Reconnaissance Flora and Basic Fauna Survey of the Malcom Challenger Project

Prepared for Kumarina Resources Pty. Ltd.

May 2021
Version 1

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Disclaimer

Quality Assurance

An internal quality review process has been implemented to each project task undertaken by BC. Each document and its contents are carefully reviewed by core members of the Consultancy team and signed off at Director Level prior to issue to the client. Draft documents are submitted to the client for comment and acceptance prior to final production.

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Glossary

Acronym	Description
BAM Act	*Biosecurity and Agriculture Management Act 2007*, WA Government.
BC Act	*Biodiversity Conservation Act 2016*, WA Government.
Botanica	Botanica Consulting Pty Ltd.
BoM	Bureau of Meteorology.
DAFWA	Department of Agriculture and Food (now DPIRD), WA Government.
DAWE	Department of the Agriculture, Water and Environment (formerly known as DotEE), Australian Government.
DBCA	Department of Biodiversity, Conservation and Attractions (formerly DPaW), WA Government.
DEC	Department of Environment and Conservation (now DBCA), WA Government.
DER	Department of Environment Regulation (now DWER), WA Government.
DMIRS	Department of Mines, Industry Regulation and Safety (formerly DMP), WA Government
DotEE	Department of the Environment and Energy (now known as DAWE), Australian Government.
DoW	Department of Water (now DWER), WA Government.
DPaW	Department of Parks and Wildlife (now DBCA), WA Government.
DPIRD	Department of Primary Industries and Regional Development, WA Government
DWER	Department of Water and Environmental Regulation (formerly EPA, DER and DoW), WA Government
EP Act	Environmental Protection Act 1986, WA Government.
EP Regulations	Environmental Protection (Clearing of Native Vegetation) Regulations 2004, WA Government.
EPA	Environmental Protection Authority, WA Government.
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*, Australian Government.
ESA	Environmentally Sensitive Area.
Ha	Hectare (10,000 square meters).
IBRA	Interim Biogeographic Regionalization for Australia.
IUCN	International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union.
JAMBA	*Japan Australia Migratory Bird Agreement 1981.*
Km	Kilometer (1,000 meters).
LGA	Local Government Area
NVIS	National Vegetation Information System.
PEC	Priority Ecological Community.
TEC	Threatened Ecological Community.
WA	Western Australia.
WAHERB	Western Australian Herbarium.
WAM	Western Australian Museum, WA Government.

Executive Summary

Botanica Consulting Pty Ltd (Botanica) was commissioned by Kumarina Resources Pty. Ltd. (Kumarina) to undertake a reconnaissance flora/ vegetation survey and basic fauna survey of the Malcom Challenger project (referred to as 'survey area'). The survey area is approximately 177 ha in extent and is located approximately 49 km east of Leonora, Western Australia. The survey was conducted to support a Native Vegetation Clearing Permit (NVCP) application and Mining Proposal.

The survey area lies within the Eastern Murchison (MUR1) subregion of the Murchison Bioregion, as defined by the Interim Biogeographic Regionalisation of Australia (IBRA).

The Eastern Murchison comprises the northern parts of the craton's Southern Cross and Eastern Goldfields Terrains and is characterised by internal drainage and extensive areas of elevated red desert sandplains with minimal dune development. Salt Lake systems are associated with the occluded paleodrainage system. Broad plains of red-brown soils and breakaways complexes as well as red sandplains are widespread. Vegetation is dominated by Mulga woodlands and is often rich in ephemerals, hummock grasslands, saltbush shrublands and *Tecticornia* shrublands (Cowan, 2001).

The dominant land uses of the Eastern Murchison subregion include grazing native pastures (85.47%), unallocated crown reserves (11.34%), conservation (1.4%) and mining (1.79%) (Cowan, 2001). The survey area is located within the Minara Pastoral Lease.

Prior to the field assessment a literature review was undertaken of previous flora and fauna assessments conducted within the local region. Documents reviewed included:

- Botanica Consulting (2020). *Kookynie Project Reconnaissance Flora/ Vegetation and Basic Fauna Survey.* Prepared for Genesis Minerals Limited, October 2020.

In addition to the literature review, searches of the following databases were undertaken to aid in the compilation of a list of significant flora within the survey area:

- DBCA Threatened/ Priority Flora spatial data (DBCA, 2019a);
- DBCA NatureMap database (DBCA, 2021b); and
- EPBC Protected Matters search tool (DAWE, 2021a).

The NatureMap species search and EPBC Protected Matters search were conducted with a 40 km buffer from the survey area.

The desktop review identified 372 vascular flora species as occurring within 40 km of the survey area, representing 150 genera from 55 families. The most diverse families were Asteraceae (58 species), Fabaceae (45 species) and Chenopodiaceae (44 species). Significant genera were *Eremophila* (30 species), *Acacia* (24 species) and *Maireana* and *Ptilotus* (11 species each). This total includes six introduced (weed) species (1.6%).

The desktop review identified eight introduced flora (weed) species as potentially occurring in the vicinity of the survey area, representing six families. No species are listed as a Declared Pest on the Western Australian Organism List (WAOL) under the *Biosecurity and Agriculture Management* (BAM) *Act 2007* or as Weeds of National Significance (WONS).

The assessment of the DBCA Priority/ Threatened flora data (DBCA, 2019a), NatureMap search (DBCA, 2021b), Protected Matters searches (DAWE, 2021a) and previous relevant literature identified 16 significant flora species recorded within a 40 km radius of the survey area. These comprised of three Priority 1, 11 Priority 3 and two Priority 4 taxa (Appendix 3).

These taxa were assessed for distribution and known habitat to determine their likelihood of occurrence within the survey area. The assessment identified two significant flora taxa as likely to occur in the survey area, consisting of one Priority 3 and one Priority 4 taxa. In addition, two significant taxa were identified as possibly occurring in the survey area, consisting of two Priority 3 taxa.

The Protected Matters search (DAWE, 2021a) did not identify any Threatened Ecological Communities as potentially occurring within the survey area. Analysis of the Priority Ecological Communities within the Midwest region (DBCA, 2021a) did not identify any significant communities as likely or possibly occurring within the survey area.

All vegetation associations retain >97% of their pre-European extent.

The desktop review identified a total of 203 terrestrial vertebrate fauna taxa recorded within 40 km of the survey area, consisting of 131 bird, 20 mammal, 47 reptile and five amphibian taxa. This total includes eight introduced (feral) species (3.6%)

The desktop review identified 11 terrestrial fauna species of conservation significance as previously being recorded in the regional area, consisting of seven Threatened, one Priority 4 and three migratory or otherwise protected species. In addition, seven migratory wading/shorebird species were assessed collectively due to their similar habitat requirements.

Habitat and distribution data was used to determine the likelihood of occurrence within the survey area. The assessment identified three significant fauna species as potentially occurring in the survey area.

There are no DBCA managed lands or lands of interest located within the survey area.

There are no Environmentally Sensitive Areas (ESAs) located within the survey area.

There are no Nationally Important or RAMSAR wetlands located within the survey area.

The nearest significant environmental features are Lake Ballard and Lake Marmion, located approximately 90 km south-west of the survey area. These areas are categorised both as Nationally Important Wetlands and as Environmentally Sensitive Areas. Disturbances within the survey area are unlikely to impact these features.

Botanica conducted a reconnaissance flora/ vegetation and basic fauna survey on the 7th May 2021, with the area traversed on foot and 4WD by Jennifer Jackson (Senior Botanist, BSc (Honours) Environmental Management) and Matthew Nedlands (Environmental Technician).

The field survey identified 36 vascular flora taxa within the survey area. These taxa represented 20 genera across 15 families, with the most diverse families being Chenopodiaceae (nine species), Fabaceae (eight species) and Scrophulariaceae (five species). Dominant genera include *Acacia* (six species), *Eremophila* (five species) and *Maireana* (five species). No introduced (weed) species were recorded.

No Threatened or Priority flora species or otherwise significant flora were recorded within the survey area.

A total of three broad-scale vegetation communities were identified within the survey area. Vegetation community descriptions and extents were determined from field survey results, aerial imagery interpretation and extrapolation of the communities.

The survey found RP-AS1 was the most widespread community in the survey area, occupying 84.5 ha (44.7%), while RP-AS2 was the most restricted with 17.3 ha (9.8%). The most diverse community was DD-AS1 with 25 species (69.4%), while the least diverse was RP-AS2 with nine species (30.6%).

No Threatened or Priority Ecological Communities or otherwise significant vegetation were identified within the survey area.

Based on vegetation and associated landforms identified during the flora and vegetation assessment, two broad scale terrestrial fauna habitats were identified as occurring within the survey area.

No evidence of significant fauna species were observed during the survey, including no evidence of Malleefowl nesting mounds or other activity.

Native vegetation within the survey area was rated as ‘good’ to ‘degraded’. ‘Good’ condition depicts more obvious signs of damage caused by human activity since European settlement, in this case clearing for exploration activities and changed fire regimes, while degraded areas had evidence of severe grazing and high levels of historical disturbance. Areas cleared of vegetation, including major tracks and historical mining operations, were categorized as ‘completely degraded’.

Based on the outcomes from the survey undertaken, Botanica assessed the results of the desktop and field survey with regards to the native vegetation clearing principles listed under Schedule 5 of the EP Act. The assessment found that the proposed vegetation clearing activities may be at variance with clearing principle (f).

1 INTRODUCTION

1.1 Project Description

Botanica Consulting Pty Ltd (Botanica) was commissioned by Kumarina Resources Pty. Ltd. (Kumarina) to undertake a reconnaissance flora/ vegetation survey and basic fauna survey of the Malcom Challenger project (referred to as 'survey area') (Figure 1-1). The survey area is approximately 177 ha in extent and is located approximately 49 km east of Leonora, Western Australia. The survey was conducted to support a Native Vegetation Clearing Permit (NVCP) application and Mining Proposal.

1.2 Objectives

The flora assessment was conducted in accordance with the requirements of a reconnaissance flora survey as defined in *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment – December 2016* (EPA, 2016a). The objectives of the assessment were to:

- gather background information on flora and vegetation in the target area (literature review, database and map-based searches);
- identify significant flora, vegetation and ecological communities and assess the potential sensitivity to impact;
- conduct a field survey to verify / ground truth the desktop assessment findings;
- undertake floristic community mapping to a scale appropriate for the bioregion and described according to the National Vegetation Information System (NVIS) structure and floristics;
- undertake vegetation condition mapping;
- assess the project area's plant species diversity, density, composition, structure and weed cover, using NVIS classification system for vegetation description;
- assess Matters of National Environmental Significance (MNES) and indicate whether potential impacts on MNES as protected under the EPBC Act are likely to require referral of the project to the Commonwealth DAWE; and
- determine the State legislative context of environmental aspects required for the assessment.

The fauna assessment was conducted in accordance with the requirements for a basic terrestrial fauna survey as defined in *Technical Guidance - Terrestrial Fauna Surveys for Environmental Impact Assessment – June 2020* (EPA, 2020). The objectives of the assessment were to:

- Gather background information on fauna in the survey area (literature review, database and map-based searches);
- Delineate and characterise the faunal assemblages and fauna habitats present in the survey area; and
- Assess the likelihood of significant fauna occurring within the survey area.

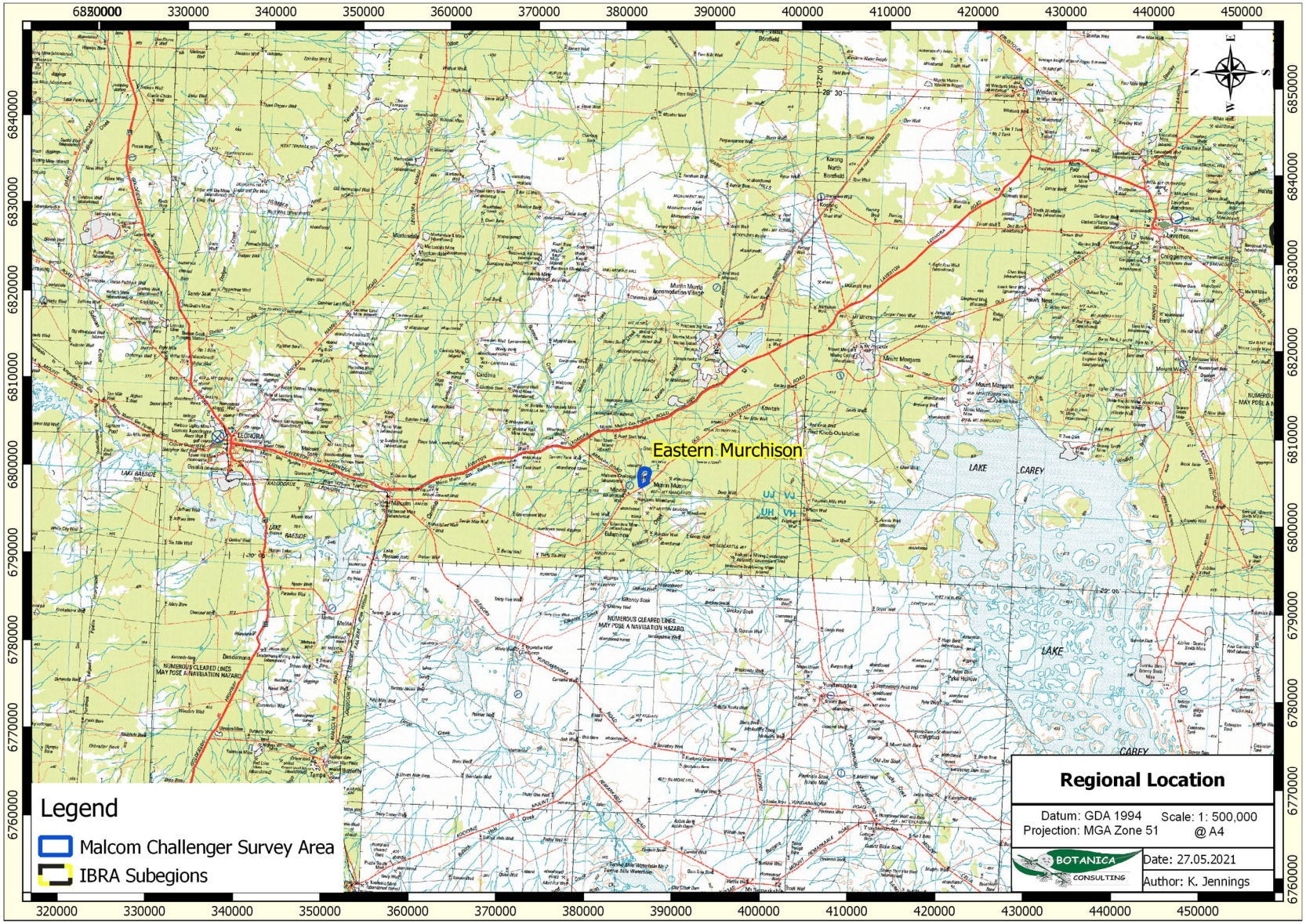


Figure 1-1: Regional map of the survey area

2 BIOPHYSICAL ENVIRONMENT

2.1 Regional Environment

The survey area lies within the Eastern Murchison (MUR1) subregion of the Murchison Bioregion, as defined by the Interim Biogeographic Regionalisation of Australia (IBRA). The Eastern Murchison comprises the northern parts of the craton's Southern Cross and Eastern Goldfields Terrains and is characterised by internal drainage and extensive areas of elevated red desert sandplains with minimal dune development. Salt Lake systems are associated with the occluded paleodrainage system. Broad plains of red-brown soils and breakaways complexes as well as red sandplains are widespread. Vegetation is dominated by Mulga woodlands and is often rich in ephemerals, hummock grasslands, saltbush shrublands and Tecticornia shrublands (Cowan, 2001).

