83.	47997 <i>Melanodryas cucullata</i> (Hooded Robin)			
84.	24736 <i>Melopsittacus undulatus</i> (Budgerigar)			
85.	25184 <i>Menetia greyii</i>			
86.	25545 <i>Mirafr javanica</i> (Horsfield's Bushlark, Singing Bushlark)			
87.	<i>Missulena occatoria</i>			
88.	24904 <i>Moloch horridus</i> (Thorny Devil)			
89.	25190 <i>Morethia butleri</i>			
90.	24223 <i>Mus musculus</i> (House Mouse)	Y		
91.	25422 <i>Neobatrachus aquilonius</i> (Northern Burrowing Frog)			
92.	25425 <i>Neobatrachus kunapalari</i> (Kunapalari Frog)			
93.	25427 <i>Neobatrachus sutor</i> (Shoemaker Frog)			
94.	25428 <i>Neobatrachus wilsmorei</i> (Plonking Frog)			
95.	24737 <i>Neophema bourkii</i> (Bourke's Parrot)			
96.	<i>Neopsephotus bourkii</i>			
97.	<i>Nephila edulis</i>			
98.	24971 <i>Nephurus vertebralis</i>			
99.	24094 <i>Ningau ridei</i> (Wongai Ningau)			
100.	<i>Notsodipus capensis</i>			
101.	24742 <i>Nymphicus hollandicus</i> (Cockatiel)			
102.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
103.	24618 <i>Oreoica gutturalis</i> (Crested Bellbird)			
104.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
105.	25254 <i>Parasuta monachus</i>			
106.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
107.	<i>Pediana occidentalis</i>			
108.	<i>Pediana tenuis</i>			
109.	48061 <i>Petrochelidon nigricans</i> (Tree Martin)			
110.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
111.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			
112.	24748 <i>Platycercus varius</i> (Mulga Parrot)			
113.	42306 <i>Platyplectrum spenceri</i> (Centralian Burrowing Frog)			
114.	25703 <i>Podargus strigoides</i> (Tawny Frogmouth)			

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
115.	24681	<i>Poliiocephalus poliocephalus</i> (Hoary-headed Grebe)			
116.	24683	<i>Pomatostomus superciliosus</i> (White-browed Babbler)			
117.	25706	<i>Pomatostomus temporalis</i> (Grey-crowned Babbler)			
118.	24106	<i>Pseudantechinus woolleyae</i> (Woolley's Pseudantechinus)			
119.	24237	<i>Pseudomys hermannsburgensis</i> (Sandy Inland Mouse)			
120.	25434	<i>Pseudophryne occidentalis</i> (Western Toadlet)			
121.	24390	<i>Psophodes occidentalis</i> (Western Wedgebill, Chiming Wedgebill)			
122.		<i>Ptilonorhynchus guttatus</i>			
123.	42344	<i>Purnella albifrons</i> (White-fronted Honeyeater)			
124.	25009	<i>Pygopus nigriceps</i>			
125.	24278	<i>Pyrrholaemus brunneus</i> (Redthroat)			
126.	24776	<i>Recurvirostra novaehollandiae</i> (Red-necked Avocet)			
127.	25614	<i>Rhipidura leucophrys</i> (Willie Wagtail)			
128.		<i>Scolopendra laeta</i>			
129.		<i>Selenotholus foelschei</i>			
130.	25266	<i>Simoselaps bertholdi</i> (Jan's Banded Snake)			
131.	30948	<i>Smicrornis brevirostris</i> (Weebill)			
132.	24109	<i>Sminthopsis dolichura</i> (Little long-tailed Dunnart)			
133.	24116	<i>Sminthopsis macroura</i> (Stripe-faced Dunnart)			
134.	25597	<i>Strepera versicolor</i> (Grey Currawong)			
135.	24923	<i>Strophurus assimilis</i> (Goldfields Spiny-tailed Gecko)			
136.	24946	<i>Strophurus strophurus</i>			
137.	24949	<i>Strophurus wellingtonae</i>			
138.		<i>Supunna funerea</i>			
139.	25269	<i>Suta fasciata</i> (Rosen's Snake)			
140.	24331	<i>Tadorna tadornoides</i> (Australian Shelduck, Mountain Duck)			
141.	30870	<i>Taeniopygia guttata</i> (Zebra Finch)			
142.	24851	<i>Turnix velox</i> (Little Button-quail)			
143.	30814	<i>Tympanocryptis cephalus</i> (Pebble Dragon)			
144.	25762	<i>Tyto alba</i> (Barn Owl)			
145.	24983	<i>Underwoodisaurus millii</i> (Barking Gecko)			
146.		<i>Urodacus armatus</i>			
147.		<i>Urodacus hoplurus</i>			
148.	24386	<i>Vanellus tricolor</i> (Banded Lapwing)			
149.	25211	<i>Varanus caudolineatus</i>			
150.	25212	<i>Varanus eremius</i> (Pygmy Desert Monitor)			
151.	25223	<i>Varanus panoptes subsp. rubidus</i>			

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.

Appendix 3

Likelihood of Significant Flora Occurring in the Study Area



Species	Conservation Status	Habitat and Habit ((WA Herbarium 2021) unless otherwise stated)	TPFL	WA Herb	Cockerton & Stratford (1997)	WB (2011)	WB (2017)	Stanley (2018)	WB (2020)	Distance from Study Area*	Likelihood of Occurrence
<i>Attriplex yeelirrie</i>	Threatened	Shrub. Found in intermittently waterlogged clay playas on palaeodrainage channels (Western Botanical 2011).	-	-	-	✓	-	-	-	>50 km NW.	Would not occur. Nearest record (NR) a great distance from study area and no suitable habitat available.
<i>Seringia exostia</i>	Threatened ^a	Shrub. Found in red sandy soils on sandplains, dunes and breakaways.	-	✓	-	-	-	-	-	37 km NNW.	Unlikely to occur. Some habitat available but NR is considerable distance from study area.
<i>Anacampteros</i> sp. Eremdean (F. Hort, J. Hort & J. Shanks 3248)	Priority 1	Erect, single-stemmed, tuberous, perennial herb with succulent green leaves growing to 0.1 m tall. White flowers in September. Grows in sand patches inside rocks, on brown sandy clay and granite, on depressions in rock outcrops, breakaways and flats.	✓	✓	-	-	✓	-	-	50 km N.	Unlikely to occur. NR a great distance from study area.
<i>Frankenia georgei</i>	Priority 1	This small shrub has pink flowers in December. Occurs on rocky slopes.	-	✓	-	-	-	-	-	48 km N.	Unlikely to occur. NR a great distance from study area.
<i>Korthalsella leucothrix</i>	Priority 1	An aerial parasitic shrub with obtuse leaf apices and c. 20 white flowers per node. Flowers in August. Found on <i>Acacia acuminata</i> and <i>A. craspedocarpa</i> .	✓	✓	-	-	-	-	-	19 km SE.	May occur. NR is considerable distance however host species is present in study area.
<i>Micromyrtus chrysodema</i>	Priority 1	Densely branched shrub. Occurs on red sands on sandplains.	✓	✓	-	-	-	-	-	35 km SE.	Unlikely to occur. Habitat available however NR is considerable distance from study area.

Species	Conservation Status	Habitat and Habit ((WA Herbarium 2021) unless otherwise stated)	TPFL	WA Herb	Cockerton & Stratford (1997)	WB (2011)	WB (2017)	Stantec (2018)	WB (2020)	Distance from Study Area*	Likelihood of Occurrence
<i>Neurachne lanigera</i>	Priority 1	Tufted perennial grass to 0.3 m tall flowering from July to August or October. Grows in red sand and laterite on rocky outcrops and plains.	-	-	-	✓	-	-	-	>50 km NW.	Unlikely to occur. NR a great distance from study area.
<i>Philotheca tubiflora</i>	Priority 1	Compact, densely branched shrub to 0.6 m tall with pink-white flowers in June to October. Found on rocky rises, hills and outcrops.	-	✓	-	-	-	-	-	>50 km ESE.	Unlikely to occur. NR a great distance from study area.
<i>Stenanthemum patens</i>	Priority 1	Shrub growing to ~0.5 m tall; found on rocky hillsides.	✓	✓	-	-		-	-	>50 km SE.	Would not occur. NR a great distance from study area and no suitable habitat available.
<i>Swainsona katijarra</i>	Priority 1	Open annual herb to 0.5 m tall, with several stems radiating from a slender taproot (Davis and Hammer 2020).	-	✓	-	-	-	-	-	39 km NW.	Unlikely to occur. NR is considerable distance from study area.
<i>Calytrix warburtonensis</i>	Priority 2	A shrub growing to 0.6 m tall with white flowers in March or from September to October. Occurs on rocky hills and breakaways.	✓	-	-	-	-	-	-	>50 km NW.	Unlikely to occur. NR a great distance from study area.
<i>Eremophila</i> sp. long pedicels (G. Cockerton 1975)	Priority 2	Low shrub to 0.6 m tall with purple flowers in September. It occurs in dark red hardpans over paleochannels in Mulga woodlands.	-	✓	-	-	-	-	-	>50 km N.	Unlikely to occur. NR a great distance from study area.
<i>Hilbertia</i> sp. Sherwood Breakaways (R.J. Cranfield 6771)	Priority 2	Shrub to 1 m tall with dark green, glabrous, glossy, pungent needle-like leaves and large yellow flowers. Found on low remnant laterite capped hills and granite breakaway plateaux.	-	✓	-	-	-	-	-	>50 km N.	Unlikely to occur. NR a great distance from study area.
<i>Acacia</i> sp. Marshall Pool (G. Cockerton 3024)	Priority 3	Tall shrub to small tree.	-	✓	-	-	-	-	-	>50 km SE.	Unlikely to occur. NR is a great distance from study area.
<i>Aristida jerichoensis</i> var <i>. subspinuifera</i>	Priority 3	Compactly tufted perennial, grass growing to 0.8 m tall with a muricate lemma groove. Occurs on hardpan plains.	-	-	-	-	✓	-	-	>50 km N.	Unlikely to occur. NR a great distance from study area.