In accordance with Beard (1990), the Murchison region is located in the Austin Botanical District within the Eremaean Province of WA. It is defined by the vegetational expression of geological boundaries of the Yilgarn Block, described as Archaean granite with infolded volcanics and meta-sediments (greenstones) of a like age. The topography is undulating, with occasional ranges of low hills and extensive sandplains in the eastern half. The principal soil type is shallow earthy loam overlying red-brown hardpan, with shallow stony loams on hills and red earthy sands on sandplains. The western half of the region more or less coincides with the basin of the Murchison River, the eastern half embraces the drainage of former rivers, now dry, draining towards the Eucla Basin. Vegetation is predominantly mulga low woodland *(Acacia aneura)* on plains, reduced to scrub on hills, with a tree steppe of *Eucalyptus* spp. and *Triodia basedowii* on sandplains.

2.2 Land Use

The dominant land uses of the Eastern Murchison subregion include grazing native pastures (85.47%), unallocated crown reserves (11.34%), conservation (1.4%) and mining (1.79%) (Cowan, 2001). The survey area is located within the Minara Pastoral Lease.

2.3 Soils and Landscape Systems

The survey area lies within the Murchison Province, which consists of hardpan wash plains and sandplains (with some stony plains, hills, mesas and salt lakes) on the granitic rocks and greenstone of the Yilgarn Craton. The Murchison Province is located in the inland Mid-west and northern Goldfields between three Springs, the Gascoyne River, Wiluna, Cosmo Newberry and Menzies. Soil types consist of red loamy earths, red sandy earths, red shallow loams, red deep sands and red-brown hardpan shallow loams with some red shallow sands and red shallow sandy duplexes present. Vegetation communities are predominately Mulga shrublands with spinifex grasslands, with areas of bowgada shrublands, Eucalypt woodlands and halophytic shrublands (Tille, 2006).

The Murchison Province is further divided into soil-landscape zones, with the survey area located within the Salinaland Plains Zone (279). The Salinaland Plains Zone is located in the northern Goldfields from Lakes Barlee and Ballard to Wiluna and Laverton (Tille, 2006). It is comprised of sandplains (with hardpan wash plains and some mesas, stony plains and salt lakes) on granitic rocks (and some greenstone) of the Yilgarn Craton. Soils include red sandy earths, red deep sands, red shallow loams and red loamy earths with some red-brown hardpan shallow loams, salt lake soils and red shallow sandy duplexes. Vegetation consists of mulga shrublands with spinifex grasslands (and some halophytic shrublands and eucalypt woodlands).

These zones are further divided into soil landscape systems, with the survey area located within two soil landscape systems, as shown in Table 2-1 and Figure 2-1, in accordance with soil landscape system mapping data (Government of Western Australia, 2019).

Table 2-1: Soil Landscape Systems within the survey area

Soil Landscape System	Description	Extent within Survey Area ha (%)
Nubev System	Gently undulating stony plains, minor limonitic low rises and drainage floors supporting mulga and halophytic shrublands.	160.1 ha (90.4%)
Hootanui System	Breakaways, hills and ridges with saline gravelly and stony lower plains supporting scattered halophytic low shrublands.	16.9 ha (9.6%)

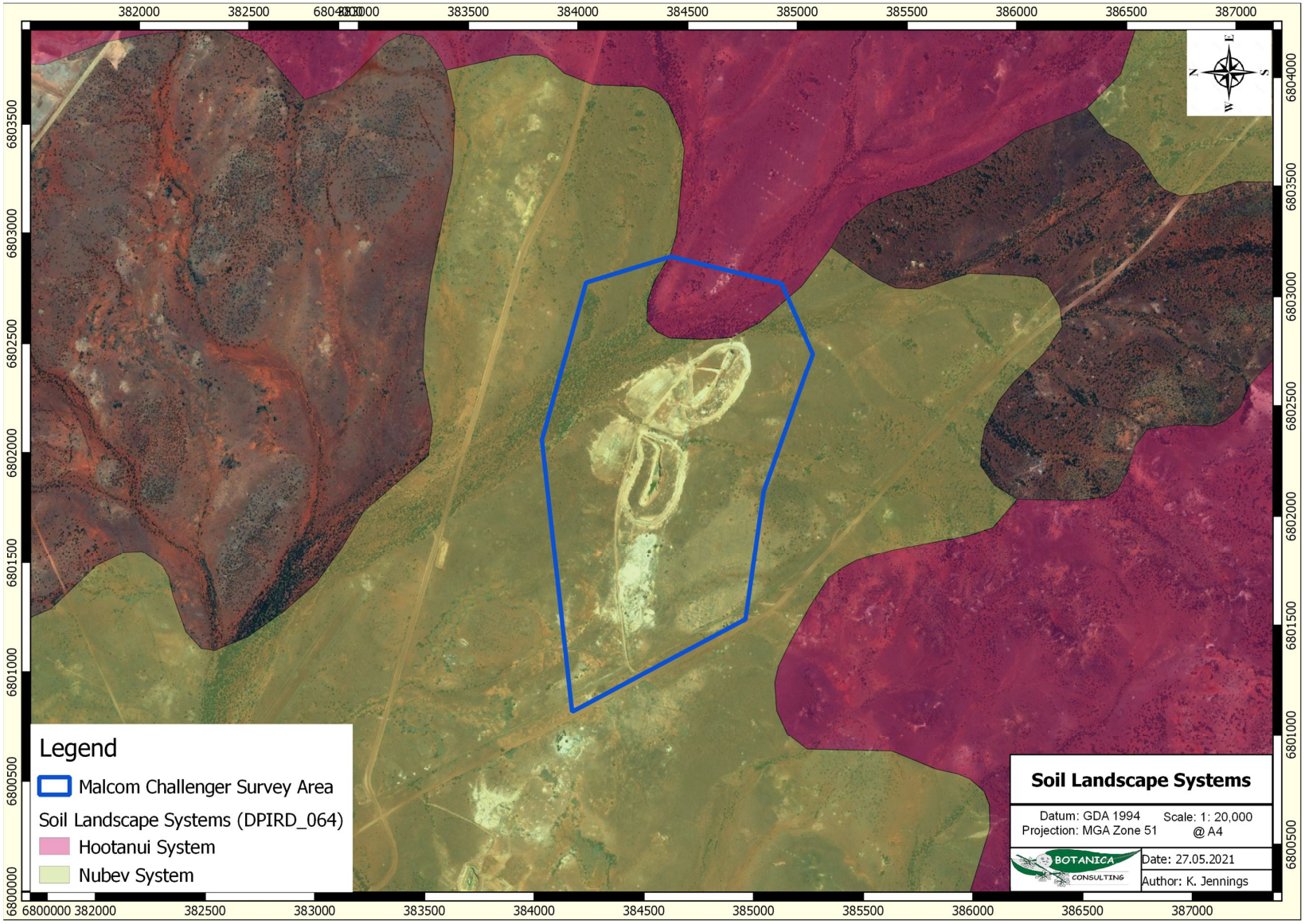


Figure 2-1: Soil Landscape Systems within the survey area

2.4 Regional Vegetation

In accordance with Tille (2006), the vegetation of the Salinaland Plains Zone is typified by the preponderance of the sandplains and occasional dunes of Mulga shrublands with spinifex grasslands, and some halophytic shrublands and eucalypt woodlands.

More broadly, the vegetation of the Murchison region is described as Mulga (*Acacia aneura*) shrublands and woodlands with gidgee (*A. pruinocarpa*), kurara (*A. tetragonophylla*), *A. linophylla,* bowgada (*A. ramulosa*), jam (*A. acuminata*), minniritchie (*A. grasbyi*), *Senna* spp. and *Eremophila* spp. which dominate the hardpan wash plains. Denser, taller mulga woodlands are found on groves while the sandy banks support mulga, bowgada and kurara shrublands with an understorey of wanderrie grasses (*Eragrostis* and *Eriachne* spp. and *Monachather paradoxa*). Snakewood (*A. xiphophylla*), bluebush (*Maireana* spp.) and saltbush (*Atriplex* spp.) grow on the saline drainage tracts.

The sandplains in the east support grasslands of hard spinifex (*Triodia basedowii*). These grasslands occur with an open tree and shrub steppe of mulga, marble gum (*Eucalyptus gongylocarpa*), mallees (*E. kingsmillii*, *E. longissima*, *E. brachycorys* and *E. youngiana*), bowgada and spinifex wattle (*A. coolgardiensis*). In places denser woodlands of mulga, spinifex wattle or mallee are found over the spinifex. On western sandplains shrublands are dominated by bowgada with cypress pine (*Callitris columellaris*), mallees (*e.g. E. leptopoda* and *E. kingsmillii*), mulga and *Grevillea* spp. On the yellow sandplains in the south-west are closed mixed shrublands with *Melaleuca*, *Hakea*, *Calothamnus*, *Baeckea*, *Banksia prionotes*, *Allocasuarina*. and *Acacia* spp. The mesas have bowgada, mulga and *A. linophylla* shrublands above the breakaways, while the footslopes support shrublands with saltbush (*Atriplex* spp.), *Frankenia* spp., *Ptilotus* spp. and *Eremophila pterocarpa*. The hilly terrain has shrublands of mulga, minniritchie, *Eremophila* spp. and cotton bush (*Ptilotus obovatus*). Hills in the far west have woodlands of York gum (*Eucalyptus loxophleba*), salmon gum (*E. salmonophloia*) and jam (*Acacia acuminata).* The stony plains support shrublands of mulga, gidgee, granite wattle (*Acacia quadrimarginea*), minniritchie, prickly wattle, snakewood, jam and *Eremophila* spp. in the valley floors there are shrublands of samphire (*Tecticornia* spp.), saltbush, sage (*Cratystylis subspinescens*) and *Frankenia* spp. surrounding salt lakes. Floodplains along the Murchison and its tributaries have shrublands of bluebush (*Maireana* spp.), saltbush and *Frankenia* spp., as well as mulga, prickly wattle and *Acacia distans* (Tille 2006).

2.5 Conservation Values

The Murchison Bioregion contains 41 vegetation associations (hummock grasslands, succulent steppe or low woodlands) that have at least 85 per cent of their total extent in the Bioregion. The Bioregion is rich and diverse in flora and fauna but most species are wide ranging and usually occur in adjoining regions. A snake (*Pseudechis butleri*) is the only known regionally endemic vertebrate species.

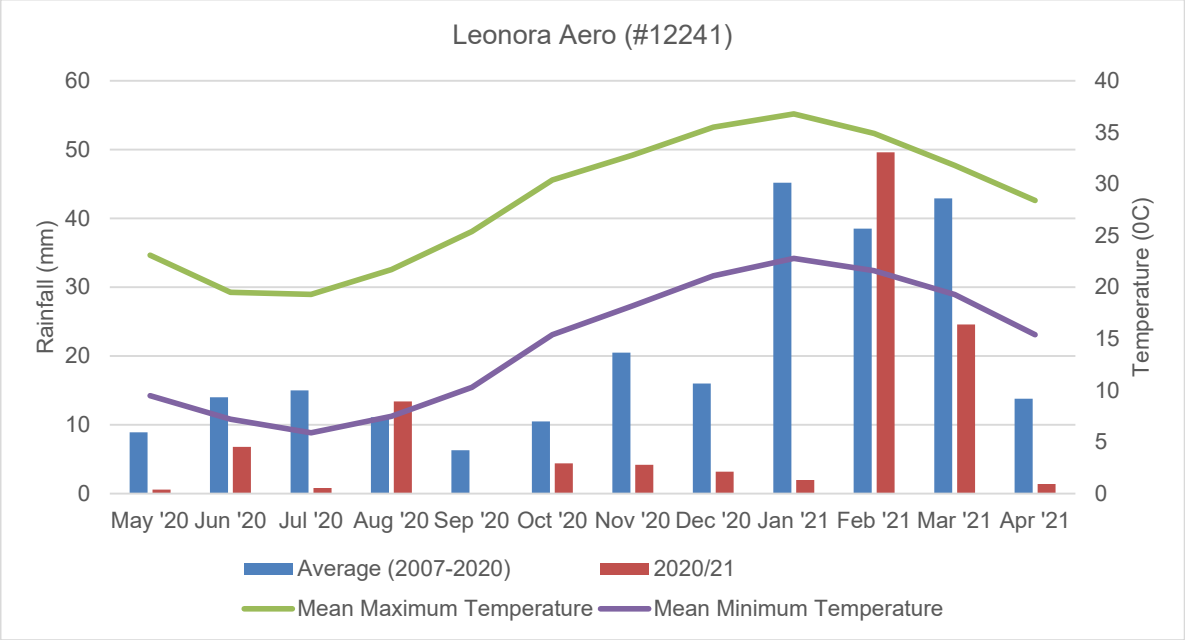
There are six wetlands of national importance in the Bioregion, all of which are salt lakes: Lake Ballard, Lake Barlee, Lake Marmion, Lake Wooleen, Lake Breberle and Lake Anneen. There is one wetland of regional importance within the Murchison Bioregion; the Mungawolagudgi Claypan on Muggon Station.

No ecosystems are listed as threatened under WA State legislation occur within the Murchison Bioregion, but 52 communities and vegetation associations are thought to be at risk for a variety of reasons. Grazing from livestock, goats and rabbits and changed fire regimes are the main

threatening processes in the region, with clearing, impacts of mining, erosion and sedimentation also causing significant impacts.

2.6 Climate

The climate of the Eastern Murchison subregion is characterised as an arid climate with summer and winter rainfall of approximately 200 mm annually (Beard, 1990). Rainfall data for the Leonora Aero weather station (#12241), located approximately 49 km west of the survey area, is shown in Graph 2-1 (BoM, 2021a). Mean monthly rainfall ranges from 6.3 mm in September to 42.9 mm in March, with a mean annual rainfall of 254.1 mm. The survey was conducted in early May 2021, with the preceding months (March-April) experiencing below average rainfall. However, rainfall in February 2021 was above average after several significant rainfall events in February.



Graph 2-1: Average and recent rainfall and average temperature data of Leonora Aero (BoM, 2021a)

2.7 Hydrology

According to the Geoscience Australia database (2015), there are no permanent or ephemeral inland waters within the survey area. There are multiple ephemeral drainage lines that intersect with the survey area (Figure 2-2).

Groundwater Dependent Ecosystems (GDE) includes biological assemblages of species such as wetlands or woodlands that use groundwater either opportunistically or as their primary water source. For the purposes of this report, a GDE is defined as any vegetation community that derives part of its water budget from groundwater and must be assumed to have some degree of groundwater dependency. In accordance with the BoM *Atlas of Groundwater Dependent Ecosystems* (BoM, 2021b) database, there are no potential terrestrial nor aquatic GDE's within the survey area.

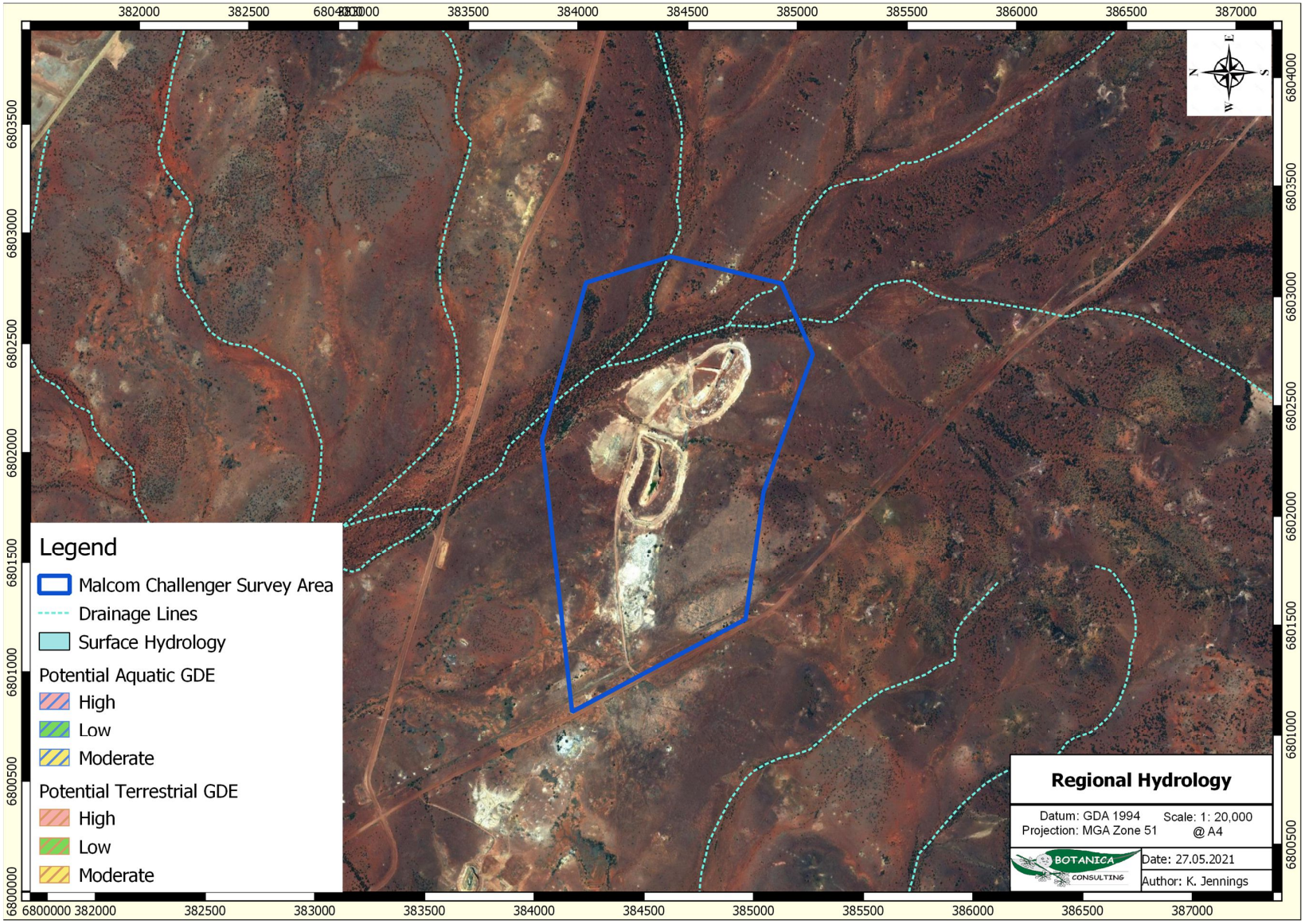


Figure 2-2: Surface Hydrology of the survey area

3 SURVEY METHODOLOGY

3.1 Desktop Assessment

Prior to the field assessment a literature review was undertaken of previous flora and fauna assessments conducted within the local region. Documents reviewed included:

- Botanica Consulting (2020). *Kookynie Project Reconnaissance Flora/ Vegetation and Basic Fauna Survey.* Prepared for Genesis Minerals Limited, October 2020.

In addition to the literature review, searches of the following databases were undertaken to aid in the compilation of a list of significant flora within the survey area:

- DBCA Threatened/ Priority Flora spatial data (DBCA, 2019a);
- DBCA NatureMap database (DBCA, 2021b); and
- EPBC Protected Matters search tool (DAWE, 2021a).

The NatureMap species search and EPBC Protected Matters search were conducted with a 40 km buffer from the survey area.

Significant flora and fauna species identified by the desktop review were assessed with regards to their population extent and distribution and preferred habitat to determine their likelihood of occurrence within the survey area.

The assessment categorised flora species as follows:

- Unlikely- Suitable habitat is not expected to occur and/or the survey area is outside the known range of the species.
- Possible- Suitable habitat may be present, and the area is within the known range of the species. This option is also used when there is insufficient information to determine the preferred habitat of a species.
- Likely- Suitable habitat is expected to occur and there are records within 10 km of the survey area.
- Previously Recorded- A record for this species is located within the survey area. Field survey will ground-truth currently occurring individuals and populations.

Fauna species were categorised as follows:

- Would Not Occur: There is no suitable habitat for the species in the survey area and/or there is no documented record of the species in the general area since records have been kept and/or the species is generally accepted as being locally/regionally extinct (supported by a lack of recent records).
    - Locally Extinct: Populations no longer occur within a small part of the species natural range, in this case within 10 or 20km of the survey area. Populations do however persist outside of this area.
    - Regionally Extinct: Populations no longer occur in a large part of the species natural range, in this case within the Northern Goldfields region. Populations do however persist outside of this area.

- Unlikely to Occur: The survey area is outside of the currently documented distribution for the species in question, or no suitable habitat (type, quality and extent) was identified as being present during the field assessment. Individuals of some species may occur occasionally as vagrants/transients especially if suitable habitat is located nearby but the site itself would not support a population or part population of the species.

- Possibly Occurs: Survey area is within the known distribution of the species in question and habitat of at least marginal quality was identified as likely to be present during the field survey and literature review, supported in some cases by recent records being documented in literature from within or near the survey area. In some cases, while a species may be classified as possibly being present at times, habitat may be marginal (e.g. poor quality, fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.

- Known to Occur: The species in question has been positively identified as being present (for sedentary species) or as using the survey area as habitat for some other purpose (for non-sedentary/mobile species) during field surveys within or near the survey area. This information may have been obtained by direct observation of individuals or by way of secondary evidence (e.g. tracks, foraging debris, scats). In some cases, while a species may be classified as known to occur, habitat may be marginal (e.g. poor quality, fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.

It should be noted that these lists are based on observations from a broader area than the assessment area (40 km radius) and therefore may include taxa not present. The databases also often include very old records that may be incorrect or in some cases the taxa in question have become locally or regionally extinct. Information from these sources should therefore be taken as indicative only and local knowledge and information also needs to be taken into consideration when determining what actual species may be present within the specific area being investigated.

The conservation significance of flora and fauna taxa was assessed using data from the following sources:

- *Environment Protection and Biodiversity and Conservation* (EPBC) *Act 1999*. Administered by the Australian Government (DAWE);
- *Biodiversity Conservation* (BC) *Act 2016*. Administered by the WA Government (DBCA);
- Red List produced by the Species Survival Commission (SSC) of the World Conservation Union (also known as the IUCN Red List – the acronym derived from its former name of the International Union for Conservation of Nature and Natural Resources). The Red List has no legislative power in Australia but is used as a framework for State and Commonwealth categories and criteria; and
- Priority Flora/ Fauna list. A non-legislative list maintained by DBCA for management purposes (fauna list released April 2019; flora list released December 2018).

The EPBC Act also requires the compilation of a list of migratory species that are recognized under international treaties including the:

- Japan Australia Migratory Bird Agreement 1981 (JAMBA)[1];
- China Australia Migratory Bird Agreement 1998 (CAMBA);
- Republic of Korea-Australia Migratory Bird Agreement 2007 (ROKAMBA); and
- Bonn Convention 1979 (The Convention on the Conservation of Migratory Species of Wild Animals).

Most but not all migratory bird species listed in the annexes to these bilateral agreements are protected in Australia as Matters of National Environmental Significance (MNES) under the EPBC Act. Descriptions of conservation significant species and communities are provided in Appendix 1.

3.2 Field Assessment

Botanica conducted a reconnaissance flora/ vegetation and basic fauna survey on the 7th May 2021, with the area traversed on foot and 4WD by Jennifer Jackson (Senior Botanist, BSc (Honours) Environmental Management) and Matthew Nedlands (Environmental Technician).

[1] Most but not all species listed under JAMBA are also specially protected under Specially Protected Species of the BC Act.

Figure 3-1: GPS survey data within the survey area

3.2.1 Flora Assessment

Prior to the commencement of field work, aerial photography was inspected and obvious differences in the vegetation assemblages were identified. The different vegetation communities identified were then inspected during the field survey to assess their validity. A handheld GPS unit was used to record the coordinates of the boundaries between existing vegetation communities. At each sample point, the following information was recorded:

- GPS location;
- Photograph of vegetation;
- Dominant taxa for each stratum;
- All vascular taxa (including annual taxa);
- Landform classification;
- Vegetation condition rating;
- Collection and documentation of unknown plant specimens; and
- GPS location, photograph and collection of flora of conservation significance if encountered.

Unknown specimens collected during the survey were identified with the aid of samples housed at the Botanica Herbarium and Western Australian Herbarium. Vegetation was classified in accordance with NVIS classifications.

3.2.2 Fauna Assessment

Vegetation and landform units identified during the flora assessment have been used to define broad fauna habitat types across the site. This information has been supplemented with observations made during the fauna assessment.

The main aim of the fauna habitat assessment was to determine the likelihood of fauna species of conservation significance utilizing the areas that may be impacted during site development. The habitat information obtained was also used to aid in finalizing the overall potential fauna list.

As part of the desktop literature review, available information on the habitat requirements of the species of conservation significance listed as possibly occurring in the area was researched. During the field survey, the habitats within the study area were assessed and specific elements identified, if present, to determine the likelihood of listed threatened species utilizing the area and its significance to them.

Opportunistic observations of fauna species were made during all field survey work which involved a series of transects across the study area during the day including observations of bird species with binoculars. Secondary evidence of a species presence such as tracks, scats, skeletal remains, foraging evidence or calls were also noted if observed/heard.

3.2.3 Scientific Licences

Table 3-1: Scientific Licences of Botanica Staff coordinating the flora survey

Licensed staff	Permit Number	Valid Until
Jennifer Jackson	FB62000309 (Licence to take flora for scientific purposes)	11/01/2024

3.3 Survey Limitations and Constraints

It is important to note that flora surveys will entail limitations notwithstanding careful planning and design. Potential limitations are listed in Table 3-2.

The conclusions presented in this report are based upon field data and environmental assessments and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the site at the time of the field assessments. Also, it should be recognised that site conditions can change with time. Information not available at the time of this assessment which may subsequently become available may alter the conclusions presented.

Some species are reported as potentially occurring based on there being suitable habitat (quality and extent) within the survey area or immediately adjacent. The habitat requirements and ecology of many of the species known to occur in the wider area are however often not well understood or documented. It can therefore be difficult to exclude species from the potential list based on a lack of a specific habitats or microhabitats within the survey area. As a consequence of this limitation, the potential species list produced is most likely an overestimation of those species that actually utilise the survey area for some purpose.

In recognition of survey limitations, a precautionary approach has been adopted for this assessment. Any flora and fauna species that would possibly occur within the survey area (or immediately adjacent), as identified through ecological databases, publications, discussions with local experts/residents and the habitat knowledge of the author, has been listed as having the potential to occur.

Table 3-2: Limitations and constraints associated with the survey

Variable	Potential Impact on Survey	Details
Access problems	Not a constraint	The survey was conducted via 4WD and on foot. Numerous tracks were located within the survey area, providing ease of access.
Competency/ Experience	Not a constraint	The BC personnel that conducted the survey were regarded as suitably qualified and experienced. **Coordinating Botanist/ Zoologist:** Jennifer Jackson **Data Interpretation:** Jennifer Jackson and Kelby Jennings.
Timing of survey, weather & season	Not a constraint	Fieldwork was undertaken within EPA's recommended primary survey time period for the Eremaean Province (i.e., 6-8 weeks post wet season (March-June)) following above average rainfall received in February 2021.
Area disturbance	Not a constraint	The area has been disturbed from exploration operations, cattle grazing and other human impacts; however, vegetation was mostly intact and comprised of native vegetation.
Survey Effort/ Extent	Not a constraint	Survey intensity was appropriate for the size/significance of the area with a reconnaissance survey completed to identify vegetation types/fauna habitats and conservation significant species/communities.
Availability of contextual information at a regional and local scale	Not a constraint	Threatened flora database searches provided by the DBCA were used to identify any potential locations of Threatened/Priority taxa. BoM, DWER, DPIRD, DBCA and DAWE databases were reviewed to obtain appropriate regional desktop information on the biophysical environment of the local region. Previous flora/ fauna surveys within the local area have been assessed for pertinent information and environmental context of the regional area.
Completeness	Not a constraint	In the opinion of Botanica, the survey area was covered sufficiently in order to identify vegetation assemblages. All observed flora individuals were able to be identified to species level. The vegetation types for this study were based on visual descriptions of locations in the field. The distribution of these vegetation communities/ fauna habitats outside the study area is not known, however vegetation types identified were categorised via comparison to vegetation distributions throughout WA specified in the NVIS Major Vegetation Groups (DotEE, 2017b).

4 RESULTS

4.1 Desktop Assessment

4.1.1 Flora

The desktop review identified 372 vascular flora species as occurring within 40 km of the survey area, representing 150 genera from 55 families. The most diverse families were Asteraceae (58 species), Fabaceae (45 species) and Chenopodiaceae (44 species). Significant genera were *Eremophila* (30 species), *Acacia* (24 species) and *Maireana* and *Ptilotus* (11 species each). This total includes six introduced (weed) species (1.6%).

4.1.1.1 Introduced Flora

The desktop review identified eight introduced flora (weed) species as potentially occurring in the vicinity of the survey area, representing six families. None of these species are listed as a Declared Pest on the Western Australian Organism List (WAOL) under the *Biosecurity and Agriculture Management* (BAM) *Act 2007* or as Weeds of National Significance (WONS).

The full list of potential weed species is contained in Appendix 2.

4.1.1.2 Significant Flora

The assessment of the DBCA Priority/ Threatened flora data (DBCA, 2019a), NatureMap search (DBCA, 2021b), Protected Matters searches (DAWE, 2021a) and previous relevant literature identified 16 significant flora species recorded within a 40 km radius of the survey area. These are comprised of three Priority 1, 11 Priority 3 and two Priority 4 taxa (Appendix 3).

These taxa were assessed for distribution and known habitat to determine their likelihood of occurrence within the survey area. The assessment identified four significant flora taxa as likely to occur in the survey area, consisting of one Priority 3 and one Priority 4 taxa. In addition, two significant taxa were identified as possibly occurring in the survey area, consisting of two Priority 3 taxa (Table 4-1). The full flora likelihood assessment is listed in Appendix 3. The locations of the DBCA database records are illustrated spatially in Figure 4-1.

Table 4-1: Potentially occurring significant flora species

DBCA Rank	Taxon	Comments	Likelihood
P3	*Acacia* sp. Marshall Pool (G. Cockerton 3024)	Little known, within known species range.	Possible
	Cratystylis centralis	Records within 10 km, habitat may be present.	Possible
	Hybanthus floribundus subsp. *chloroxanthus*	Records within 10 km, habitat likely to be present.	Likely
P4	*Hemigenia exilis*	Records within 10 km, habitat likely to be present.	Likely