Species	Conservation Status	Habitat and Habit (WA Herbarium 2021) unless otherwise stated)	TPFL	WA Herb	Cockerton & Stratford (1997)	WB (2011)	WB (2017)	Stantec (2018)	WB (2020)	Distance from Study Area*	Likelihood of Occurrence
<i>Austroparmelia macrospora</i>	Priority 3	Lichen. Found on sheltered dry bark of shrubs or sheltered to exposed dry wood on ground (Western Botanical 2017).	✓	✓	-	-	-	-	-	49 km N.	Unlikely to occur. NR a great distance from study area.
<i>Baeckea</i> sp. Sandstone (C.A. Gardner s.n. 26 Oct. 1963)	Priority 3	Upright shrub growing to 1 m tall with white flowers in October. Found on orange sand on flats.	✓	✓	-	✓	-	-	-	25 km SW.	Unlikely to occur. Habitat available however NR is considerable distance from study area.
<i>Bossiaea eremaea</i>	Priority 3	Divicately branched, spreading shrub growing to 1.2 m tall with red, yellow, or purple-brown flowers in July to September. Found on deep red sand.	-	✓	-	✓	-	-	✓	>50 km N.	Unlikely to occur. NR a great distance from study area.
<i>Calytrix praecipua</i>	Priority 3	A shrub growing to 0.7 m tall with pink-white flowers in June to July or September to November. Grows in skeletal sandy soils over granite or laterite on breakaways and rock outcrops.	-	✓	-	-	-	-	-	>50 km SE.	Unlikely to occur. NR a great distance from study area.
<i>Eremophila arachnoides</i> subsp. <i>arachnoides</i>	Priority 3	A broom-like shrub to 3 m tall; its branches have circular, discrete tubercles. The species has white or blue-purple flowers in September. Found growing in shallow loam over limestone.	-	✓	-	✓	-	-	-	>50 km SW.	Unlikely to occur. NR a great distance from study area.
<i>Euryomyrtus inflata</i>	Priority 3	Shrub to 0.7 m tall with dull green leaves and erect fruits. It has white flowers from June to July. Occurs in deep red sand on flat plains.	-	-	-	✓	-	-	✓	>50 km NW.	Unlikely to occur. NR a great distance from study area.
<i>Goodenia modesta</i>	Priority 3	Herb to 0.5 m tall with yellow flowers from January to December (likely). Occurs on red loam and sand.	✓	✓	-	-	-	-	-	26 km N.	Unlikely to occur. NR a considerable distance from study area.
<i>Hibiscus krichauffianus</i>	Priority 3	Low or ascending shrub to 0.7 m tall with purple-pink flowers in March or October. Found in red sandy soils.	-	-	-	-	✓	-	-	>50 km N.	Unlikely to occur. NR a great distance from study area.
<i>Homalocalyx echinulatus</i>	Priority 3	A shrub growing to 1 m tall with pink flowers from June to September. Occurs on laterite on breakaways and sandstone hills.	-	✓	-	-	-	-	-	>50 km W.	Unlikely to occur. NR a great distance from study area.

Species	Conservation Status	Habitat and Habit (WA Herbarium 2021) unless otherwise stated)	TPFL	WA Herb	Cockerton & Stratford (1997)	WB (2011)	WB (2017)	Stantec (2018)	WB (2020)	Distance from Study Area*	Likelihood of Occurrence
<i>Hybanthus floribundus</i> subsp. <i>chloroxanthus</i>	Priority 3	Multi-stemmed shrub to 0.7 m tall with blue and white flowers in August to October. Occurs in dark red-brown soil rich in iron oxide and laterite; never sandy soil. Found in rocky areas, creek banks and along drainage lines.	-	✓	-	-	✓	-	-	>50 km NNW.	Unlikely to occur. NR a great distance from study area.
<i>Mirbelia ferricola</i>	Priority 3	Erect spindly or broom-like shrub with angular, spineless, glabrous stems. Flowers in August, September and October.	-	✓	-	-	-	-	-	43 km WSW.	Unlikely to occur. NR a great distance from study area.
<i>Olearia mucronata</i>	Priority 3	Densely branched, unpleasantly aromatic shrub to 1 m tall with white and yellow flowers from August to December or in January. Found on schistose hills and along drainage channels.	-	✓	-	-	-	-	-	>50 km NNW.	Unlikely to occur. NR a great distance from study area.
<i>Phyllanthus baeckeoides</i>	Priority 3	Shrub growing to 1.5 m tall with white-yellow or green-yellow flowers from July to September. Occurs on red lateritic and sandy clay soils on granite outcrops.	✓	✓	-	-	-	-	-	9 km N.	Unlikely to occur. Very minor suitable habitat in study area.
<i>Sauropus</i> sp. <i>Woolgorong</i> (M. Officer s.n. 10/8/94)	Priority 3	Shrub to 1 m tall with yellow flowers in June. Occurs in red sand on plains.	-	-	-	✓	-	-	-	>50 km NW.	Unlikely to occur. NR a great distance from study area.
<i>Sida picklesiana</i>	Priority 3	Herb to shrub flowering in April, August or November.	-	-	-	-	✓	-	-	>50 km N.	Unlikely to occur. NR a great distance from study area.
<i>Tecticornia cymbiformis</i>	Priority 3	Erect, perennial shrub growing to 0.5 m tall. Occurs in saline soils along the edge of creeklines.	-	✓	-	-	-	-	-	>50 km NW.	Would not occur. NR a great distance from study area and no suitable habitat available.
<i>Thryptomene neelensis</i>	Priority 3	Shrub growing to ~0.3 m tall with pink flowers in October. Found on lateritic breakaways.	-	✓	-	-	-	-	-	14 km NE.	Unlikely to occur. Very minor suitable habitat in study area.

Species	Conservation Status	Habitat and Habit ((WA Herbarium 2021) unless otherwise stated)	TPFL	WA Herb	Cockerton & Stratford (1997)	WB (2011)	WB (2017)	Stantec (2018)	WB (2020)	Distance from Study Area*	Likelihood of Occurrence
<i>Thryptomene</i> sp. Leinster (B.J. Lepski & L.A. Craven 4362)	Priority 3	Upright to sprawling shrub to 2.5 m tall, producing white to pink flowers from October to December. Occurs on rocky Archaeoan granite breakaways, stony rises and rocky granite outcroppings (Western Botanical 2017).	✓	✓	-	✓	✓	-	-	Historical record inside SA in now-cleared townsite location. NR 250 m S.	Unlikely to occur. Very minor suitable habitat in study area.
<i>Tribulus adelaecanthus</i>	Priority 3	Prostrate villous herb with leaflets in pairs of 3 to 6 and 5-winged fruits lacking spines.	-	-	-	-	✓	-	-	>50 km N.	Unlikely to occur. NR a great distance from study area.
<i>Verticordia jamiesonii</i>	Priority 3	Shrub to 0.6 m tall with white or pink flowers from September to October. Occurs in sandy clay soils on lateritic breakaways.	-	✓	-	-	✓	-	-	>50 km N.	Unlikely to occur. NR a great distance from study area.
<i>Comesperma viscidulum</i>	Priority 4	A shrub to ~0.7 m tall.	-	-	-	✓	-	-	-	>50 km NW.	Unlikely to occur. NR a great distance from study area.
<i>Eremophila pungens</i>	Priority 4	Erect, viscid shrub growing to 1.5 m tall with purple-violet flowers from June to August. Occurs in sandy loam and clayey sand over laterite on plains, ridges and breakaways.	-	✓	-	-	-	✓	-	7 km N.	May occur: some habitat available, however not recorded during field survey.
<i>Grevillea inconspicua</i>	Priority 4	Intricately branched, spreading shrub to 2 m tall with white to pink-white flowers from June to August. Occurs in loam soils with gravel along drainage lines and on rocky outcrops.	✓	✓	✓	-	✓	✓	-	8 km N.	May occur: some habitat available, however not recorded during field survey.
<i>Hemigenia exilis</i>	Priority 4	Erect, multi-stemmed shrub to 2 m tall with blue-purple or white flowers in April or September to November. Found on laterite on breakaways and slopes.	✓	✓	✓	-	✓	-	-	5 km N.	May occur: some habitat available, however not recorded during field survey.