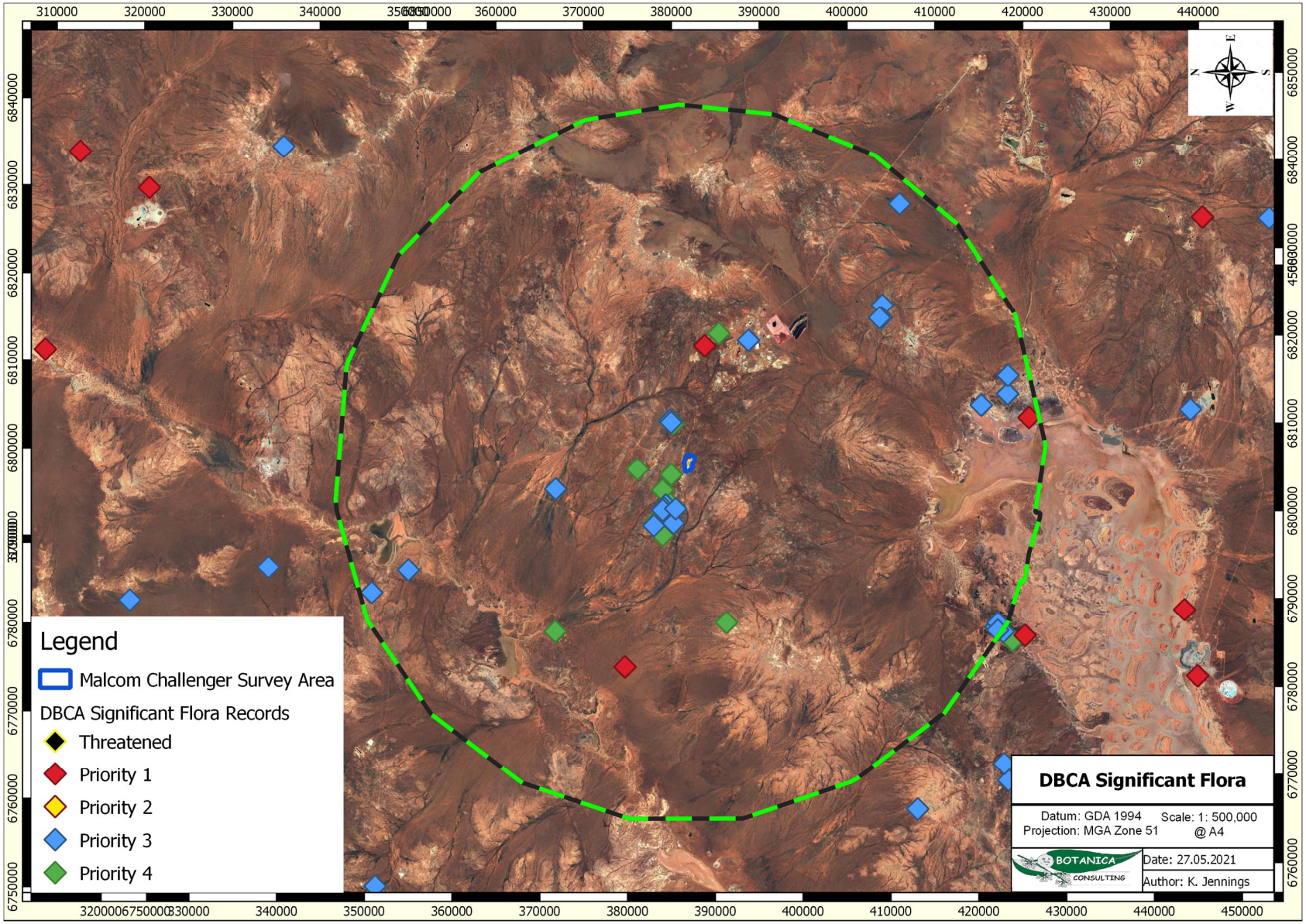


Figure 4-1: DBCA significant flora records

4.1.2 Vegetation and Ecological Communities

4.1.2.1 Vegetation Associations

The Pre-European vegetation association spatial mapping dataset (DPIRD, 2018) identifies the survey area as occurring within vegetation association Laverton 39 (Figure 4-2). The association description and remaining extent, as specified in the 2018 Statewide Vegetation Statistics (DBCA, 2019b) is provided in Table 4-2. Areas retaining less than 30% of their pre-European vegetation extent generally experience exponentially accelerated species loss, while areas with less than 10% are considered "endangered" (EPA, 2000). The Laverton 39 vegetation association retains >97% of its pre-European extent, and development within the survey area will not significantly reduce the current extent of this vegetation association.

Table 4-2: Pre-European Vegetation Associations within the survey area

Vegetation Association	Current Extent (ha)	Pre-European extent remaining	% Protected for Conservation	Floristic Description	Extent within Survey Area ha (%)
Laverton 39	151,580.2	97.5%	-	Shrublands; mulga scrub	177 ha (100%)

4.1.2.2 Significant Ecological Communities

The Protected Matters search (DAWE, 2021a) did not identify any Threatened Ecological Communities as potentially occurring within the survey area. Analysis of the Priority Ecological Communities within the Midwest region (DBCA, 2021a) did not identify any significant communities as likely or possibly occurring within the survey area.

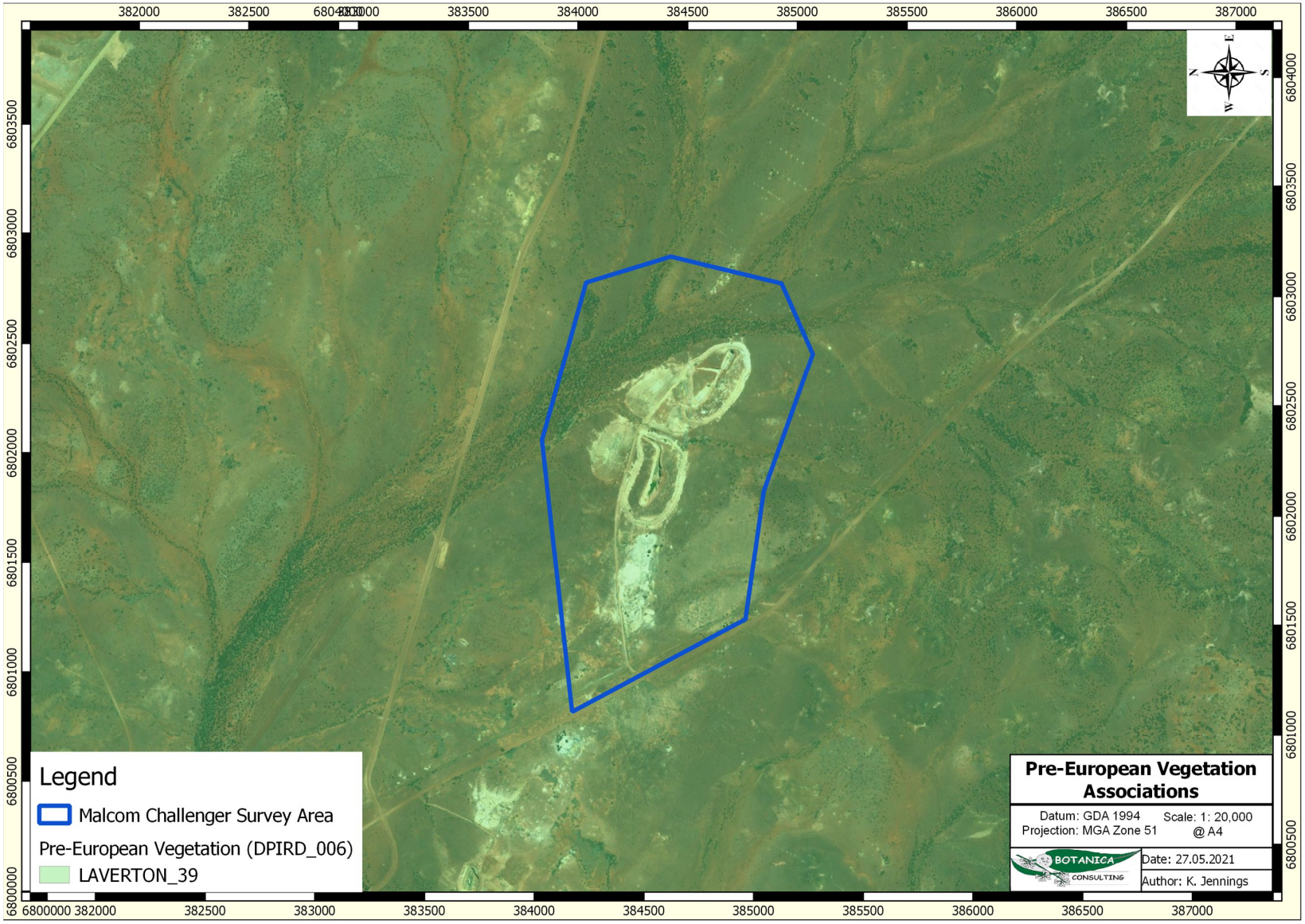


Figure 4-2: Pre-European Vegetation Associations within the survey area

4.1.3 Fauna

According to the results of the NatureMap search (DBCA, 2021b), a total of 203 terrestrial vertebrate fauna taxa have been recorded within 40 km of the survey area, consisting of 131 bird, 20 mammal, 47 reptile and five amphibian taxa. This total includes eight introduced (feral) species (3.6%).

4.1.3.1 Introduced (Feral) Fauna

The NatureMap and EPBC database searches identified 12 feral fauna species, representing eight families, as potentially occurring in the survey area (Table 4-3).

Table 4-3: Potentially Occurring Introduced Fauna

Family	Taxon	Common Name
Bovidae	*Bos taurus*	European Cattle
	Capra hircus	Goat
Camelidae	*Camelus dromedarius*	Dromedary Camel
Canidae	*Canis lupus familiaris*	Domestic Dog
	Vulpes vulpes	Red Fox
Columbidae	*Columba livia*	Domestic Pigeon
	Streptopelia senegalensis	Laughing Turtle-Dove
Felidae	*Felis catus*	Cat
Leporidae	*Oryctolagus cuniculus*	Rabbit
Muridae	*Mus musculus*	House Mouse
Equidae	*Equus caballus*	Horse
	Equus asinus	Donkey, Ass

4.1.3.2 Conservation Significant Fauna

The desktop review identified 11 terrestrial fauna species of conservation significance as previously being recorded in the regional area, consisting of seven Threatened, one Priority 4 and three migratory or otherwise protected species. In addition, seven migratory wading/shorebird species were assessed collectively due to their similar habitat requirements. The full fauna likelihood assessment is listed in Appendix 4.

Habitat and distribution data was used to determine the likelihood of occurrence within the survey area. The assessment identified three significant fauna species as potentially occurring in the survey area, consisting of two Vulnerable taxa and one Specially Protected taxa (Table 4-4).

Table 4-4: Significant fauna species potentially occurring in survey area

Species	Conservation Status			Likelihood
	EPBC Act	BC Act	DBCA Priority	
Malleefowl *Leipoa ocellata*	VU	VU	-	Possible
Grey Falcon *Falco hypoleucos*	VU	VU		Possible
Peregrine Falcon *Falco peregrinus*	OS	-	-	Possible

4.1.4 Conservation Areas

There are no DBCA managed lands or lands of interest located within the survey area.

There are no Environmentally Sensitive Areas (ESAs) located within the survey area.

There are no Nationally Important or RAMSAR wetlands located within the survey area.

The nearest significant environmental features are Lake Ballard and Lake Marmion, located approximately 90 km south-west of the survey area. These areas are categorised both as Nationally Important Wetlands and as Environmentally Sensitive Areas. Disturbances within the survey area are unlikely to impact these features.

4.2 Field Assessment

4.2.1 Flora

The field survey identified 36 vascular flora taxa within the survey area. These taxa represented 20 genera across 15 families, with the most diverse families being Chenopodiaceae (nine species), Fabaceae (eight species) and Scrophulariaceae (five species). Dominant genera include *Acacia* (six species), *Eremophila* (five species) and *Maireana* (five species). No introduced (weed) species were recorded. The full field species inventory is listed in Appendix 5.

4.2.1.1 Introduced Flora

No species of introduced flora were recorded within the survey area.

4.2.1.2 Significant Flora

According to the EPA *Environmental Factor Guideline for Flora and Vegetation* (EPA, 2016b) significant flora includes:

- flora being identified as threatened or priority species;
- locally endemic flora or flora associated with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems);
- new species or anomalous features that indicate a potential new species;
- flora representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- unusual species, including restricted subspecies, varieties or naturally occurring hybrids; and
- flora with relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

No Threatened or Priority flora species or otherwise significant flora were recorded within the survey area.

4.2.2 Vegetation Communities

A total of three broad-scale vegetation communities were identified within the survey area. Vegetation community descriptions and extent are listed below in Table 4-5 and illustrated spatially in Figure 4-3. Vegetation community descriptions and extents were determined from field survey results, aerial imagery interpretation and extrapolation of the communities.

The survey found RP-AS1 was the most widespread community in the survey area, occupying 84.5 ha (44.7%), while RP-AS2 was the most restricted with 17.3 ha (9.8%). The most diverse community was DD-AS1 with 25 species (69.4%), while the least diverse was RP-AS2 with nine species (30.6%).

Table 4-5: Vegetation Community Descriptions and Extent

Vegetation Community	Broad Floristic Formation (NVIS III)	Vegetation Description (NVIS V)	Landform	Image
RP-AS1 84.5 ha (47.7%)	*Acacia* sparse shrubland	*Acacia aneura, Hakea preissii* and *Santalum acuminatum* sparse tall shrubland over *Atriplex bunburyana* and *Cratystylis subspinescens* sparse shrubland over *Maireana triptera, M. georgei and Ptilotus obovatus var. obovatus* low sparse shrubland.	Rocky plain	
RP-AS2 17.3 ha (9.8%)	*Acacia* sparse shrubland	*Acacia aneura* sparse tall shrubland over *Eremophila platycalyx subsp. Leonora* and *Cratystylis subspinescens* sparse shrubland over *Maireana triptera, M. georgei and Tecticornia disarticulata* low sparse chenopod shrubland.	Rocky plain	

Vegetation Community	Broad Floristic Formation (NVIS III)	Vegetation Description (NVIS V)	Landform	Image
DD-AS1 35.6 ha (20.1%)	*Acacia* shrubland	*Acacia incurvaneura, A. aneura* and *A. caesaneura* tall shrubland over *Acacia tetragonophylla, Teucrium teucriiflorum* and *Senna artemisioides subsp. artemisioides* open shrubland over *Maireana triptera, M. georgei and Ptilotus obovatus var. obovatus* low open shrubland.	Drainage depression	

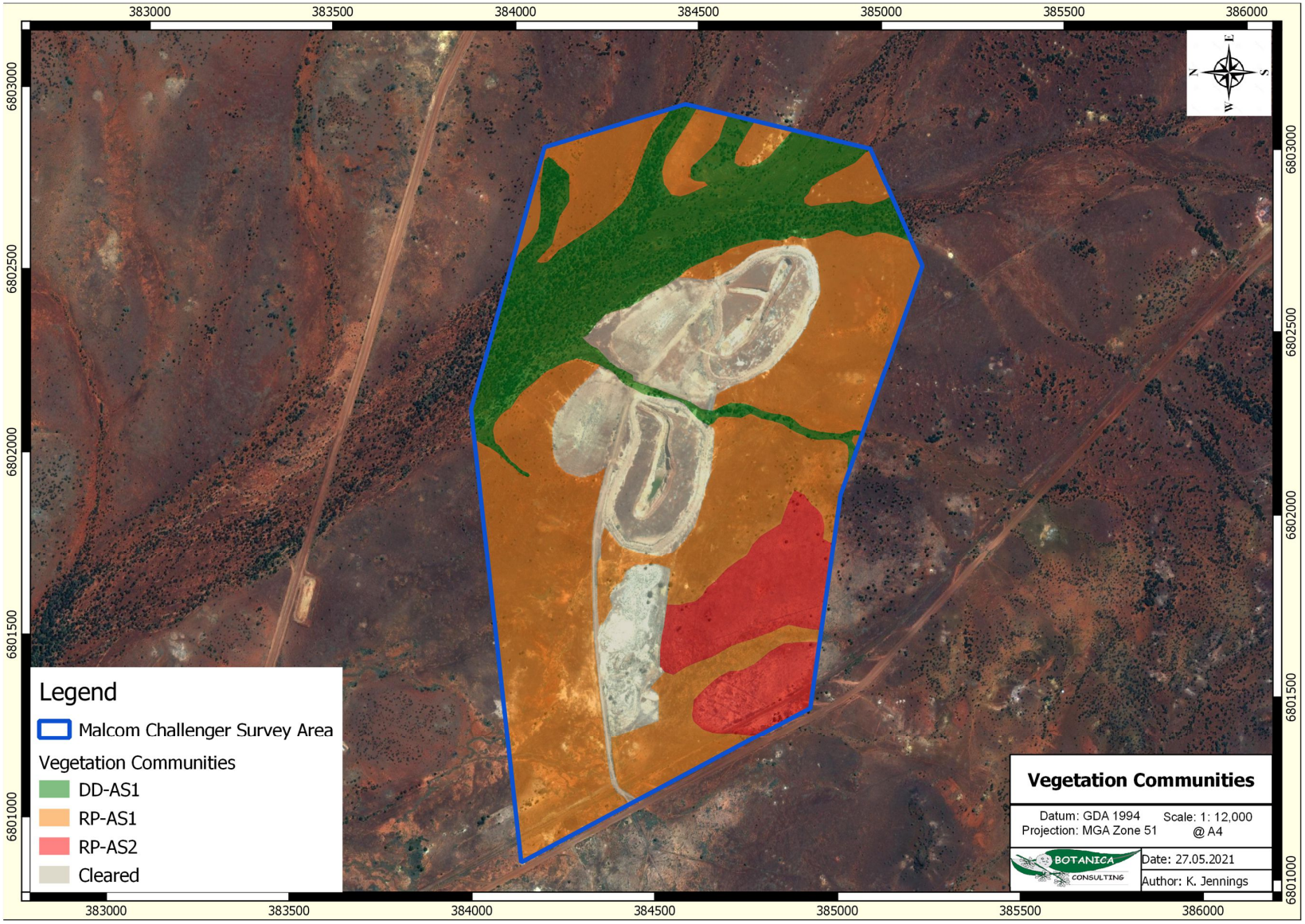


Figure 4-3: Vegetation Communities

4.2.3 Vegetation Condition

Based on the vegetation condition rating scale adapted from Keighery (1994) and Trudgen, (1988), native vegetation within the survey area was rated as 'good' to 'degraded' (Table 4-6, Figure 4-5). 'Good' condition depicts more obvious signs of damage caused by human activity since European settlement, in this case clearing for exploration activities and changed fire regimes, while degraded areas had evidence of severe grazing and high levels of historical disturbance. Areas cleared of vegetation, including major roads and historical mining operations were categorized as 'completely degraded'.

Table 4-6: Vegetation Condition within the survey area

Condition Rating	Area (ha)	Area (%)
Good	33.3	18.8
Degraded	104.1	58.8
Completely Degraded	39.6	22.4
Total	**177**	**100**

Figure 4-4: Vegetation Condition

4.2.4 Significant Vegetation

According to the EPA *Environmental Factor Guideline for Flora and Vegetation* (EPA, 2016b) significant vegetation includes:

- vegetation being identified as threatened or priority ecological communities;
- vegetation with restricted distribution;
- vegetation subject to a high degree of historical impact from threatening processes;
- vegetation which provides a role as a refuge; and
- vegetation providing an important function required to maintain ecological integrity of a significant ecosystem.

No Threatened or Priority Ecological Communities or otherwise significant vegetation were identified within the survey area.

4.2.5 Fauna Habitat

Based on vegetation and associated landforms identified during the flora and vegetation assessment, two broad scale terrestrial fauna habitats were identified as occurring within the survey area. Table 4-7 provides a visual representation of this habitat type, and the extent of fauna habitat is shown spatially in Figure 4-5.

Table 4-7: Terrestrial Fauna Habitats within the survey area

Fauna Habitat	Example Image
Acacia sparse shrubland on rocky plain Area: 104.1 ha (58.8%)	

Fauna Habitat	Example Image
Acacia shrubland in drainage depression Area: 33.4 ha (18.9%)	

Figure 4-5: Terrestrial Fauna Habitats

4.2.6 Significant Fauna

According to the EPA *Environmental Factor Guideline for Terrestrial Fauna* (EPA, 2016d) significant fauna includes:

- Fauna being identified as a threatened or priority species;
- Fauna species with restricted distribution;
- Fauna subject to a high degree of historical impact from threatening processes; and
- Fauna providing an important function required to maintain the ecological integrity of a significant ecosystem.

No evidence of significant fauna species were observed during the survey, including no evidence of Malleefowl nesting mounds or other activity.

The current status of some species on site and/or in the general area is difficult to determine, however, based on the habitats present and, in some cases, direct observations or recent nearby records, the following species of conservation significance can be regarded as possibly utilising the survey area for some purpose at times, these being:

- **Malleefowl (*Leipoa ocellata)* - Vulnerable (EPBC Act and BC Act)**
  This species is occasionally recorded in the Eastern Murchison subregion. Habitat appears marginal/or unsuitable for breeding, however occasional transients could potentially occur. No evidence of malleefowl activity (inactive or active mounds, tracks, feathers or bird observations etc.) were observed within the survey area. Significant impact unlikely.

- **Grey Falcon (*Falco hypoleucos)* - Vulnerable (EPBC Act and BC Act)**
  This species is sparsely recorded throughout inland Australia. Suitable habitat may be present but is unlikely to represent critical habitat. Significant impact unlikely.

- **Peregrine Falcon (*Falco peregrinus) - OS (BC Act)***
  This species potentially utilises some sections of the survey area as part of a much larger home range, though records in this area are uncommon. It is considered unlikely to breed within the survey area. Significant impact unlikely.

It should be noted that while habitats onsite for one or more of the species listed above are considered possibly suitable, some or all may be marginal in extent/quality and therefore the fauna species considered as possibly occurring may in fact only visit the area for short periods as infrequent vagrants.

4.3 Matters of National Environmental Significance

4.3.1 *Environment Protection and Biodiversity Conservation Act 1999*

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

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

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

4.4 Matters of State Environmental Significance

4.4.1 Environmental Protection Act WA 1986

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

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

No evidence of the survey area containing any TEC or Threatened flora or fauna was found during the survey period. The survey area is not located within an ESA.

4.4.2 Biodiversity Conservation Act 2016

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

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

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

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

4.5 Native Vegetation Clearing Principles

Based on the outcomes from the survey undertaken, Botanica assessed the results of the desktop and field survey with regards to the native vegetation clearing principles listed under Schedule 5 of the EP Act (Table 4-8). The assessment found that the proposed vegetation clearing activities may be at variance with clearing principle (f).

Table 4-8: Assessment against native vegetation clearing principles

Letter	Principle	Assessment	Outcome
Native vegetation should not be cleared if it:			
(a)	comprises a high level of biological diversity.	Vegetation identified within the survey area is not considered to be of high biological diversity and is well represented outside of the survey area. The survey area does not occur within any mapped Priority Ecological Communities (PECs), Threatened Ecological Communities (TECs) or associated buffer zones and does not contain any Banded Ironstone Formations.	Clearing is unlikely to be at variance with this principle
(b)	comprises the whole or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to WA.	No significant fauna or fauna habitat were observed within the survey area.	Clearing is unlikely to be at variance with this principle
(c)	includes, or is necessary for the continued existence of rare flora.	No Threatened Flora taxa, pursuant to the BC Act and the EPBC Act were identified within the survey area.	Clearing is unlikely to be at variance with this principle
(d)	comprises the whole or part of or is necessary for the maintenance of a threatened ecological community (TEC).	No TEC listed under the EPBC Act or by the BC Act occur within the survey area or the Eastern Murchison subregion.	Clearing is not at variance with this principle

Letter	Principle	Assessment	Outcome
Native vegetation should not be cleared if it:			
(e)	is significant as a remnant of native vegetation in an area that has been extensively cleared	All vegetation associations retain >97% of their original pre-European vegetation extent.	Clearing is unlikely to be at variance with this principle
(f)	is growing, in, or in association with, an environment associated with a watercourse or wetland	Multiple ephemeral drainage lines are located within the survey area which were associated with vegetation type DD-AS1 which represents 20.1% of the total survey area.	Clearing may be at variance with this principle
(g)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	The survey area and surrounding region has not been extensively cleared. Clearing within the survey area is not considered likely to lead to land degradation issues such as salinity, water logging or acidic soils.	Clearing is unlikely to be at variance with this principle
(h)	Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	The nearest significant environmental features are Lake Ballard and Lake Marmion, located approximately 90 km south-west of the survey area. Disturbances within the survey area are unlikely to impact these areas.	Clearing is unlikely to be at variance with this principle
(i)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	Multiple ephemeral drainage lines are located within the survey area which were associated with vegetation type DD-AS1 which represents 20.1% of the total survey area. Disturbances within the survey area are not expected to significantly affect water quality.	Clearing is unlikely to be at variance with this principle
(j)	Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding	Rainfall in the Eastern Murchison subregion has an average rainfall of 200-300mm. Rainfall events occur sporadically and are unlikely to result in localised flooding. Clearing within the survey area is not likely to increase the incidence or intensity of flooding within the survey area or surrounds.	Clearing is unlikely to be at variance with this principle

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Appendix 1: Conservation Ratings BC Act and EPBC Act

Definitions of Conservation Significant Species

Code	Category
State categories of threatened and priority species	
Threatened Species (T) 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).	
CR	**Critically Endangered** 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** 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** 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 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 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.	
IA	**International Agreement/ Migratory** 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.

Code	Category
	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** 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*.
Priority species Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora. Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring. Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.	
P1	**Priority 1: Poorly-known species** Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
P2	**Priority 2: Poorly-known species** Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
P3	**Priority 3: Poorly-known species** Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
P4	**Priority 4: Rare, Near Threatened and other species in need of monitoring** (a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
Commonwealth categories of threatened species	
EX	**Extinct** Taxa where there is no reasonable doubt that the last member of the species has died.
EW	**Extinct in the Wild** Taxa where it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CR	**Critically Endangered** Taxa that are facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
EN	**Endangered**

Code	Category
	Taxa which are not critically endangered and is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
VU	**Vulnerable** Taxa which are not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	**Conservation Dependent** Taxa which are the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or (b) the following subparagraphs are satisfied: (i) the species is a species of fish; (ii) the species is the focus of a plan of management that provides for actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised; (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.

Definitions of Conservation Significant Communities

Category Code	Category
State categories of Threatened Ecological Communities (TEC)	
PD	**Presumed Totally Destroyed**
	An ecological community will be listed as Presumed Totally Destroyed if there are no recent records of the community being extant and either of the following applies:
	• records within the last 50 years have not been confirmed despite thorough searches or known likely habitats or;
	• all occurrences recorded within the last 50 years have since been destroyed.
CR	**Critically Endangered**
	An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future, meeting any one of the following criteria:
	The estimated geographic range and distribution has been reduced by at least 90% and is either continuing to decline with total destruction imminent, or is unlikely to be substantially rehabilitated in the immediate future due to modification;
	The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area;
	The ecological community is highly modified with potential of being rehabilitated in the immediate future.
EN	**Endangered**
	An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. The ecological community must meet any one of the following criteria:
	The estimated geographic range and distribution has been reduced by at least 70% and is either continuing to decline with total destruction imminent in the short-term future, or is unlikely to be substantially rehabilitated in the short-term future due to modification;
	The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area;
	The ecological community is highly modified with potential of being rehabilitated in the short-term future.
VU	**Vulnerable**
	An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing high risk of total destruction in the medium to long term future. The ecological community must meet any one of the following criteria:
	The ecological community exists largely as modified occurrences that are likely to be able to be substantially restored or rehabilitated;
	The ecological community may already be modified and would be vulnerable to threatening process, and restricted in range or distribution;

Category Code	Category
	The ecological community may be widespread but has potential to move to a higher threat category due to existing or impending threatening processes.
Commonwealth categories of Threatened Ecological Communities (TEC)	
CE	**Critically Endangered** If, at that time, an ecological community is facing an extremely high risk of extinction in the wild in the immediate future (indicative timeframe being the next 10 years).
EN	**Endangered** If, at that time, an ecological community is not critically endangered but is facing a very high risk of extinction in the wild in the near future (indicative timeframe being the next 20 years).
VU	**Vulnerable** If, at that time, an ecological community is not critically endangered or endangered, but is facing a high risk of extinction in the wild in the medium–term future (indicative timeframe being the next 50 years).
Priority Ecological Communities (PEC)	
P1	**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.
P2	**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, un-allocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation.
P3	**Poorly known ecological communities**
	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:
	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;
	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 and inappropriate fire regimes.
P4	**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.
P5	**Conservation Dependent ecological communities**
	Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Appendix 2: Potentially Occurring Introduced (Weed) Flora Species

Family	Taxon	Common Name	WAOL Status	Control Category	WONS
Asteraceae	*Centaurea melitensis*	Maltese Cockspur, Malta Thistle	Permitted - s11	No Control Category	No
Brassicaceae	*Carrichtera annua*	Ward's Weed	Permitted - s11	No Control Category	No
Cucurbitaceae	*Cucumis myriocarpus* subsp. *myriocarpus*	-	Declared Pest, Prohibited - s12	C1 Exclusion, Whole of State	No
Geraniaceae	*Erodium aureum*	-	Permitted - s11	No Control Category	No
	Erodium cicutarium	Common Storksbill	Declared Pest, Prohibited - s12	C1 Exclusion, Whole of State	No
Poaceae	*Alopecurus geniculatus*	Marsh Foxtail	Permitted - s11	No Control Category	No
	Cenchrus ciliaris	Black Buffel-grass	Declared Pest, Prohibited - s12	C1 Exclusion, Whole of State	No
Primulaceae	*Lysimachia arvensis*	Pimpernel	Declared Pest, Prohibited - s12	C1 Exclusion, Whole of State	No

Appendix 3: Significant Flora Likelihood Assessment

DBCA Rank	Taxon	Habitat	Comments	Likelihood
P1	*Acacia websteri*	Red sand, clay or loam. Low-lying areas, flats.	Outside usual species range	Unlikely
	Ptilotus tetrandrus	Loamy sand.	Sparse, scattered records	Unlikely
	Tecticornia sp. Lake Way (P. Armstrong 05/961)	-	Outside usual species range	Unlikely
P3	*Acacia* sp. Marshall Pool (G. Cockerton 3024)	-	Little known, within known species range.	Possible
	Angianthus prostratus	Red clay or loamy soils. Saline depressions.	Habitat unlikely to be present.	Unlikely
	Calytrix praecipua	Skeletal sandy soils over granite or laterite. Breakaways, outcrops.	Habitat unlikely to be present.	Unlikely
	Cratystylis centralis	Red sandy loam with ironstone gravel. Flat plains, breakaway country.	Records within 10 km, habitat may be present.	Possible
	Eremophila annosicaulis	-	Sparse, scattered records	Unlikely
	Goodenia lyrata	Red sandy loam. Near claypan.	Habitat unlikely to be present.	Unlikely
	Gunniopsis propinqua	Stony sandy loam. Lateritic outcrops, winter-wet sites.	Widespread, habitat unlikely to be present.	Unlikely
	Hybanthus floribundus subsp. *chloroxanthus*	Dark red-brown soil, never sandy, rich in iron oxide, laterite. Rocky areas, creek banks, along drainage lines.	Records within 10 km, habitat likely to be present.	Likely
	Olearia mucronata	Schistose hills, along drainage channels.	Outside usual range of species.	Unlikely
	Tecticornia cymbiformis	Saline soils. Along the edge of creeklines.	Outside usual range of species.	Unlikely
	Triglochin protuberans	Winter-wet sites, claypans, near salt lakes, margins of pools.	Outside usual range of species.	Unlikely
P4	*Conospermum toddii*	Yellow sand. Sand dunes.	Outside usual range of species.	Unlikely
	Hemigenia exilis	Laterite. Breakaways, slopes.	Records within 10 km, habitat likely to be present.	Likely

Appendix 4: Significant Fauna Likelihood Assessment

Species	Conservation Status			Habitat Description	Comments	Likelihood
	EPBC Act	BC Act	DBCA Priority			
Night Parrot *Pezoporus occidentalis*	EN	CR	-	Most habitat records are of *Triodia* (Spinifex) grasslands and/or chenopod shrublands in the arid and semi-arid zones, or *Astrebla* spp. (Mitchell grass), shrubby samphire and chenopod associations, scattered trees and shrubs, *Acacia aneura* (Mulga) woodland, treeless areas and bare gibber are associated with sightings of the species. Roosting and nesting sites are consistently reported as within clumps of dense vegetation, primarily old and large Spinifex (*Triodia*) clumps, but sometimes other vegetation types (DAWE, 2020b).	At extreme of known range, no suitable habitat expected to occur.	Unlikely
Grey Falcon *Falco hypoleucos*	VU	VU		The Grey Falcon occurs at low densities across inland Australia. The species frequents timbered lowland plains, particularly acacia shrublands that are crossed by tree-lined water courses. The species has been observed hunting in treeless areas and frequents tussock grassland and open woodland, especially in winter. While breeding Grey Falcons feed almost exclusively on birds.	Possibly Occurs. Survey area may form part of larger home range.	Possible
Princess Parrot *Polytelis alexandrae*	VU	-	P4	Confined to arid regions of Western Australia, the Northern Territory, and South Australia. In Western Australia, it is sparsely distributed from near Coolgardie in the west and the Murchison River to the east, and north to near the Fitzroy River in Western Australia and to Howell Ponds in the Northern Territory. It is believed that the population is mainly concentrated in the Great Sandy, Gibson, Tanami and Great Victoria Deserts, and in the central ranges. It inhabits sand dunes and sand flats in the arid zone of western and central Australia, in open savanna woodlands and shrublands that usually consist of scattered stands of Eucalyptus (including *E. gongylocarpa*, *E. chippendalei* and mallee species), Casuarina or Allocasuarina trees; an understorey of shrubs such as *Acacia* (especially *A. aneura*), *Senna*, *Eremophila*, *Grevillea*, *Hakea* and *Senna*; and a ground cover dominated by *Triodia* species (DAWE, 2020b).	Unlikely to Occur. Rarely recorded this far south and no recent records nearby.	Unlikely
Malleefowl *Leipoa ocellata*	VU	VU	-	Scrublands and woodlands dominated by mallee and wattle species (DAWE, 2020b).	Possibly Occurs. Habitat likely marginal and unsuitable for breeding. Occasional transients only.	Possible
Fork-tailed Swift *Apus pacificus*	MI	MI	-	Low to very high airspace over varied habitat from rainforest to semi desert (Birdlife Australia, 2019).	Unlikely to occur. Very occasional transients only.	Unlikely
Grey Wagtail *Motacilla cinerea*	MI	-	-	Running water in disused quarries, sandy, rocky streams in escarpments and rainforest, sewerage ponds, ploughed fields and airfields (Morecombe 2004).	Would Not Occur. No suitable habitat.	Would Not Occur
Chuditch, Western Quoll *Dasyurus geoffroii*	VU	VU		Previously occurred throughout arid and semi-arid Australia but is now restricted to south-west Western Australia. (DAWE, 2020b).	Unlikely to Occur. Considered to be locally extinct.	Unlikely
Migratory Shorebirds (Various species)	IA/MI	IA/MI	P4	Prefer muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks,	Habitat would not be present.	Would Not Occur