Species	Conservation Status	Habitat and Habit ((WA Herbarium 2021) unless otherwise stated)	TPFL	WA Herb	Cockerton & Stafford (1997)	WB (2011)	WB (2017)	Stantec (2018)	WB (2020)	Distance from Study Area *	Likelihood of Occurrence
<i>Olearia arida</i>	Priority 4	Erect shrub to 0.4 m tall with white flowers from July to September. Occurs on red or yellow sand on undulating low rises.	-	✓	-	✓	-	-	-	>50 km NW.	Unlikely to occur. NR a great distance from study area.
<i>Paspalidium distans</i>	Priority 4	Rhizomatous, tufted perennial, grass to 0.8 m tall, flowering from March to September. Occurs on loam soils on river banks.	-	-	-	-	✓	-	-	>50 km N.	Unlikely to occur. NR a great distance from study area.

* Distance of the nearest record.

^a While still formally listed as Threatened flora, *Seringia exasfia* is no longer considered to be threatened by the DBCA due to a recent taxonomic study that found that *S. exasfia* is the same entity as the widespread and common *S. elliptica*.

Appendix 4

Fauna Returned from Desktop Study



A4.1: Mammals identified in desktop study

Family / Species	Common Name	Status		Source			
		BC Act	EPBC Act	NatureMap	PMST	ALA	This survey
Dasyuridae							
<i>Antechinomys laniger</i>	Kultarr			•		•	
<i>Ningauai ridei</i>	Wongai Ningauai			•		•	
Macropodidae							
<i>Osphranter robustus</i>	Euro, Biggada					•	•
<i>Osphranter rufus</i>	Red Kangaroo, Marlu						•
Muridae							
<i>Mus musculus</i> *	House Mouse*			•	•	•	
<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse			•		•	
Leporidae							
<i>Oryctolagus cuniculus</i> *	Rabbit*				•		•
Vespertilionidae							
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat					•	
Canidae							
<i>Canis familiaris</i> *	Dog*				•		•
<i>Vulpes vulpes</i> *	Red Fox*				•		
Felidae							
<i>Felis catus</i> *	Cat*				•		
Equidae							
<i>Equus asinus</i> *	Donkey*				•		
Camelidae							
<i>Camelus dromedarius</i> *	Dromedary, Camel*				•		
Bovidae							
<i>Bos taurus</i> *	European Cattle*						•
<i>Capra hircus</i> *	Goat*				•		

A4.2: Birds identified in desktop study

Family / Species	Common Name	Status		Source			
		BC Act	EPBC Act	NatureMap	PMST	ALA	This survey
Casuariidae							
<i>Dromaius novaehollandiae</i>	Emu			•		•	•
Anatidae							
<i>Cygnus atratus</i>	Black Swan					•	•
<i>Tadorna tadornoides</i>	Australian Shelduck			•		•	•
<i>Malacorhynchus membranaceus</i>	Pink-eared Duck						•
<i>Chenonetta jubata</i>	Maned Duck			•		•	
<i>Anas superciliosa</i>	Pacific Black Duck						•
<i>Anas gracilis</i>	Grey Teal			•		•	•
Megapodiidae							
<i>Leipoa ocellata</i>	Malleefowl	VU	VU		•		
Podargidae							
<i>Podargus strigoides</i>	Tawny Frogmouth			•		•	
Caprimulgidae							
<i>Eurostopodus argus</i>	Spotted Nightjar		MA	•		•	
Aegothelidae							
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar			•		•	
Otididae							
<i>Ardeotis australis</i>	Australian Bustard					•	
Cuculidae							
<i>Chrysococcyx basalis</i>	Horsfield's Bronze Cuckoo					•	
<i>Chrysococcyx osculans</i>	Black-eared Cuckoo	M		•	•	•	
<i>Cacomantis pallidus</i>	Pallid Cuckoo	M		•		•	
Columbidae							
<i>Phaps chalcoptera</i>	Common Bronzewing			•		•	•
<i>Ocyphaps lophotes</i>	Crested Pigeon			•		•	•
<i>Geopelia cuneata</i>	Diamond Dove					•	•
Podicipedidae							
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe						•
<i>Poliocephalus poliocephalus</i>	Hoary-headed Grebe					•	•
Recurvirostridae							
<i>Himantopus leucocephalus</i>	Pied Stilt		MA	•		•	•
Charadriidae							
<i>Vanellus tricolor</i>	Banded Lapwing			•		•	
<i>Erythronyx cinctus</i>	Red-kneed Dotterel			•		•	
<i>Charadrius veredus</i>	Oriental Plover	MI	MI/MA		•		
<i>Euseyonis melanops</i>	Black-fronted Dotterel			•		•	
Scolopacidae							
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	MI	MI/MA		•		
<i>Calidris melanotos</i>	Pectoral Sandpiper	MI	MI/MA		•		
<i>Actitis hypoleucos</i>	Common Sandpiper	MI	MI/MA		•		
Laridae							
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		MA			•	
<i>Gelochelidon [nilotica] macrotarsa</i>	Australian [Gull-billed] Tern	MI	MI/MA			•	
<i>Onychoprion fuscatus</i>	Sooty Tern		MA			•	
<i>Chlidonias hybrida</i>	Whiskered Tern		MA			•	
Threskiornithidae							
<i>Threskiornis spinicollis</i>	Straw-Necked Ibis		MA			•	
<i>Platalea flavipes</i>	Yellow-Billed Spoonbill					•	
Ardeidae							

Family / Species	Common Name	Status		Source			
		BC Act	EPBC Act	NatureMap	PMST	ALA	This survey
<i>Egretta novaehollandiae</i>	White-faced Heron						•
Accipitridae							
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard			•		•	
<i>Aquila audax</i>	Wedge-tailed Eagle			•		•	•
<i>Circus assimilis</i>	Spotted Harrier					•	
<i>Haliastur sphenurus</i>	Whistling Kite		MA			•	•
Tytonidae							
<i>Tyto javanica</i>	Eastern Barn Owl			•			
Strigidae							
<i>Ninox boobook</i>	Australian Boobook		MA			•	
Alcedinidae							
<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher					•	
Meropidae							
<i>Merops ornatus</i>	Rainbow Bee-eater				•		
Falconidae							
<i>Falco cenchroides</i>	Nankeen Kestrel		MA	•		•	
<i>Falco longipennis</i>	Australian Hobby		MA	•		•	•
<i>Falco berigora</i>	Brown Falcon			•		•	
<i>Falco hypoleucos</i>	Grey Falcon	VU	VU		•		
Cacatuidae							
<i>Nymphicus hollandicus</i>	Cockatiel			•		•	•
<i>Eolophus roseicapilla</i>	Galah			•		•	•
Psittaculidae							
<i>Polytelis alexandrae</i>	Princess Parrot	P4	VU		•		
<i>Psephotellus varius</i>	Mulga Parrot			•		•	
<i>Barnardius zonarius</i>	Australian Ringneck			•		•	•
<i>Pezoporus occidentalis</i>	Night parrot	CR	CR		•		
<i>Neopsephotus bourkii</i>	Bourke's Parrot			•		•	•
<i>Melopsittacus undulatus</i>	Budgerigar			•		•	
Ptilonorhynchidae							
<i>Chlamydera guttata</i>	Western Bowerbird			•		•	•
Climacteridae							
<i>Climacteris affinis</i>	White-browed Treecreeper			•		•	
Maluridae							
<i>Malurus splendens</i>	Splendid Fairywren					•	•
<i>Malurus leucopterus</i>	White-winged Fairywren			•		•	
Meliphagidae							
<i>Epthianura tricolor</i>	Crimson Chat			•		•	
<i>Certhionyx variegatus</i>	Pied Honeyeater					•	
<i>Lichmera indistincta</i>	Brown Honeyeater			•		•	•
<i>Purnella albifrons</i>	White-fronted Honeyeater			•		•	
<i>Gavicalis virescens</i>	Singing Honeyeater			•		•	•
<i>Ptilotula plumula</i>	Grey-fronted Honeyeater					•	
<i>Anthochaera carunculata</i>	Red Wattlebird			•		•	
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater			•		•	•
<i>Manorina flavigula</i>	Yellow-throated Miner			•		•	•
Pardalotidae							
<i>Pardalotus striatus</i>	Striated Pardalote			•		•	
Acanthizidae							
<i>Smicronis brevirostris</i>	Weebill			•		•	•
<i>Calamanthus campestris</i>	Rufous Fieldwren			•		•	

Family / Species	Common Name	Status		Source			
		BC Act	EPBC Act	NatureMap	PMST	ALA	This survey
<i>Pyrholaemus brunneus</i>	Redthroat			•		•	•
<i>Gerygone fusca</i>	Western Gerygone			•		•	
<i>Acanthiza apicalis</i>	Inland Thornbill			•		•	•
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill			•		•	
<i>Acanthiza iredalei</i>	Slender-Billed Thornbill					•	
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill			•		•	
<i>Acanthiza robustirostris</i>	Slaty-backed Thornbill			•		•	
<i>Aphelocephala leucopsis</i>	Southern Whiteface					•	
Pomatostomidae							
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler			•		•	•
<i>Pomatostomus superciliosus</i>	White-browed Babbler			•		•	•
Cinclosomatidae							
<i>Cinclosoma marginatum</i>	Western Quail-thrush			•		•	
Artamidae							
<i>Artamus personatus</i>	Masked Woodswallow					•	•
<i>Artamus cinereus</i>	Black-faced Woodswallow			•		•	
<i>Gymnorhina tibicen</i>	Australian Magpie			•		•	•
<i>Cracticus torquatus</i>	Grey Butcherbird			•		•	
<i>Cracticus nigrogularis</i>	Pied Butcherbird			•		•	•
<i>Strepera versicolor</i>	Grey Currawong			•		•	
Campephagidae							
<i>Coracina maxima</i>	Ground Cuckooshrike			•		•	
<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike		M	•		•	•
<i>Lalage tricolor</i>	White-Winged Triller					•	
Neosittidae							
<i>Daphoenositta chrysoptera</i>	Varied Sittella					•	
Oreoicidae							
<i>Oreoica gutturalis</i>	Crested Bellbird			•		•	•
Pachycephalidae							
<i>Pachycephala rufiventris</i>	Rufous Whistler			•		•	•
<i>Colluricincla harmonica</i>	Grey Shrikethrush					•	
Rhipiduridae							
<i>Rhipidura leucophrys</i>	Willie Wagtail			•		•	•
<i>Rhipidura albiscapa</i>	Grey Fantail					•	
Monarchidae							
<i>Grallina cyanoleuca</i>	Magpie-lark		M	•		•	•
Corvidae							
<i>Corvus orru</i>	Torresian Crow			•		•	•
<i>Corvus bennetti</i>	Little Crow			•		•	
Petroicidae							
<i>Melanodryas cucullata</i>	Hooded Robin					•	
<i>Petroica goodenovii</i>	Red-capped Robin			•		•	•
Hirundinidae							
<i>Cheramoeca leucosterna</i>	White-backed Swallow			•		•	
<i>Hirundo neoxena</i>	Welcome Swallow		M	•		•	•
<i>Petrochelidon nigricans</i>	Tree Martin		M	•		•	•
Locustellidae							
<i>Cincloramphus cruralis</i>	Brown Songlark					•	
<i>Cincloramphus mathewsi</i>	Rufous Songlark					•	
Dicaeidae							
<i>Dicaeum hirundinaceum</i>	Mistletoebird					•	

Family / Species	Common Name	Status		Source			
		BC Act	EPBC Act	NatureMap	PMST	ALA	This survey
Estrildidae							
<i>Taeniopygia guttata</i>	Zebra Finch			•		•	
Motacillidae							
<i>Motacilla tschutschensis</i>	Eastern Yellow Wagtail	MI	MI/MA		•		
<i>Motacilla cinerea</i>	Grey Wagtail	MI	MI/MA		•		
<i>Anthus australis</i>	Australian Pipit		M			•	

A4.3: Reptiles identified in desktop study

Family / Species	Common Name	Status		Source			
		BC Act	EPBC Act	NatureMap	PMST	ALA	This survey
Diplodactylidae							
<i>Diplodactylus granariensis</i>				•		•	•
<i>Diplodactylus conspicillatus</i>	Variable Fat-tailed Gecko					•	
<i>Lucasium bungabinna</i>	Southern Sand Plain Gecko			•			
<i>Strophurus assimilis</i>	Goldfields Spiny-tailed Gecko			•			
<i>Strophurus strophurus</i>				•		•	
Gekkonidae							
<i>Gehyra variegata</i>				•		•	
<i>Heteronotia binoei</i>	Bynoe's Gecko			•		•	•
Pygopodidae							
<i>Delma butleri</i>				•			
<i>Pygopus nigriceps</i>				•			
Agamidae							
<i>Ctenophorus caudicinctus</i>	Ring-tailed Dragon					•	
<i>Ctenophorus isolepis</i>	Military Dragon						•
<i>Ctenophorus scutulatus</i>						•	
<i>Moloch horridus</i>	Thorny Devil					•	
<i>Tympanocryptis cephalus</i>	Coastal Pebble-mimic Dragon			•		•	
<i>Tympanocryptis pseudopsephos</i>	Goldfields Pebble-mimic Dragon					•	
Scincidae							
<i>Ctenotus grandis</i>				•			
<i>Ctenotus schomburgkii</i>						•	
<i>Egernia depressa</i>	Southern Pygmy Spiny-tailed Skink					•	•
<i>Eremiascincus richardsonii</i>	Broad-banded Sand Swimmer					•	
<i>Lerista desertorum</i>				•		•	
<i>Lerista timida</i>				•		•	
<i>Tiliqua occipitalis</i>	Western Bluetongue						•
Varanidae							
<i>Varanus caudolineatus</i>				•			
<i>Varanus eremius</i>	Pygmy Desert Goanna			•			
<i>Varanus panoptes</i>	Yellow-spotted Goanna			•		•	
Typhlopidae							
<i>Anilius bituberculatus</i>						•	
Elapidae							
<i>Brachyuropsis semifasciatus</i>						•	
<i>Furina ornata</i>	Moon Snake			•			
<i>Suta monachus</i>				•		•	
<i>Pseudonaja modesta</i>	Ringed Brown Snake					•	
<i>Simoselaps bertholdi</i>	Jan's Banded Snake			•		•	
<i>Suta fasciata</i>	Rosen's Snake			•		•	

A4.4: Amphibians returned from desktop study

Family / Species	Common Name	Status		Source		
		BC Act	EPBC Act	NatureMap	PMST	ALA
Pelodryadidae						
<i>Litoria rubella</i>	Little Red Tree Frog					•
Limnodynastidae						
<i>Neobatrachus aquilonius</i>	Northern Burrowing Frog			•		•
<i>Neobatrachus kunapalari</i>	Kunapalari Frog			•		•
<i>Neobatrachus sutor</i>	Shoemaker Frog			•		•
<i>Platyplectrum spenceri</i>	Centralian Burrowing Frog			•		•

Appendix 5

Vegetation Structural Classification and Condition Ranking



Vegetation structural classes based on modifications of the vegetation classification system of Specht (1970) by Muir (1977) and Aplin (1979).

Stratum	Canopy Cover (%)				
	70-100%	30-70%	10-30%	2-10%	<2%
Trees over 30 m	Tall closed forest	Tall open forest	Tall woodland	Tall open woodland	Scattered tall trees
Trees 10-30 m	Closed forest	Open forest	Woodland	Open woodland	Scattered trees
Trees under 10 m	Low closed forest	Low open forest	Low woodland	Low open woodland	Scattered low trees
Shrubs over 2 m	Tall closed scrub	Tall open scrub	Tall shrubland	Tall open shrubland	Scattered tall shrubs
Shrubs 1-2 m	Closed heath	Open heath	Shrubland	Open shrubland	Scattered shrubs
Shrubs under 1 m	Low closed heath	Low open heath	Low shrubland	Low open shrubland	Scattered low shrubs
Hummock grasses	Closed hummock grassland	Hummock grassland	Open hummock grassland	Very open hummock grassland	Scattered hummock grasses
Grasses, Sedges, Herbs	Closed tussock grassland / bunch grassland / sedgeland / herbland	Tussock grassland / bunch grassland / sedgeland / herbland	Open tussock grassland / bunch grassland / sedgeland / herbland	Very open tussock grassland / bunch grassland / sedgeland / herbland	Scattered tussock grasses / bunch grasses / sedges / herbs

Vegetation condition scale taken from EPA (2016a), based on scales developed by Keighery (1994) and Trudgen (1988).

Vegetation Condition	South West and Interzone Botanical Provinces	Eremaean and Northern Botanical Provinces
Pristine	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.	
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor		Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely Degraded	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 comprising weed or crop species with isolated native trees and shrubs.	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

Appendix 6

Raw Data from Flora Sampling Sites



Leinster Townsite **Site:** LNREL01
Described by: JWPC **Date:** 12/04/21 **Type:** Relevé 20 x 20 m
MGA Zone: 51 271410 mE 6912373 mN 120.677732 E -27.893892 S
Habitat: Flat plain.
Soil: Red-brown loam.
Rock Type: Ironstone, Quartz and laterite gravel.
Vegetation: WABS.
Veg Condition: Excellent.
Fire Age: No sign of recent fire.