Species	Conservation Status			Habitat Description	Comments	Likelihood
	EPBC Act	BC Act	DBCA Priority			
				bore drains and bore swamps, saltpans and hypersaline salt lakes inland (DAWE, 2020b).		
Greater Stick-nest Rat *Leporillus conditor*	VU	VU	-	Once found across much of the semi-arid and southern arid zone of Australia (SADEH, 2006), the only natural extant population of the Greater Stick-nest Rat is on Franklin Island in the Nuyts Archipelago, South Australia. The Greater Stick-nest Rat inhabits perennial shrublands, especially of succulent and semi succulent plant species.	Extinct on mainland	Would Not Occur
Peregrine Falcon *Falco peregrinus*	OS	-	-	The Peregrine Falcon is found in most habitats, from rainforests to the arid zone, and at most altitudes, from the coast to alpine areas. It requires abundant prey and secure nest sites, and prefers coastal and inland cliffs or open woodlands near water, and may even be found nesting on high city buildings (Birdlife Australia, 2018).	Possibly Occurs. Survey area may form part of larger home range but unlikely to breed in area	Possible
Burrowing Bettong *Bettongia lesueur*	VU	VU	CD	Extant on offshore islands only.	Extinct on mainland	Would Not Occur
Long-tailed Dunnart *Sminthopsis longicaudata*	-	-	P4	Found in the Gibson Desert, southern Carnarvon Basin, Rangelands and Pilbara in WA. Inhabits flat-topped hills, lateritic plateaus, sandstone ranges and breakaways in areas with sparse mulga over spinifex, exposed rock and stony soils with hummock grasses and shrubs.	At extreme of known range, potential habitat likely to be marginal.	Unlikely

Appendix 5: List of species identified within each vegetation type

Family	Taxon	RP-AS1	RP-AS2	DD-AS1
Amaranthaceae	*Ptilotus obovatus* var. *obovatus*	*		*
Asteraceae	*Cratystylis subspinescens*	*	*	*
	Senecio magnificus		*	
Chenopodiaceae	*Atriplex bunburyana*	*		*
	Atriplex nummularia		*	
	Maireana brevifolia	*		*
	Maireana georgei	*	*	
	Maireana pyramidata		*	*
	Maireana sedifolia	*	*	
	Maireana triptera	*	*	
	Rhagodia drummondii			*
	Tecticornia disarticulata		*	
Fabaceae	*Acacia aneura*	*	*	*
	Acacia caesaneura			*
	Acacia incurvaneura			*
	Acacia papyrocarpa	*		
	Acacia ramulosa			*
	Acacia tetragonophylla			*
	Senna artemisioides subsp. *artemisioides*			*
	Senna artemisioides subsp. *filifolia*			*
Frankeniaceae	*Frankenia* sp. (sterile)	*		
Goodeniaceae	*Scaevola spinescens*			*
Lamiaceae	*Teucrium teucriiflorum*			*
Malvaceae	*Sida calyxhymenia*			*
	Sida spodochroma			*
Myrtaceae	*Eucalyptus lucasii*		*	
Pittosporaceae	*Pittosporum angustifolium*	*		
Proteaceae	*Hakea preissii*	*		*
Rubiaceae	*Psydrax suaveolens*			*
Santalaceae	*Santalum acuminatum*	*		
Scrophulariaceae	*Eremophila forrestii*			*
	Eremophila georgei			*
	Eremophila pantonii			*
	Eremophila platycalyx subsp. Leonora (J. Morrisey 252)		*	*
	Eremophila youngii			*
Solanaceae	*Solanum lasiophyllum*			*

Appendix 6: Vegetation Condition Rating

Vegetation Condition Rating	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.	N/A
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	N/A	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 7: NatureMap Species List (40km buffer)

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 01/06/2021

Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 121° 48' 54" E,28° 54' 12" S
Buffer 40km
Group By Species Group

Species Group	Species	Records
Amphibian	5	23
Bird	131	1580
Bryopsid (Moss)	2	2
Dicotyledon	333	759
Hepatic (Liverwort)	3	3
Invertebrate	33	82
Lichen	9	14
Mammal	20	207
Monocotyledon	31	46
Pteridophyte (Fern)	7	11
Reptile	47	327
TOTAL	**621**	**3054**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Amphibian					
1.	25375	*Cyclorana maini (Sheep Frog)*			
2.	25376	*Cyclorana platycephala (Water-holding Frog)*			
3.	25392	*Litoria rubella (Little Red Tree Frog)*			
4.	25427	*Neobatrachus sutor (Shoemaker Frog)*			
5.	25434	*Pseudophryne occidentalis (Western Toadlet)*			
Bird					
6.	24559	*Acanthagenys rufogularis (Spiny-cheeked Honeyeater)*			
7.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
8.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
9.	25527	*Acanthiza iredalei (Samphire Thornbill, Slender-billed Thornbill)*			
10.	24264	*Acanthiza robustirostris (Slaty-backed Thornbill)*			
11.	24265	*Acanthiza uropygialis (Chestnut-rumped Thornbill)*			
12.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
13.	25536	*Accipiter fasciatus (Brown Goshawk)*			
14.	41323	*Actitis hypoleucos (Common Sandpiper)*		IA	
15.	25544	*Aegotheles cristatus (Australian Owlet-nightjar)*			
16.	24312	*Anas gracilis (Grey Teal)*			
17.	24316	*Anas superciliosa (Pacific Black Duck)*			
18.	47414	*Anhinga novaehollandiae (Australasian Darter)*			
19.	25528	*Aphelocephala leucopsis (Southern Whiteface)*			
20.	24267	*Aphelocephala leucopsis subsp. leucopsis (Southern Whiteface)*			
21.	24285	*Aquila audax (Wedge-tailed Eagle)*			
22.	41324	*Ardea modesta (great egret, white egret)*			
23.	24341	*Ardea pacifica (White-necked Heron)*			
24.	24610	*Ardeotis australis (Australian Bustard)*			
25.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
26.	24355	*Artamus minor (Little Woodswallow)*			
27.	24356	*Artamus personatus (Masked Woodswallow)*			
28.	24318	*Aythya australis (Hardhead)*			
29.		*Barnardius zonarius*			
30.	24319	*Biziura lobata (Musk Duck)*			
31.	24359	*Burhinus grallarius (Bush Stone-curlew)*			
32.	25715	*Cacatua roseicapilla (Galah)*			
33.	24725	*Cacatua roseicapilla subsp. assimilis (Galah)*			
34.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
35.	24564	*Certhionyx variegatus (Pied Honeyeater)*			
36.	24377	*Charadrius ruficapillus (Red-capped Plover)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
37.	24321	*Chenonetta jubata (Australian Wood Duck, Wood Duck)*			
38.	47909	*Cheramoeca leucosterna (White-backed Swallow)*			
39.		*Chroicocephalus novaehollandiae*			
40.	24434	*Chrysococcyx osculans (Black-eared Cuckoo)*			
41.	25580	*Cinclosoma castaneothorax (Chestnut-breasted Quail-thrush)*			
42.	24289	*Circus assimilis (Spotted Harrier)*			
43.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
44.	24361	*Coracina maxima (Ground Cuckoo-shrike)*			
45.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
46.	24416	*Corvus bennetti (Little Crow)*			
47.	25592	*Corvus coronoides (Australian Raven)*			
48.		*Corvus mellori*			
49.	25593	*Corvus orru (Torresian Crow)*			
50.	24420	*Cracticus nigrogularis (Pied Butcherbird)*			
51.	25595	*Cracticus tibicen (Australian Magpie)*			
52.	25596	*Cracticus torquatus (Grey Butcherbird)*			
53.	24322	*Cygnus atratus (Black Swan)*			
54.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
55.	24470	*Dromaius novaehollandiae (Emu)*			
56.		*Egretta novaehollandiae*			
57.		*Elanus axillaris*			
58.	47937	*Elseyornis melanops (Black-fronted Dotterel)*			
59.		*Eolophus roseicapillus*			
60.	24567	*Epthianura albifrons (White-fronted Chat)*			
61.	24568	*Epthianura aurifrons (Orange Chat)*			
62.	24570	*Epthianura tricolor (Crimson Chat)*			
63.	24379	*Erythrogonys cinctus (Red-kneed Dotterel)*			
64.	24368	*Eurostopodus argus (Spotted Nightjar)*			
65.	25621	*Falco berigora (Brown Falcon)*			
66.	25622	*Falco cenchroides (Australian Kestrel, Nankeen Kestrel)*			
67.	24473	*Falco hypoleucos (Grey Falcon)*		T	
68.	25623	*Falco longipennis (Australian Hobby)*			
69.	25624	*Falco peregrinus (Peregrine Falcon)*		S	
70.	25727	*Fulica atra (Eurasian Coot)*			
71.	42314	*Gavicalis virescens (Singing Honeyeater)*			
72.	24401	*Geopelia cuneata (Diamond Dove)*			
73.	25530	*Gerygone fusca (Western Gerygone)*			
74.	24443	*Grallina cyanoleuca (Magpie-lark)*			
75.	24295	*Haliastur sphenurus (Whistling Kite)*			
76.	25734	*Himantopus himantopus (Black-winged Stilt)*			
77.	24491	*Hirundo neoxena (Welcome Swallow)*			
78.	24367	*Lalage tricolor (White-winged Triller)*			
79.	24557	*Leipoa ocellata (Malleefowl)*		T	
80.	25661	*Lichmera indistincta (Brown Honeyeater)*			
81.	24326	*Malacorhynchus membranaceus (Pink-eared Duck)*			
82.	25651	*Malurus lamberti (Variegated Fairy-wren)*			
83.	25652	*Malurus leucopterus (White-winged Fairy-wren)*			
84.	24551	*Malurus pulcherrimus (Blue-breasted Fairy-wren)*			
85.	25654	*Malurus splendens (Splendid Fairy-wren)*			
86.	24583	*Manorina flavigula (Yellow-throated Miner)*			
87.	47994	*Megalurus cruralis (Brown Songlark)*			
88.	47997	*Melanodryas cucullata (Hooded Robin)*			
89.	24736	*Melopsittacus undulatus (Budgerigar)*			
90.	24598	*Merops ornatus (Rainbow Bee-eater)*			
91.		*Microcarbo melanoleucos*			
92.	25693	*Microeca fascinans (Jacky Winter)*			
93.	25542	*Milvus migrans (Black Kite)*			
94.	24737	*Neophema bourkii (Bourke's Parrot)*			
95.	24742	*Nymphicus hollandicus (Cockatiel)*			
96.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
97.	24618	*Oreoica gutturalis (Crested Bellbird)*			
98.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
99.	24627	*Pardalotus rubricatus (Red-browed Pardalote)*			
100.	25682	*Pardalotus striatus (Striated Pardalote)*			
101.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
102.	48060	*Petrochelidon ariel (Fairy Martin)*			
103.	48061	*Petrochelidon nigricans (Tree Martin)*			
104.	24659	*Petroica goodenovii (Red-capped Robin)*			
105.	25697	*Phalacrocorax carbo (Great Cormorant)*			
106.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
107.	24409	*Phaps chalcoptera (Common Bronzewing)*			
108.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
109.	24748	*Platycercus varius (Mulga Parrot)*			
110.	25721	*Platycercus zonarius (Australian Ringneck, Ring-necked Parrot)*			
111.	25704	*Podiceps cristatus (Great Crested Grebe)*			
112.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
113.	24683	*Pomatostomus superciliosus (White-browed Babbler)*			
114.	25706	*Pomatostomus temporalis (Grey-crowned Babbler)*			
115.	24390	*Psophodes occidentalis (Western Wedgebill, Chiming Wedgebill)*			
116.		*Ptilonorhynchus guttatus*			
117.	24757	*Ptilonorhynchus maculatus subsp. guttatus (Western Bowerbird)*			
118.	42344	*Purnella albifrons (White-fronted Honeyeater)*			
119.	24278	*Pyrrholaemus brunneus (Redthroat)*			
120.	24776	*Recurvirostra novaehollandiae (Red-necked Avocet)*			
121.	48096	*Rhipidura albiscapa (Grey Fantail)*			
122.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
123.	30948	*Smicrornis brevirostris (Weebill)*			
124.	24528	*Sterna hybrida subsp. javanica (Whiskered Tern)*			
125.	25597	*Strepera versicolor (Grey Currawong)*			
126.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
127.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
128.	30870	*Taeniopygia guttata (Zebra Finch)*			
129.	48135	*Thinornis rubricollis (Hooded Plover, Hooded Dotterel)*		P4	
130.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
131.	42351	*Todiramphus pyrrhopygius (Red-backed Kingfisher)*			
132.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
133.	48141	*Tribonyx ventralis (Black-tailed Native-hen)*			
134.	24808	*Tringa nebularia (Common Greenshank, greenshank)*		IA	
135.	24851	*Turnix velox (Little Button-quail)*			
136.	24386	*Vanellus tricolor (Banded Lapwing)*			
Bryopsid (Moss)					
137.	32346	*Didymodon torquatus*			
138.	32353	*Entosthodon apophysatus*			
Dicotyledon					
139.	3217	*Acacia aneura (Mulga, Wanari)*			
140.	37260	*Acacia aptaneura*			
141.	14622	*Acacia balsamea*			
142.	3248	*Acacia burkittii (Sandhill Wattle)*			
143.	36417	*Acacia caesaneura*			
144.	3273	*Acacia craspedocarpa (Hop Mulga)*			
145.	44536	*Acacia doreta*			
146.	32118	*Acacia effusifolia*			
147.	36781	*Acacia fuscaneura*			
148.	36418	*Acacia incurvaneura*			
149.	14610	*Acacia kalgoorliensis*			
150.	3419	*Acacia ligulata (Umbrella Bush, Watarka)*			
151.	3473	*Acacia oswaldii (Miljee, Nelia)*			
152.	3481	*Acacia papyrocarpa (Western Myall)*			
153.	3495	*Acacia prainii (Prain's Wattle)*			
154.	36800	*Acacia pteraneura*			
155.	3507	*Acacia quadrimarginea*			
156.	3510	*Acacia ramulosa (Horse Mulga)*			
157.	19499	*Acacia ramulosa var. ramulosa*			
158.	8949	*Acacia sibirica (Bastard Mulga)*			
159.	18424	*Acacia sp. Marshall Pool (G. Cockerton 3024)*		P3	
160.	3577	*Acacia tetragonophylla (Kurara, Wakalpuka)*			
161.	31511	*Acacia victoriae subsp. victoriae*			
162.	3600	*Acacia websteri*		P1	
163.	19901	*Actinobole oldfieldianum*			
164.	11487	*Alectryon oleifolius subsp. oleifolius*			
165.	1725	*Allocasuarina dielsiana (Northern Sheoak)*			
166.	4907	*Alyogyne pinoniana (Sand Hibiscus)*			
167.	2372	*Amyema fitzgeraldii (Pincushion Mistletoe)*			
168.	11614	*Amyema gibberula var. gibberula*			
169.	11191	*Amyema gibberula var. tatei*			
170.	13265	*Amyema miraculosa subsp. boormanii*			
171.	40910	*Androcalva luteiflora (Yellow-flowered Rulingia)*			
172.	7834	*Angianthus prostratus*		P3	
173.	2992	*Arabidella trisecta*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
174.	2451	*Atriplex bunburyana (Silver Saltbush)*			
175.	17801	*Atriplex cephalantha*			
176.	2453	*Atriplex codonocarpa (Flat-topped Saltbush)*			
177.	2459	*Atriplex holocarpa (Pop Saltbush)*			
178.	11516	*Atriplex nummularia subsp. spathulata (Old Man Saltbush)*			
179.	11791	*Atriplex quadrivalvata var. quadrivalvata*			
180.	2474	*Atriplex quinii*			
181.	2476	*Atriplex semilunaris (Annual Saltbush)*			
182.	2481	*Atriplex vesicaria (Bladder Saltbush)*			
183.	4999	*Brachychiton gregorii (Desert Kurrajong, Ngalta)*			
184.	7871	*Brachyscome ciliaris*			
185.	30397	*Calandrinia crispisepala*			
186.	20170	*Calandrinia pleiopetala*			
187.	30396	*Calandrinia translucens*			
188.	7891	*Calocephalus francisii (Fine-leaf Beauty-heads)*			
189.	7893	*Calocephalus knappii*			
190.	7903	*Calotis hispidula (Bindy Eye)*			
191.	7905	*Calotis multicaulis (Many-stemmed Burr-daisy)*			
192.	5451	*Calytrix desolata*			
193.	5456	*Calytrix erosipetala*			
194.	5473	*Calytrix praecipua*		P3	
195.	7916	*Centaurea melitensis (Maltese Cockspur, Malta Thistle)*	Y		
196.	7921	*Centipeda thespidioides (Desert Sneezewood)*			
197.	7922	*Cephalipterum drummondii (Pompom Head)*			
198.	7933	*Chthonocephalus pseudevax (Woolly Groundheads)*			
199.	1884	*Conospermum toddii (Victoria Desert Smokebush)*		P4	
200.	11709	*Crassula colorata var. acuminata*			
201.	31278	*Cratystylis centralis*		P3	
202.	13471	*Cryptandra connata*			
203.	48865	*Cucumis myriocarpus subsp. myriocarpus*	Y		
204.	3010	*Cuphonotus andraeanus*			
205.	6218	*Daucus glochidiatus (Australian Carrot)*			
206.	6753	*Dicrastylis brunnea*			
207.	6758	*Dicrastylis exsuccosa*			
208.	6759	*Dicrastylis flexuosa*			
209.	2498	*Didymanthus roei*			
210.	11681	*Disphyma crassifolium subsp. clavellatum*			
211.	2499	*Dissocarpus paradoxus (Curious Saltbush)*			
212.	4752	*Dodonaea adenophora*			
213.	4769	*Dodonaea lobulata (Bead Hopbush)*			
214.	4773	*Dodonaea petiolaris*			
215.	4779	*Dodonaea rigida*			
216.	11674	*Dodonaea viscosa subsp. mucronata*			
217.	44508	*Duma florulenta*			
218.	31274	*Duperreya commixta*			
219.	33501	*Dysphania cristata (Crested Goosefoot)*			
220.	2500	*Dysphania glandulosa*			
221.	11632	*Dysphania glomulifera subsp. eremaea*			
222.	2502	*Dysphania kalpari (Rat's Tail, Kalpari)*			
223.	33479	*Dysphania melanocarpa (Black Crumbweed)*			
224.	2509	*Einadia nutans (Nodding Saltbush)*			
225.	12064	*Enchylaena tomentosa var. tomentosa (Barrier Saltbush)*			
226.	19846	*Enekbatus eremaeus*			
227.	17595	*Eremophila abietina subsp. abietina*			
228.	31235	*Eremophila annosocaulis*		P3	
229.	7189	*Eremophila clarkei (Turpentine Bush)*			
230.	7204	*Eremophila eriocalyx (Desert Pride)*			
231.	7205	*Eremophila exilifolia*			
232.	7206	*Eremophila falcata*			
233.	7208	*Eremophila forrestii (Wilcox Bush)*			
234.	15052	*Eremophila forrestii subsp. forrestii*			
235.	29532	*Eremophila galeata*			
236.	7211	*Eremophila georgei*			
237.	17176	*Eremophila gilesii subsp. variabilis*			
238.	14340	*Eremophila glabra subsp. glabra*			
239.	16475	*Eremophila glandulifera*			
240.	7219	*Eremophila granitica (Thin-leaved Poverty Bush)*			
241.	7234	*Eremophila longifolia (Berrigan, Tulypurpa)*			
242.	15158	*Eremophila mackinlayi subsp. spathulata*			
243.	16363	*Eremophila maculata subsp. brevifolia (Native Fuchsia)*			