Species	Cover (%)	Height (cm)
<i>Acacia aptaneura</i>	3.5	30
<i>Acacia incurvaneura</i>	5	400
<i>Acacia minyura</i>	0.1	250
<i>Acacia mulganeura</i>	5	400
<i>Acacia pteraneura</i>	0.1	50
<i>Acacia ramulosa</i> var. <i>linophylla</i>	1.5	200
<i>Dianella revoluta</i> var. <i>divaricata</i>	0.1	70
<i>Eremophila foliosissima</i>	6.5	60
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	0.1	100
<i>Eriachne helmsii</i>	3.5	50
<i>Eriachne mucronata</i>	0.1	20
<i>Erodium crinitum</i>	0.1	5
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	0.1	15
<i>Grevillea berryana</i>	0.1	400
<i>Haloragis odontocarpa</i> forma <i>rugosa</i>	0.1	15
<i>Maireana planifolia</i>	0.1	15
<i>Marsdenia australis</i>	0.1	150
<i>Psyrax rigidula</i>	0.1	70
<i>Ptilotus schwartzii</i>	0.1	30
<i>Santalum lanceolatum</i>	0.1	140
<i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925)	0.1	5
<i>Solanum ferocissimum</i>	0.1	10
<i>Solanum lasiophyllum</i>	0.1	50
<i>Thyridolepis mitchelliana</i>	0.1	20



Leinster Townsite **Site:** LNREL02
Described by: JWPC **Date:** 12/04/21 **Type:** Relevé 20 x 20 m
MGA Zone: 51 271760 mE 6911993 mN 120.681212 E -27.897379 S
Habitat: Stony plain associated with drainage.
Soil: Red-brown sandy loam with crust.
Rock Type: Ironstone, Laterite and Quartz gravel.
Vegetation: SAES.
Veg Condition: Excellent. Tracks in area but does not affect vegetation, very old tin can.
Fire Age: No sign of recent fire.

Species	Cover (%)	Height (cm)	Specimen
<i>Abutilon otocarpum</i>	0.1	10	LNREL02-42
<i>Acacia aneura</i>	1	250	LNREL02-35
<i>Acacia aptaneura</i>	1.5	300	=REL01-26
<i>Acacia tetragonophylla</i>	0.1	30	
<i>Aristida contorta</i>	0.1	10	
<i>Cymbopogon ambiguus</i>	0.1	30	
<i>Digitaria brownii</i>	0.1	20	LNREL02-37
<i>Enneapogon polyphyllus</i>	0.1	5	
<i>Eremophila georgei</i>	0.1	40	LNREL02-43
<i>Eremophila gilesii</i>	0.1	10	LNREL02-32
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	0.1	120	LNREL02-41
<i>Eremophila ramiflora</i>	1	150	LNREL02-27
<i>Erodium crinitum</i>	0.1	5	=REL01-25
<i>Euphorbia drummondii</i>	0.1	5	LNREL02-45
<i>Monachather paradoxus</i>	0.1	40	
<i>Paspalidium clementii</i>	0.1	20	LNREL02-33
<i>Phyllanthus erwinii</i>	0.1	5	LNREL02-44
<i>Portulaca oleracea</i>	0.1	5	LNREL02-34
<i>Ptilotus aervoides</i>	0.1	5	LNREL02-30
<i>Ptilotus obovatus</i>	1	40	LNREL02-28
<i>Ptilotus schwartzii</i>	0.1	30	=REL01-15
<i>Solanum lasiophyllum</i>	0.1	30	
<i>Thyridolepis mitchelliana</i>	0.1	20	=REL01-21
<i>Tribulus astrocarpus</i>	0.1	5	



Leinster Townsite **Site:** LNREL03
Described by: JWPC **Date:** 12/04/21 **Type:** Relevé 20 x 20 m
MGA Zone: 51 270891 mE 6911948 mN 120.672381 E -27.897636 S
Habitat: Broad flat drainage line, dry.
Soil: Red-brown sandy clay loam.
Rock Type: Ironstone, Laterite and Quartz gravel.
Vegetation: DRMS.
Veg Condition: Very Good. Cow pats, some grazing, old tracks.
Fire Age: No sign of recent fire.

Species	Cover (%)	Height (cm)	Specimen
<i>Abutilon cryptopetalum</i>	0.1	40	LNREL03-53
<i>Abutilon otocarpum</i>	0.1	40	=REL02-42
<i>Acacia aptaneura</i>	1	250	LNREL03-56
<i>Acacia craspedocarpa</i>	12.5	350	=REL01-03
<i>Acacia tetragonophylla</i>	1	300	
<i>Alternanthera nodiflora</i>	0.1	15	
<i>Aristida contorta</i>	0.1	20	
<i>Aristida obscura</i>	0.1	30	LNREL03-58
<i>Dactyloctenium radulans</i>	0.1	15	
<i>Dianella revoluta</i> var. <i>divaricata</i>	0.1	80	
<i>Digitaria brownii</i>	0.1	20	=REL02-37
<i>Dysphania melanocarpa</i> forma <i>melanocarpa</i>	0.1	15	
<i>Enneapogon polyphyllus</i>	0.1	15	LNREL03-61
<i>Eragrostis kennedyae</i>	0.1	20	LNREL03-57
<i>Eremophila forrestii</i>	0.1	120	
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	0.1	50	=REL02-41
<i>Eremophila ramiflora</i>	2	180	=REL02-27
<i>Eriachne pulchella</i> subsp. <i>pulchella</i>	0.1	15	LNREL03-59
<i>Erodium crinitum</i>	0.1	1	=REL01-25
<i>Eucalyptus lucasii</i>	0.1	450	LNREL03-48
<i>Euphorbia drummondii</i>	0.1	1	=REL02-45
<i>Fimbristylis dichotoma</i>	0.1	20	LNREL03-62
<i>Goodenia occidentalis</i>	0.1	10	LNREL03-49
<i>Goodenia rosea</i>	0.1	10	LNREL03-50
<i>Iseilema membranaceum</i>	0.1	20	LNREL03-54
<i>Nicotiana occidentalis</i>	0.1	50	LNREL03-55
<i>Paspalidium clementii</i>	0.1	30	=REL02-33
<i>Phyllanthus erwinii</i>	0.1	5	=REL02-44
<i>Ptilotus aervoides</i>	0.1	5	=REL02-30
<i>Ptilotus exaltatus</i>	0.1	5	LNREL03-63
<i>Ptilotus gaudichaudii</i>	0.1	30	LNREL03-51
<i>Ptilotus obovatus</i>	0.1	50	=REL02-28
<i>Rhodanthe charsleyae</i>	0.1	20	LNREL03-60
<i>Sida fibulifera</i>	0.1	1	LNREL03-52
<i>Thyridolepis mitchelliana</i>	0.1	20	=REL01-21
<i>Tribulus astrocarpus</i>	0.1	5	



Leinster Townsite **Site:** LNREL04
Described by: JWPC **Date:** 13/04/21 **Type:** Relevé 50 x 50 m
MGA Zone: 51 273381 mE 6911235 mN 120.697525 E -27.904492 S
Habitat: Stony mantle, gently east sloping.
Soil: Red-brown sandy loam.
Rock Type: Outcropping granite and laterite with gravel.
Vegetation: SMS.
Veg Condition: Excellent. Small piece iron corrugate dumped, not affecting vegetation condition.
Fire Age: No sign of recent fire.

Species	Cover (%)	Height (cm)	Specimen
<i>Acacia aptaneura</i>	0.1	150	=REL03-56
<i>Acacia craspedocarpa</i>	0.1	300	=REL01-03
<i>Acacia incurvaneura</i>	4	400	LNREL04-71
<i>Acacia incurvaneura</i>	2	400	=REL01-01
<i>Acacia mulganeura</i>	0.1	400	=REL01-04
<i>Acacia quadrimarginea</i>	1	400	LNREL04-72
<i>Acacia tetragonophylla</i>	0.1	110	
<i>Aristida contorta</i>	0.1	10	
<i>Dodonaea microzyga</i>	0.1	60	
<i>Eremophila foliosissima</i>	0.1	40	=REL01-09
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	2	150	=REL02-41
<i>Eriachne mucronata</i>	0.1	15	=REL01-12
<i>Eriachne pulchella</i> subsp. <i>pulchella</i>	0.1	5	=REL03-59
<i>Hysterobaeckea occlusa</i>	0.1	60	LNREL04-70
<i>Maireana tomentosa</i>	0.1	20	LNREL04-67
<i>Maireana triptera</i>	0.1	30	
<i>Marsdenia australis</i>	0.1	100	
<i>Psyrax rigidula</i>	0.1	70	=REL01-08
<i>Ptilotus schwartzii</i>	0.1	10	=REL01-15
<i>Scaevola spinescens</i>	0.1	60	
<i>Senna artemisioides</i> subsp. <i>x sturtii</i>	0.1	130	
<i>Sida ectogama</i>	0.1	70	
<i>Sida</i> sp. Golden calyces glabrous (H.N. Foote 32)	0.1	1	
<i>Solanum lasiophyllum</i>	0.1	20	
<i>Vincetoxicum lineare</i>	0.1	70	



Leinster Townsite
Described by: JWPC **Site:** LNREL05
Date: 13/04/21 **Type:** Relevé 50 x 50 m
MGA Zone: 51 273244 mE 6911072 mN 120.696102 E -27.905939 S
Habitat: Flat sandy plain.
Soil: Red-brown sandy loam.
Rock Type: Laterite and granite gravel.
Vegetation: HPMS.
Veg Condition: Excellent.
Fire Age: No sign of recent fire.