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244.	7239	*Eremophila margarethae (Sandbank Poverty Bush)*			
245.	7240	*Eremophila metallicorum*			
246.	7242	*Eremophila miniata (Kopi Poverty Bush)*			
247.	15003	*Eremophila oldfieldii subsp. angustifolia*			
248.	18570	*Eremophila oppositifolia subsp. angustifolia*			
249.	7250	*Eremophila pantonii*			
250.	48949	*Eremophila platycalyx subsp. Granites (D.J. Edinger & G. Marsh DJE 4782)*			
251.	48951	*Eremophila platycalyx subsp. Leonora (J. Morrisey 252)*			
252.	15054	*Eremophila platythamnos subsp. exotrachys*			
253.	7269	*Eremophila serrulata (Serrate-leaved Eremophila)*			
254.		*Eremophila sp.*			
255.	17163	*Eremophila spectabilis subsp. brevis*			
256.	15155	*Eremophila youngii subsp. youngii*			
257.	2514	*Eriochiton sclerolaenoides (Woolly Bindii)*			
258.	7970	*Erodiophyllum acanthocephalum*			
259.	4331	*Erodium aureum*	Y		
260.	4333	*Erodium cicutarium (Common Storksbill)*	Y		
261.	4334	*Erodium crinitum (Corkscrew)*			
262.	4335	*Erodium cygnorum (Blue Heronsbill)*			
263.	14377	*Erymophyllum ramosum subsp. ramosum*			
264.	35345	*Eucalyptus camaldulensis subsp. obtusa (Blunt-budded River Red Gum)*			
265.	5583	*Eucalyptus carnei (Carne's Blackbutt)*			
266.	48436	*Eucalyptus clelandiorum*			
267.	5596	*Eucalyptus concinna (Victoria Desert Mallee)*			
268.	5636	*Eucalyptus eremicola*			
269.	13037	*Eucalyptus loxophleba subsp. lissophloia*			
270.	5703	*Eucalyptus lucasii (Barlee Box)*			
271.	29701	*Eucalyptus sp. Mulga Rock (K.D. Hill & L.A.S. Johnson KH 2668)*			
272.	35303	*Euphorbia australis var. subtomentosa*			
273.	4620	*Euphorbia boophthona (Gascoyne Spurge)*			
274.	4626	*Euphorbia drummondii (Caustic Weed, Piwi)*			
275.	42869	*Euphorbia porcata*			
276.	12097	*Euphorbia tannensis subsp. eremophila (Desert Spurge)*			
277.	16722	*Euryomyrtus maidenii*			
278.	5200	*Frankenia fecunda*			
279.	5209	*Frankenia pauciflora (Seaheath)*			
280.	5212	*Frankenia setosa (Bristly Frankenia)*			
281.	12780	*Gilberta tenuifolia*			
282.	11008	*Gilruthia osbornii*			
283.	7060	*Glossostigma diandrum*			
284.	7061	*Glossostigma drummondii (Mudmat)*			
285.	7988	*Gnephosis arachnoidea (Cobwebby-headed Gnephosis)*			
286.	7989	*Gnephosis brevifolia (Short-leaved Gnephosis)*			
287.	8002	*Gnephosis tenuissima*			
288.	7514	*Goodenia havilandii*			
289.	12529	*Goodenia lyrata*		P3	
290.	7527	*Goodenia mimuloides*			
291.	7529	*Goodenia mueckeana*			
292.	1949	*Grevillea acuaria*			
293.	1963	*Grevillea berryana*			
294.	1986	*Grevillea deflexa*			
295.	2004	*Grevillea extorris*			
296.	2806	*Gunniopsis propinqua*			
297.	2807	*Gunniopsis quadrifida (Sturts Pigface)*			
298.	19137	*Hakea lorea subsp. lorea*			
299.	6687	*Halgania cyanea (Rough Halgania)*			
300.	6174	*Haloragis gossei*			
301.	23465	*Haloragis gossei var. gossei*			
302.	6176	*Haloragis odontocarpa (Mulga Nettle)*			
303.	6180	*Haloragis trigonocarpa*			
304.	17325	*Harnieria kempeana subsp. muelleri*			
305.	8045	*Helipterum craspedioides (Yellow Billy Buttons)*			
306.	6853	*Hemigenia exilis*		P4	
307.	19157	*Hybanthus floribundus subsp. chloroxanthus*		P3	
308.	11973	*Hybanthus floribundus subsp. curvifolius*			
309.	48648	*Hysterobaeckea occlusa*			
310.	3974	*Indigofera georgei (Bovine Indigo)*			
311.	14779	*Jacksonia arida*			
312.	13289	*Lawrencella davenportii*			
313.	4953	*Lawrencia densiflora*			

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314.	4959	*Lawrencia squamata*			
315.	19237	*Leiocarpa websteri*			
316.	3032	*Lepidium muelleri-ferdinandii*			
317.	3033	*Lepidium oxytrichum*			
318.	3039	*Lepidium platypetalum (Slender Peppercress)*			
319.	4055	*Leptosema chambersii*			
320.	4061	*Lotus cruentus (Redflower Lotus)*			
321.	2396	*Lysiana casuarinae*			
322.	2398	*Lysiana murrayi (Mistletoe, Parka-Parka)*			
323.	36375	*Lysimachia arvensis (Pimpernel)*	Y		
324.	2533	*Maireana amoena*			
325.	2536	*Maireana atkinsiana (Bronze Bluebush)*			
326.	2538	*Maireana carnosa (Cottony Bluebush)*			
327.	2539	*Maireana convexa (Mulga Bluebush)*			
328.	2543	*Maireana eriosphaera*			
329.	2544	*Maireana georgei (Satiny Bluebush)*			
330.	2545	*Maireana glomerifolia (Ball Leaf Bluebush)*			
331.	2556	*Maireana planifolia (Low Bluebush)*			
332.	2565	*Maireana suaedifolia*			
333.	11662	*Maireana tomentosa subsp. tomentosa*			
334.	2569	*Maireana triptera (Threewinged Bluebush)*			
335.	12949	*Marsdenia australis*			
336.	20288	*Melaleuca interioris*			
337.	5991	*Melaleuca xerophila*			
338.	3050	*Menkea australis (Fairy Spectacles)*			
339.	3053	*Menkea sphaerocarpa*			
340.	3054	*Menkea villosula*			
341.	8110	*Minuria leptophylla (Minnie Daisy)*			
342.	4098	*Mirbelia rhagodioides*			
343.	8116	*Myriocephalus guerinae*			
344.	17925	*Myriocephalus oldfieldii*			
345.	14186	*Myriocephalus pygmaeus*			
346.	8121	*Myriocephalus rudallii*			
347.	6190	*Myriophyllum decussatum*			
348.	6791	*Newcastelia hexarrhena (Lambs' Tails)*			
349.	6972	*Nicotiana cavicola (Talara)*			
350.	11327	*Nicotiana occidentalis subsp. hesperis*			
351.	11331	*Nicotiana occidentalis subsp. obliqua*			
352.	11734	*Nicotiana rosulata subsp. rosulata*			
353.	6978	*Nicotiana rotundifolia (Round-leaved Tobacco)*			
354.	8129	*Olearia calcarea*			
355.	12638	*Olearia mucronata*		P3	
356.	8140	*Olearia muelleri (Goldfields Daisy)*			
357.	12642	*Ozothamnus cassiope*			
358.	12670	*Parietaria cardiostegia*			
359.	18537	*Philotheca brucei subsp. brucei*			
360.	17206	*Physopsis viscida*			
361.	11185	*Pimelea microcephala subsp. microcephala*			
362.	12104	*Pimelea spiculigera var. thesioides*			
363.	19744	*Pittosporum angustifolium*			
364.	6724	*Plagiobothrys australasicus*			
365.	7299	*Plantago debilis*			
366.	7300	*Plantago drummondii (Sago Weed)*			
367.	45238	*Podolepis aristata subsp. affinis*			
368.	8173	*Podolepis capillaris (Wiry Podolepis)*			
369.	8176	*Podolepis kendallii*			
370.	8177	*Podolepis lessonii*			
371.	8180	*Podolepis rugata (Pleated Podolepis)*			
372.	15822	*Prostanthera althoferi subsp. althoferi*			
373.	41650	*Prostanthera prostantheroides*			
374.	18154	*Psydrax latifolia*			
375.	18210	*Psydrax rigidula*			
376.	18155	*Psydrax suaveolens*			
377.	2690	*Ptilotus aervoides*			
378.	2708	*Ptilotus chamaecladus*			
379.	48602	*Ptilotus eremita*			
380.	2721	*Ptilotus exaltatus (Tall Mulla Mulla)*			
381.	2731	*Ptilotus helipteroides (Hairy Mulla Mulla)*			
382.	2747	*Ptilotus obovatus (Cotton Bush)*			
383.	11396	*Ptilotus obovatus var. obovatus*			