Species	Cover (%)	Height (cm)	Specimen
<i>Acacia aneura</i>	0.1	400	=REL02-35
<i>Acacia incurvaneura</i>	8	400	=REL01-01
<i>Acacia ramulosa</i> var. <i>linophylla</i>	2	200	
<i>Eremophila foliosissima</i>	0.1	400	=REL01-09
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	1.5	120	=REL02-41
<i>Eriachne mucronata</i>	0.1	15	=REL01-12
<i>Polygala glaucifolia</i>	0.1	5	LNREL05-80
<i>Solanum ferocissimum</i>	0.1	20	=REL01-16
<i>Solanum lasiophyllum</i>	0.1	15	
<i>Triodia basedowii</i>	0.1	40	



Leinster Townsite **Site:** LNREL06
Described by: JWPC **Date:** 13/04/21 **Type:** Relevé 30 x 30 m
MGA Zone: 51 273284 mE 6910936 mN 120.696483 E -27.907173 S
Habitat: Very gently west sloping sandy plain.
Soil: Red-brown loamy sand.
Rock Type: None present.
Vegetation: HPMS.
Veg Condition: Very good. Rubbish sighted.
Fire Age: No sign of recent fire.

Name	Cover (%)	Height (cm)	Specimen
<i>Acacia incurvaneura</i>	1	400	=REL01-01
<i>Acacia minyura</i>	2	400	LNREL06-81
<i>Acacia ramulosa</i> var. <i>linophylla</i>	8	250	
<i>Dianella revoluta</i> var. <i>divaricata</i>	0.1	70	
<i>Eremophila foliosissima</i>	3	80	=REL01-09
<i>Eremophila forrestii</i>	8	160	
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	0.1	160	=REL02-41
<i>Eriachne helmsii</i>	0.1	60	
<i>Haloragis odontocarpa</i> forma <i>rugosa</i>	0.1	10	=REL01-24
<i>Psydrax suaveolens</i>	0.1	70	
<i>Sida</i> sp. Golden calyces pubescent (G.J. Leach 1966)	0.1	1	



Leinster Townsite **Site:** LNREL07
Described by: JWPC **Date:** 13/04/21 **Type:** Relevé 20 x 20 m
MGA Zone: 51 272418 mE 6911249 mN 120.687750 E -27.904202 S
Habitat: Broad drainage.
Soil: Red-brown sandy clay loam.
Rock Type: Granite, Laterite and Quartz gravel.
Vegetation: DRMS.
Veg Condition: Excellent. Grazed, some rubbish dumped, cow pats, track running through, weedy grass.
Fire Age: No sign of recent fire.

Species	Cover (%)	Height (cm)	Specimen
<i>Acacia aneura</i>	5	500	=REL02-35
<i>Acacia incurvaneura</i>	0.1	400	=REL01-01
<i>Acacia tetragonophylla</i>	2	400	
<i>Alternanthera nodiflora</i>	0.1	10	
<i>Aristida obscura</i>	0.1	20	=REL03-58
<i>Bulbostylis barbata</i>	0.1	5	LNREL07-86
<i>Dactyloctenium radulans</i>	0.1	10	
<i>Dianella revoluta</i> var. <i>divaricata</i>	0.1	70	
<i>Digitaria brownii</i>	0.1	20	=REL02-37
* <i>Digitaria ciliaris</i>	0.1	30	LNREL07-82
<i>Dysphania melanocarpa</i> forma <i>melanocarpa</i>	0.1	10	
<i>Enneapogon polyphyllus</i>	0.1	40	
<i>Eragrostis kennedyae</i>	0.1	20	=REL03-57
<i>Eremophila gilesii</i>	0.1	20	=REL02-32
<i>Eriachne pulchella</i> subsp. <i>pulchella</i>	0.1	10	=REL03-59
<i>Maireana convexa</i>	0.1	40	LNREL07-83
<i>Paspalidium clementii</i>	0.1	20	=REL02-33
<i>Plantago drummondii</i>	0.1	5	=REL02-47
<i>Portulaca oleracea</i>	0.1	1	=REL02-34
<i>Senna glutinosa</i> subsp. <i>charlesiana</i>	0.1	50	LNREL07-85
<i>Sida ectogama</i>	0.1	60	
<i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925)	0.1	5	=REL01-22
<i>Sida</i> sp. <i>Golden calyces pubescent</i> (G.J. Leach 1966)	0.1	1	
<i>Solanum lasiophyllum</i>	0.1	5	
<i>Teucrium teucriiflorum</i>	0.1	40	
<i>Thyridolepis mitchelliana</i>	0.1	30	=REL01-21
<i>Tribulus astrocarpus</i>	0.1	1	



Leinster Townsite **Site:** LNREL08
Described by: JWPC **Date:** 13/04/21 **Type:** Relevé 40 x 40 m
MGA Zone: 51 272136 mE 6910107 mN 120.684667 E -27.914455 S
Habitat: Gently NW sloping sandy plain.
Soil: Red-brown loamy sand.
Rock Type: None present.
Vegetation: SAWS.
Veg Condition: Excellent. Very minor rubbish near track.
Fire Age: No sign of recent fire.

Species	Cover (%)	Height (cm)
<i>Acacia effusifolia</i>	4	400
<i>Acacia longispinea</i>	0.1	120
<i>Androcalva loxophylla</i>	0.1	60
<i>Bonamia erecta</i>	2	20
<i>Enekbatus eremaeus</i>	0.1	50
<i>Eriachne helmsii</i>	0.1	30
<i>Eucalyptus kingsmillii</i>	0.1	500
<i>Eucalyptus oldfieldii</i>	0.1	400
<i>Grevillea juncifolia</i> subsp. <i>juncifolia</i>	0.1	300
<i>Homalocalyx thryptomenoides</i>	0.1	50
<i>Leptosema chambersii</i>	0.1	30
<i>Micromyrtus flaviflora</i>	0.1	110
<i>Philotheca tomentella</i>	0.1	100
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	0.1	180
<i>Psyrax suaveolens</i>	0.1	60
<i>Scaevola parvifolia</i> subsp. <i>acuminata</i>	0.1	30
<i>Seringia velutina</i>	0.1	50
<i>Triodia basedowii</i>	27	30



Leinster Townsite **Site:** LNREL09
Described by: JWPC **Date:** 13/04/21 **Type:** Relevé 40 x 40 m
MGA Zone: 51 271690 mE 6909022 mN 120.679929 E -27.924165 S
Habitat: Stony plain with outcropping rock.
Soil: Red brown sandy loam.
Rock Type: Granite, Quartz, and laterite gravel with outcropping laterite.
Vegetation: SMS.
Veg Condition: Very Good. Some rubbish, tracks running through, cow pats.
Fire Age: No sign of recent fire.

Species	Cover (%)	Height (cm)	Notes
<i>Acacia aneura</i>	1.5	400	
<i>Acacia aptaneura</i>	1	400	
<i>Acacia incurvaneura</i>	1	300	
<i>Acacia minyura</i>	0.1	120	
<i>Acacia mulganeura</i>	0.1	170	
<i>Acacia quadrimarginea</i>	0.1	200	
<i>Acacia tetragonophylla</i>	0.1	200	
<i>Aristida contorta</i>	0.1	5	
<i>Cynodon prostratus</i>	0.1	1	
<i>Enneapogon polyphyllus</i>	0.1	5	
<i>Eremophila alternifolia</i>	0.1	60	
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	0.1	60	
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	0.1	40	
<i>Eriachne pulchella</i> subsp. <i>pulchella</i>	0.1	10	
<i>Hakea preissii</i>	0.1	200	
<i>Maireana pyramidata</i>	0.1	60	
<i>Maireana triptera</i>	1	40	
<i>Neurachne munroi</i>	0.1	15	
<i>Portulaca oleracea</i>	0.1	5	
<i>Ptilotus aervoides</i>	0.1	1	
<i>Ptilotus obovatus</i>	0.1	30	
<i>Rhagodia drummondii</i>	0.1	60	
<i>Salsola australis</i>	0.1	25	
<i>Scaevola spinescens</i>	0.1	70	Spiny, narrow leaf variant
<i>Sclerolaena diacantha</i>	0.1	2	
<i>Sclerolaena fusiformis</i>	0.1	15	
<i>Senna artemisioides</i> subsp. <i>x sturtii</i>	0.1	50	
<i>Sida ectogama</i>	0.1	70	
<i>Tragus australianus</i>	0.1	15	
<i>Tripogonella loliiformis</i>	0.1	10	



Leinster Townsite **Site:** LNREL10
Described by: JWPC **Date:** 14/04/21 **Type:** Relevé 40 x 40 m
MGA Zone: 51 272375 mE 6910103 mN 120.687093 E -27.914532 S
Habitat: N facing slope of low sandy dune, very near crest.
Soil: Red-brown loamy sand.
Rock Type: None present.
Vegetation: SAGS.
Veg Condition: Excellent.
Fire Age: No sign of recent fire.

Species	Cover (%)	Height (cm)	Notes
<i>Acacia effusifolia</i>	6.5	300	
<i>Acacia jamesiana</i>	0.1	250	
<i>Acacia ligulata</i>	0.1	180	
<i>Acacia tetragonophylla</i>	0.1	150	
<i>Bonamia erecta</i>	0.1	20	
<i>Dianella revoluta</i> var. <i>divaricata</i>	0.1	50	
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	0.1	100	
<i>Eremophila platythamnos</i> subsp. <i>exotrachys</i>	1	60	
<i>Eriachne helmsii</i>	0.1	40	
<i>Eucalyptus gongylocarpa</i>	3.5	600	
<i>Eucalyptus oldfieldii</i>	2.5	400	
<i>Grevillea juncifolia</i> subsp. <i>juncifolia</i>	0.1	180	
<i>Homalocalyx thryptomenoides</i>	0.1	60	
<i>Marsdenia australis</i>	0.1	100	
<i>Micromyrtus flaviflora</i>	0.1	40	
<i>Paspalidium clementii</i>	0.1	10	
<i>Santalum lanceolatum</i>	0.1	200	
<i>Scaevola parvifolia</i> subsp. <i>acuminata</i>	0.1	50	
<i>Scaevola spinescens</i>	0.1	150	Spiny, narrow leaf variant
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	0.1	100	
<i>Solanum ferocissimum</i>	0.1	10	
<i>Solanum lasiophyllum</i>	0.1	20	
<i>Triodia basedowii</i>	14	40	



Leinster Townsite **Site:** LNREL11
Described by: JWPC **Date:** 14/04/21 **Type:** Relevé 40 x 40 m
MGA Zone: 51 274363 mE 6910231 mN 120.707304 E -27.913715 S
Habitat: Flat plain.
Soil: Red-brown sandy loam.
Rock Type: None present.
Vegetation: SAMA.
Veg Condition: Excellent. Occasional cow pats but old, no obvious grazing.
Fire Age: No sign of recent fire.

Species	Cover (%)	Height (cm)	Notes
<i>Acacia aneura</i>	3.5	500	
<i>Acacia aptaneura</i>	0.1	120	
<i>Acacia aptaneura</i>	0.1	200	
<i>Acacia craspedocarpa</i>	0.1	400	Narrow phyllode form
<i>Acacia effusifolia</i>	0.1	300	
<i>Acacia kempeana</i>	11	250	
<i>Acacia mulganeura</i>	0.1	250	
<i>Acacia ramulosa</i> var. <i>linophylla</i>	0.1	200	
<i>Acacia tetragonophylla</i>	0.1	140	
<i>Brachychiton gregorii</i>	0.1	500	
<i>Dianella revoluta</i> var. <i>divaricata</i>	0.1	70	
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	1	30	
<i>Eragrostis eriopoda</i>	0.1	40	
<i>Eremophila foliosissima</i>	0.1	60	
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	0.1	70	
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	0.1	30	
<i>Eucalyptus gongylocarpa</i>	0.1	600	
<i>Grevillea berryana</i>	0.1	350	
<i>Pimelea microcephala</i> subsp. <i>microcephala</i>	0.1	150	
<i>Psyrax rigidula</i>	0.1	400	
<i>Psyrax suaveolens</i>	0.1	120	
<i>Scaevola spinescens</i>	0.1	70	Spiny, narrow leaf variant
<i>Triodia basedowii</i>	22	30	



Leinster Townsite **Site:** LNREL12
Described by: JWPC **Date:** 14/04/21 **Type:** Relevé 40 x 40 m
MGA Zone: 51 277463 mE 6910354 mN 120.738806 E -27.913126 S
Habitat: Flat plain.
Soil: Red-brown sandy loam.
Rock Type: Quartz gravel.
Vegetation: HPMS.
Veg Condition: Very Good. Some historical clearing, rubbish, cow pats but vegetation largely intact.
Fire Age: No sign of recent fire.

Species	Cover (%)	Height (cm)
<i>Acacia caesaneura</i> (narrow phyllode variant)	1	200
<i>Acacia incurvaneura</i>	2	400
<i>Acacia mulganeura</i>	2	600
<i>Acacia ramulosa</i> var. <i>linophylla</i>	5	300
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	0.1	10
<i>Eragrostis eriopoda</i>	1	30
<i>Eremophila foliosissima</i>	3	100
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	0.1	120
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	0.1	200
<i>Eriachne helmsii</i>	0.1	30
<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	0.1	60
<i>Solanum lasiophyllum</i>	0.1	40
<i>Triodia basedowii</i>	0.1	30



Leinster Townsite	Site	LNREL13			
Described by	JWPC	Date	14/04/21	Type	Relevé 40 x 40 m
MGA Zone	51	277021 mE	6910916 mN	120.734424 E	-27.907983 S
Habitat	Flat plain.				
Soil	Red-brown sandy loam.				
Rock Type	None present.				
Vegetation	SAWS.				
Veg Condition	Excellent. Some very old rubbish and occasional cow pats, not impacting vegetation.				
Fire Age	No sign of recent fire.				

Species	Cover (%)	Height (cm)
<i>Acacia craspedocarpa</i>	0.1	400
<i>Acacia effusifolia</i>	9	300
<i>Acacia incurvaneura</i>	0.1	300
<i>Acacia minyura</i>	0.1	400
<i>Acacia ramulosa</i> var. <i>linophylla</i>	3	300
<i>Eragrostis eriopoda</i>	0.1	30
<i>Eremophila homoplastica</i>	0.1	30
<i>Eriachne helmsii</i>	12	60
<i>Haloragis odontocarpa</i> forma <i>rugosa</i>	0.1	15
<i>Maireana planifolia</i>	0.1	20
<i>Solanum lasiophyllum</i>	0.1	30
<i>Triodia basedowii</i>	0.1	40



Leinster Townsite **Site:** LNREL14
Described by: JWPC **Date:** 14/04/21 **Type:** Relevé 40 x 40 m
MGA Zone: 51 275487 mE 6910011 mN 120.718676 E -27.915889 S
Habitat: Flat plain.
Soil: Red-brown sandy loam.
Rock Type: Quartz gravel.
Vegetation: SAMA.
Veg Condition: Excellent. Very occasional old rubbish.
Fire Age: No sign of recent fire.

Species	Cover (%)	Height (cm)	Notes
<i>Acacia aneura</i>	4	500	
<i>Acacia incurvaneura</i>	1	400	
<i>Acacia mulganeura</i>	3	500	
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	0.1	40	
<i>Eremophila alternifolia</i>	0.1	100	
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	1	90	
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	0.1	250	
<i>Eriachne helmsii</i>	0.1	50	
<i>Eucalyptus horistes</i>	11	700	
<i>Eucalyptus kingsmillii</i>	0.1	500	
<i>Eucalyptus lucasii</i>	0.1	600	
<i>Pimelea microcephala</i> subsp. <i>microcephala</i>	0.1	160	
<i>Ptilotus obovatus</i>	0.1	50	
<i>Scaevola spinescens</i>	0.1	70	Spiny, fine leaf
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	0.1	60	
<i>Solanum lasiophyllum</i>	0.1	10	
<i>Teucrium teucriiflorum</i>	0.1	60	
<i>Triodia basedowii</i>	18	30	



Leinster Townsite **Site:** LNREL15
Described by: JWPC **Date:** 14/04/21 **Type:** Relevé 40 x 40 m
MGA Zone: 51 274085 mE 6909469 mN 120.704336 E -27.920541 S
Habitat: Flat sandy plain.
Soil: Red-brown loamy sand.
Rock Type: None present.
Vegetation: SAGS.
Veg Condition: Excellent. Very occasional cow pats.
Fire Age: No sign of recent fire.