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384.	2751	*Ptilotus polystachyus (Prince of Wales Feather)*			
385.	2754	*Ptilotus roei*			
386.	15855	*Ptilotus schwartzii var. schwartzii*			
387.	2765	*Ptilotus tetrandrus*		P1	
388.	8196	*Quinqueremulus linearis*			
389.	11643	*Ranunculus pentandrus var. platycarpus*			
390.	2937	*Ranunculus sessiliflorus (Smallflower Buttercup)*			
391.	11927	*Ranunculus sessiliflorus var. sessiliflorus*			
392.	2582	*Rhagodia eremaea (Thorny Saltbush)*			
393.	13306	*Rhodanthe battii*			
394.	13308	*Rhodanthe charsleyae*			
395.	13241	*Rhodanthe chlorocephala subsp. rosea*			
396.	13242	*Rhodanthe chlorocephala subsp. splendida*			
397.	13301	*Rhodanthe floribunda*			
398.	13238	*Rhodanthe maryonii*			
399.	13249	*Rhodanthe oppositifolia subsp. oppositifolia*			
400.	13251	*Rhodanthe propinqua*			
401.	13254	*Rhodanthe stricta*			
402.	45148	*Roebuckiella ciliocarpa*			
403.	17985	*Rutidosis helichrysoides subsp. helichrysoides*			
404.	30434	*Salsola australis*			
405.	2357	*Santalum lanceolatum (Northern Sandalwood, Yarnguli)*			
406.	2359	*Santalum spicatum (Sandalwood, Wilarak)*			
407.	7644	*Scaevola spinescens (Currant Bush, Maroon)*			
408.	13285	*Schoenia ayersii*			
409.	8200	*Schoenia cassiniana (Schoenia)*			
410.	2600	*Sclerolaena burbidgeae*			
411.	2606	*Sclerolaena cuneata (Yellow Bindii)*			
412.	2607	*Sclerolaena densiflora*			
413.	2608	*Sclerolaena deserticola*			
414.	2609	*Sclerolaena diacantha (Grey Copperburr)*			
415.	2611	*Sclerolaena eriacantha (Tall Bindii)*			
416.	2619	*Sclerolaena lanicuspis (Spinach Burr)*			
417.	2627	*Sclerolaena patenticuspis (Spear-fruit Saltbush)*			
418.	8207	*Senecio glossanthus (Slender Groundsel)*			
419.	9366	*Senecio gregorii (Fleshy Groundsel)*			
420.	25881	*Senecio lacustrinus*			
421.	8213	*Senecio magnificus (Showy Groundsel)*			
422.	17645	*Senna artemisioides*			
423.	12276	*Senna artemisioides subsp. filifolia*			
424.	12279	*Senna artemisioides subsp. helmsii*			
425.	17558	*Senna artemisioides subsp. x artemisioides*			
426.	18430	*Senna cardiosperma*			
427.	18449	*Senna glaucifolia*			
428.	12305	*Senna glutinosa subsp. chatelainiana*			
429.	18446	*Senna stowardii*			
430.	4970	*Sida calyxhymenia (Tall Sida)*			
431.	4981	*Sida intricata (Tangled Sida)*			
432.	4985	*Sida petrophila*			
433.	42547	*Solanum austropiceum*			
434.	6999	*Solanum coactiliferum (Western Nightshade)*			
435.	7018	*Solanum lasiophyllum (Flannel Bush, Mindjulu)*			
436.	7023	*Solanum nummularium (Money-leaved Solanum)*			
437.	11241	*Solanum orbiculatum subsp. orbiculatum (Round-leaved Solanum)*			
438.	7030	*Solanum plicatile*			
439.	7036	*Solanum sturtianum (Thargomindah Nightshade)*			
440.	19555	*Stackhousia muricata subsp. annual (W.R. Barker 2172)*			
441.	12487	*Stemodia florulenta*			
442.	3074	*Stenopetalum anfractum*			
443.	3076	*Stenopetalum filifolium*			
444.	19403	*Stenopetalum gracile*			
445.	3079	*Stenopetalum pedicellare*			
446.	8236	*Streptoglossa cylindriceps*			
447.	8238	*Streptoglossa liatroides*			
448.	7740	*Stylidium induratum (Desert Triggerplant)*			
449.	12355	*Swainsona affinis*			
450.	12356	*Swainsona formosa*			
451.	4232	*Swainsona laciniata*			
452.	4238	*Swainsona oroboides (Variable Swainsona)*			
453.	12357	*Swainsona purpurea*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
454.	4243	*Swainsona rostellata*			
455.	13585	*Swainsona tenuis*			
456.	13339	*Synaptantha tillaeacea var. tillaeacea*			
457.	31844	*Tecticornia cymbiformis*		P3	
458.	33319	*Tecticornia indica subsp. bidens*			
459.	31853	*Tecticornia sp. Burnerbinmah (D. Edinger et al. 101)*			
460.	34958	*Tecticornia sp. Lake Way (P. Armstrong 05/961)*		P1	
461.	35841	*Templetonia incrassata*			
462.	2822	*Tetragonia eremaea*			
463.	6936	*Teucrium racemosum (Grey Germander)*			
464.	48603	*Teucrium teucriiflorum*			
465.	6279	*Trachymene ornata (Spongefruit)*			
466.	4374	*Tribulus astrocarpus*			
467.	12652	*Trichanthodium skirrophorum*			
468.	7661	*Velleia hispida (Hispid Velleia)*			
469.	7664	*Velleia rosea (Pink Velleia)*			
470.	8262	*Vittadinia cervicularis*			
471.	7393	*Wahlenbergia tumidifructa*			

Hepatic (Liverwort)

472.		*Asterella drummondii*			
473.		*Riccia cartilaginosa*			
474.		*Riccia limbata*			

Invertebrate

475.		*Aname tepperi*			
476.		*Argiope protensa*			
477.		*Arthrorhabdus paucispinus*			
478.		*Asadipus yundamindra*			
479.		*Backobourkia collina*			
480.	33932	*Branchinella apophysata (fairy shrimp (Laverton))*		P1	Y
481.		*Cormocephalus michaelseni*			
482.		*Cormocephalus turneri*			
483.		*Cryptoerithus harveyi*			
484.		*Cryptoerithus occultus*			
485.		*Eucyrtops eremaea*			
486.		*Grayenulla australensis*			
487.		*Hoggicosa storri*			
488.		*Holconia nigrigularis*			
489.		*Isometroides vescus*			
490.		*Isopeda magna*			
491.		*Lampona ampeinna*			
492.		*Lamponina elongata*			
493.		*Latrodectus hasseltii*			
494.		*Leptasteron platyconductor*			
495.		*Longrita millewa*			
496.		*Lycosa australicola*			
497.		*Lycosa yalkara*			
498.		*Nephila edulis*			
499.		*Parartemia bicorna*			
500.		*Pediana occidentalis*			
501.		*Pediana tenuis*			
502.		*Scolopendra laeta*			
503.		*Scolopendra morsitans*			
504.		*Supunna funerea*			
505.		*Supunna picta*			
506.		*Synothele arrakis*			
507.		*Urodacus hoplurus*			

Lichen

508.	27574	*Acarospora citrina*			
509.		*Acarospora sp.*			
510.	27587	*Aspicilia calcarea*			
511.	42104	*Buellia albula*			
512.	28060	*Siphula coriacea*			
513.	44221	*Xalocoa ocellata*			
514.	28108	*Xanthoparmelia bellatula*			
515.	28172	*Xanthoparmelia reptans*			
516.		*Xanthoparmelia sp.*			

Mammal

517.	24087	*Antechinomys laniger (Kultarr)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
518.	25451	*Bettongia lesueur (Burrowing Bettong)*		S	
519.	24251	*Bos taurus (European Cattle)*	Y		
520.	24253	*Capra hircus (Goat)*	Y		
521.	24258	*Equus caballus (Horse)*	Y		
522.	24041	*Felis catus (Cat)*	Y		
523.	24219	*Leporillus conditor (Greater Stick-nest Rat, Wopilkara)*		S	
524.	25489	*Macropus robustus (Euro, Biggada)*			
525.	24136	*Macropus rufus (Red Kangaroo, Marlu)*			
526.	24223	*Mus musculus (House Mouse)*	Y		
527.	24224	*Notomys alexis (Spinifex Hopping-mouse)*			
528.	24194	*Nyctophilus geoffroyi (Lesser Long-eared Bat)*			
529.	24085	*Oryctolagus cuniculus (Rabbit)*	Y		
530.	48034	*Osphranter robustus (Euro, Biggada)*			
531.	24237	*Pseudomys hermannsburgensis (Sandy Inland Mouse)*			
532.	24108	*Sminthopsis crassicaudata (Fat-tailed Dunnart)*			
533.	24109	*Sminthopsis dolichura (Little long-tailed Dunnart)*			
534.	24115	*Sminthopsis longicaudata (Long-tailed Dunnart)*		P4	
535.	24207	*Tachyglossus aculeatus (Short-beaked Echidna)*			
536.	24158	*Trichosurus vulpecula subsp. vulpecula (Common Brushtail Possum)*			
Monocotyledon					
537.	189	*Alopecurus geniculatus (Marsh Foxtail)*	Y		
538.	207	*Aristida contorta (Bunched Kerosene Grass)*			
539.	17246	*Austrostipa nitida*			
540.	17255	*Austrostipa trichophylla*			
541.	17256	*Austrostipa tuckeri*			
542.	271	*Chloris truncata (Windmill Grass)*			
543.	782	*Cyperus concinnus*			
544.	798	*Cyperus iria*			
545.	830	*Eleocharis pusilla*			
546.	357	*Enneapogon caerulescens (Limestone Grass)*			
547.	378	*Eragrostis dielsii (Mallee Lovegrass)*			
548.	380	*Eragrostis eriopoda (Woollybutt Grass, Wangurnu)*			
549.	385	*Eragrostis lacunaria (Purple Lovegrass)*			
550.	387	*Eragrostis lanipes (Creeping Wanderrie)*			
551.	388	*Eragrostis leptocarpa (Drooping Lovegrass)*			
552.	392	*Eragrostis pergracilis*			
553.	393	*Eragrostis setifolia (Neverfail Grass)*			
554.	411	*Eriachne helmsii (Buck Wanderrie Grass)*			
555.	415	*Eriachne ovata*			
556.	464	*Iseilema membranaceum (Small Flinders Grass)*			
557.	911	*Isolepis congrua*			
558.	490	*Monachather paradoxus*			
559.	10975	*Paspalidium basicladum*			
560.	48355	*Schoenoplectiella dissachantha*			
561.	674	*Thyridolepis mitchelliana (Mulga Grass)*			
562.	675	*Thyridolepis multiculmis (Soft Wanderrie Grass)*			
563.	18587	*Triglochin nana*			
564.	19038	*Triglochin protuberans*		P3	
565.	19174	*Triglochin sp. A Flora of Australia (G.J. Keighery 2477)*			
566.	17874	*Triodia rigidissima*			
567.	1392	*Wurmbea deserticola*			
Pteridophyte (Fern)					
568.	37	*Cheilanthes lasiophylla (Woolly Cloak Fern)*			
569.	12818	*Cheilanthes sieberi subsp. sieberi*			
570.	14	*Isoetes muelleri*			
571.	74	*Marsilea drummondii (Common Nardoo)*			
572.	76	*Marsilea hirsuta (Nardoo)*			
573.		*Marsilea sp.*			
574.	17	*Ophioglossum lusitanicum (Adders Tongue)*			
Reptile					
575.	25448	*Antaresia stimsoni (Stimson's Python)*			
576.	24989	*Aprasia picturata (Black-headed Worm-lizard)*			
577.	30893	*Cryptoblepharus buchananii*			
578.	25458	*Ctenophorus caudicinctus (Ring-tailed Dragon)*			
579.	24867	*Ctenophorus caudicinctus subsp. infans (Ring-tailed Dragon)*			
580.	24875	*Ctenophorus isolepis subsp. gularis (Central Military Dragon)*			
581.	24882	*Ctenophorus nuchalis (Central Netted Dragon)*			
582.	24886	*Ctenophorus reticulatus (Western Netted Dragon)*			
583.	24889	*Ctenophorus scutulatus (Lozenge-marked Dragon)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
584.	25052	*Ctenotus leonhardii*			
585.	25064	*Ctenotus pantherinus subsp. ocellifer (Leopard Ctenotus)*			
586.	25074	*Ctenotus schomburgkii*			
587.	25075	*Ctenotus severus*			
588.	25465	*Ctenotus uber (Spotted Ctenotus)*			
589.	25080	*Ctenotus uber subsp. uber (Spotted Ctenotus)*			
590.	24926	*Diplodactylus conspicillatus (Fat-tailed Gecko)*			
591.	24930	*Diplodactylus granariensis subsp. rex*			
592.	24940	*Diplodactylus pulcher*			
593.	25092	*Egernia depressa (Southern Pygmy Spiny-tailed Skink)*			
594.	24953	*Gehyra montium*			
595.	24957	*Gehyra purpurascens*			
596.	24959	*Gehyra variegata*			
597.	24961	*Heteronotia binoei (Bynoe's Gecko)*			
598.	25130	*Lerista desertorum*			
599.	42411	*Lerista timida*			
600.	42415	*Lucasium squarrosum*			
601.	25184	*Menetia greyii*			
602.	25190	*Morethia butleri*			
603.	24971	*Nephrurus vertebralis*			
604.	24973	*Nephrurus wheeleri subsp. wheeleri*			
605.	25254	*Parasuta monachus*			
606.	25510	*Pogona minor (Dwarf Bearded Dragon)*			
607.	25261	*Pseudechis australis (Mulga Snake)*			
608.	25262	*Pseudechis butleri (Spotted Mulga Snake)*			
609.	42416	*Pseudonaja mengdeni (Western Brown Snake)*			
610.	25263	*Pseudonaja modesta (Ringed Brown Snake)*			
611.	25009	*Pygopus nigriceps*			
612.	24982	*Rhynchoedura ornata (Western Beaked Gecko)*			
613.	24949	*Strophurus wellingtonae*			
614.	25269	*Suta fasciata (Rosen's Snake)*			
615.	25203	*Tiliqua occipitalis (Western Bluetongue)*			
616.	25519	*Tiliqua rugosa*			
617.	30814	*Tympanocryptis cephalus (Pebble Dragon)*			
618.	24983	*Underwoodisaurus milii (Barking Gecko)*			
619.	25211	*Varanus caudolineatus*			
620.	25218	*Varanus gouldii (Bungarra or Sand Monitor)*			
621.	25524	*Varanus panoptes (Yellow-spotted Monitor)*			

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 wholely 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 8: EPBC Protected Matters Search (40km buffer)

Australian Government

Department of Agriculture, Water and the Environment

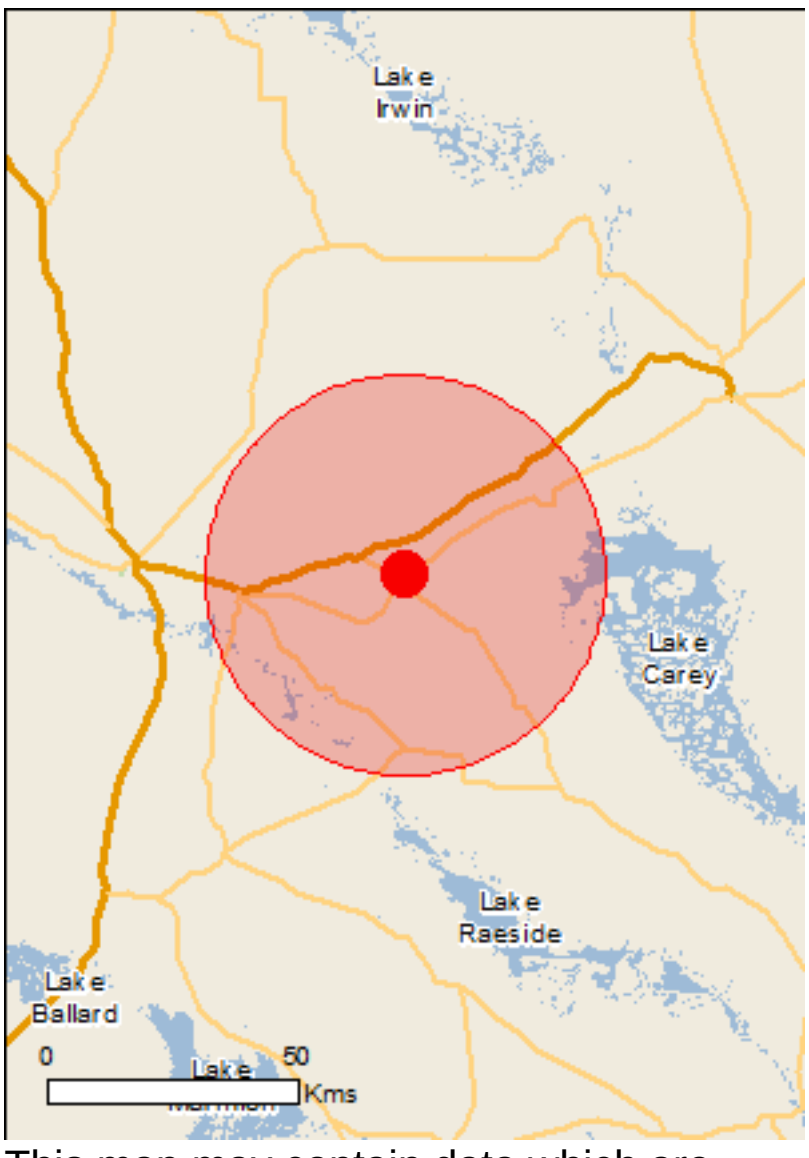
EPBC Act Protected Matters Report

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

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

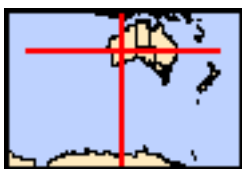
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 01/06/21 12:53:37



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:	8

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:	11
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	12
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 known 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 known to 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 known to 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
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to 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 known to occur within area
Apus pacificus		
Fork-tailed Swift [678]		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 known 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
Thinornis rubricollis		
Hooded Plover [59510]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
[Tringa nebularia](#)		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

Invasive Species [Resource Information]

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

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Mammals		
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

Name	Status	Type of Presence
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

-28.9032 121.8149

Acknowledgements

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

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

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

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

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