Species	Cover (%)	Height (cm)
<i>Acacia caesaneura</i> (narrow phyllode variant)	1.8	400
<i>Acacia effusifolia</i>	4	400
<i>Acacia incurvaneura</i>	0.1	250
<i>Acacia mulganeura</i>	0.1	200
<i>Acacia pteraneura</i>	0.1	140
<i>Acacia ramulosa</i> var. <i>linophylla</i>	0.1	200
<i>Acacia tetragonophylla</i>	0.1	150
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	0.1	60
<i>Eragrostis eriopoda</i>	0.1	40
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	6.5	180
<i>Eriachne helmsii</i>	0.1	40
<i>Eucalyptus gongylocarpa</i>	12	800
<i>Eucalyptus kingsmillii</i>	0.1	500
<i>Psydrax suaveolens</i>	0.1	300
<i>Rhagodia drummondii</i>	0.1	100
<i>Senna glutinosa</i> subsp. <i>chatelainiana</i>	0.1	100
<i>Solanum lasiophyllum</i>	0.1	20
<i>Triodia basedowii</i>	20	30



Leinster Townsite**Site:** OPP**Described by:** JWPC**Type:** Opportunistic collections

Species	Notes
<i>Acacia rhodophloia</i>	
<i>Austrostipa elegantissima</i>	
* <i>Cenchrus ciliaris</i>	On the northern access road
* <i>Citrullus amarus</i>	At rubbish tip
<i>Duboisia hopwoodii</i>	
<i>Dysphania kalpari</i>	
<i>Eucalyptus leptopoda</i> subsp. <i>elevata</i>	
<i>Eucalyptus kingsmillii</i> x <i>oldfieldii</i>	250 m. Opportunistic record adjacent to relevé LNREL10.
<i>Halgania cyanea</i> var. Allambi Stn (B.W. Strong 676)	
<i>Jacksonia arida</i>	From tank clearance area
<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	From tank clearance area
<i>Ptilotus polystachyus</i>	
* <i>Rumex vesicarius</i>	On rubbish dump
<i>Santalum acuminatum</i>	
<i>Senna pleurocarpa</i> var. <i>pleurocarpa</i>	
<i>Sida calyxhymenia</i>	

Appendix 7

Vascular Flora Recorded from the Study Area



Family	Species	Status
Amaranthaceae	<i>Alternanthera nodiflora</i>	
	<i>Ptilotus aervoides</i>	
	<i>Ptilotus exaltatus</i>	
	<i>Ptilotus gaudichaudii</i>	
	<i>Ptilotus obovatus</i>	
	<i>Ptilotus polystachyus</i>	
	<i>Ptilotus schwartzii</i>	
Apocynaceae	<i>Marsdenia australis</i>	
	<i>Vincetoxicum lineare</i>	
Asteraceae	<i>Rhodanthe charsleyae</i>	
Boraginaceae	<i>Halgania cyanea</i> var. Allambi Stn (B.W. Strong 676)	
Chenopodiaceae	<i>Dysphania kalpari</i>	
	<i>Dysphania melanocarpa</i> forma <i>melanocarpa</i>	
	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	
	<i>Maireana convexa</i>	
	<i>Maireana planifolia</i>	
	<i>Maireana pyramidata</i>	
	<i>Maireana tomentosa</i>	
	<i>Maireana triptera</i>	
	<i>Rhagodia drummondii</i>	
	<i>Salsola australis</i>	
	<i>Sclerolaena diacantha</i>	
	<i>Sclerolaena fusiformis</i>	
Convolvulaceae	<i>Bonamia erecta</i>	
Cucurbitaceae	* <i>Citrullus amarus</i>	Weed
Cyperaceae	<i>Bulbostylis barbata</i>	
	<i>Fimbristylis dichotoma</i>	
Euphorbiaceae	<i>Euphorbia drummondii</i>	
	<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	
Fabaceae	<i>Acacia aneura</i>	
	<i>Acacia aptaneura</i>	
	<i>Acacia caesaneura</i> (narrow phyllode variant)	
	<i>Acacia craspedocarpa</i>	
	<i>Acacia effusifolia</i>	
	<i>Acacia incurvaneura</i>	
	<i>Acacia jamesiana</i>	
	<i>Acacia kempeana</i>	
	<i>Acacia ligulata</i>	
	<i>Acacia longispinea</i>	
	<i>Acacia minyura</i>	
	<i>Acacia mulganeura</i>	
	<i>Acacia pteraneura</i>	
	<i>Acacia quadrimarginea</i>	
	<i>Acacia ramulosa</i> var. <i>linophylla</i>	

Family	Species	Status
Fabaceae (cont.)	<i>Acacia rhodophloia</i>	
	<i>Acacia tetragonophylla</i>	
	<i>Jacksonia arida</i>	
	<i>Leptosema chambersii</i>	
	<i>Senna artemisioides</i> subsp. <i>filifolia</i>	
	<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	
	<i>Senna artemisioides</i> subsp. <i>x sturtii</i>	
	<i>Senna glutinosa</i> subsp. <i>charlesiana</i>	
	<i>Senna glutinosa</i> subsp. <i>chatelainiana</i>	
	<i>Senna pleurocarpa</i> var. <i>pleurocarpa</i>	
Geraniaceae	<i>Erodium crinitum</i>	
Goodeniaceae	<i>Goodenia occidentalis</i>	
	<i>Goodenia rosea</i>	
	<i>Scaevola parvifolia</i> subsp. <i>acuminata</i>	
	<i>Scaevola spinescens</i> (spiny, fine leaf)	
Haloragaceae	<i>Haloragis odontocarpa</i> forma <i>rugosa</i>	
Hemerocallidaceae	<i>Dianella revoluta</i> var. <i>divaricata</i>	
Lamiaceae	<i>Prostanthera</i> sp. Bullimore Sandplain (G. Cockerton & G. O'Keefe WB32777)	SOI
	<i>Teucrium teucriiflorum</i>	
Malvaceae	<i>Abutilon cryptopetalum</i>	
	<i>Abutilon otocarpum</i>	
	<i>Androcalva loxophylla</i>	
	<i>Brachychiton gregorii</i>	
	<i>Seringia velutina</i>	
	<i>Sida calyxhymenia</i>	
	<i>Sida ectogama</i>	
	<i>Sida fibulifera</i>	
	<i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925)	
	<i>Sida</i> sp. <i>Golden calyces</i> (G.J. Leach 1966)	
	<i>Sida</i> sp. <i>Golden calyces glabrous</i> (H.N. Foote 32)	
Myrtaceae	<i>Enekbatus eremaeus</i>	
	<i>Eucalyptus gongylocarpa</i>	
	<i>Eucalyptus horistes</i>	
	<i>Eucalyptus kingsmilli</i> x <i>oldfieldii</i>	SOI
	<i>Eucalyptus kingsmillii</i>	
	<i>Eucalyptus leptopoda</i> subsp. <i>elevata</i>	
	<i>Eucalyptus lucasii</i>	
	<i>Eucalyptus oldfieldii</i>	
	<i>Homalocalyx thryptomenoides</i>	
	<i>Hysterobaeckea occlusa</i>	
	<i>Micromyrtus flaviflora</i>	
Phyllanthaceae	<i>Phyllanthus erwinii</i>	
Plantaginaceae	<i>Plantago drummondii</i>	
Poaceae	<i>Aristida contorta</i>	

Family	Species	Status
Poaceae (cont.)	<i>Aristida obscura</i>	
	<i>Austrostipa elegantissima</i>	
	* <i>Cenchrus ciliaris</i>	Weed
	<i>Cymbopogon ambiguus</i>	
	<i>Cynodon prostratus</i>	
	<i>Dactyloctenium radulans</i>	
	<i>Digitaria brownii</i>	
	* <i>Digitaria ciliaris</i>	Weed
	<i>Enneapogon polyphyllus</i>	
	<i>Eragrostis eriopoda</i>	
	<i>Eragrostis kennedyae</i>	
	<i>Eriachne helmsii</i>	
	<i>Eriachne mucronata</i>	
	<i>Eriachne pulchella</i> subsp. <i>pulchella</i>	
	<i>Iseilema membranaceum</i>	
	<i>Monachather paradoxus</i>	
	<i>Neurachne munroi</i>	
	<i>Paspalidium clementii</i>	
	<i>Thyridolepis mitchelliana</i>	
	<i>Tragus australianus</i>	
	<i>Triodia basedowii</i>	
	<i>Tripogonella loliiformis</i>	
Polygalaceae	<i>Polygala glaucifolia</i>	
Polygonaceae	* <i>Rumex vesicarius</i>	Weed
Portulacaceae	<i>Portulaca oleracea</i>	
Proteaceae	<i>Grevillea berryana</i>	
	<i>Grevillea juncifolia</i> subsp. <i>juncifolia</i>	
	<i>Hakea preissii</i>	
Rubiaceae	<i>Psyrax rigidula</i>	
	<i>Psyrax suaveolens</i>	
Rutaceae	<i>Philotheca tomentella</i>	
Santalaceae	<i>Santalum acuminatum</i>	
	<i>Santalum lanceolatum</i>	
Sapindaceae	<i>Dodonaea microzyga</i>	
Scrophulariaceae	<i>Eremophila alternifolia</i>	
	<i>Eremophila foliosissima</i>	
	<i>Eremophila forrestii</i>	
	<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	
	<i>Eremophila georgei</i>	
	<i>Eremophila gilesii</i>	
	<i>Eremophila homoplastica</i>	
	<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	
	<i>Eremophila platythamnus</i> subsp. <i>exotrachys</i>	
	<i>Eremophila ramiflora</i>	

Family	Species	Status
Solanaceae	<i>Duboisia hopwoodii</i>	
	<i>Nicotiana occidentalis</i>	
	<i>Solanum ferocissimum</i>	
	<i>Solanum lasiophyllum</i>	
Thymelaeaceae	<i>Pimelea microcephala</i> subsp. <i>microcephala</i>	
Zygophyllaceae	<i>Tribulus astrocarpus</i>	