



**Reconnaissance**  
**Flora and Vegetation Survey of the**  
**Eundynie Gold Project, Higginsville-**  
**June 2019**

Prepared for



**Avoca Mining Pty Ltd**

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## 1 INTRODUCTION

Royal Nickel Corporation (RNC) is the owner of subsidiary Avoca Mining Pty Ltd, which operate the Higginsville Gold Operation (HGO). HGO proposes to develop the Eundynie Mining Project, approximately 9km southeast of the Higginsville Mill. A mining proposal is currently being prepared and will be submitted with the inclusion of this report.

The main survey area lies within tenements M15/507 and M15/597 which are located approximately 44.6 km north of Norseman in the Coolgardie Region (COO) of Western Australia (Figure 1).

The total survey area received from HGO covers 135.34 ha. The entire survey area lies within Mining Tenements M15/507 & M15/597. Actual disturbance footprints are not yet defined; however, clearing required within the boundary of the survey area is anticipated to be less than the total survey area. This report will encompass results of the reconnaissance flora and vegetation survey within the Eundynie Mining Project survey area.



Figure 1: Regional map of survey location

## 1.1 Objectives

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

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

A reconnaissance assessment has two components:

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

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

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

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

## 1.2 Geology and Vegetation

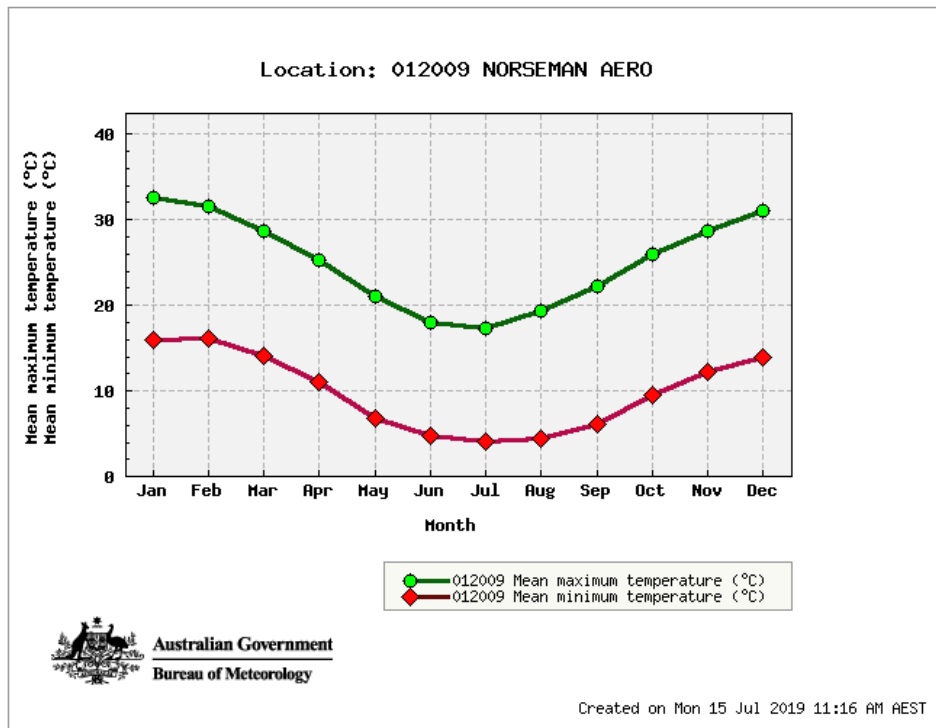
The survey area lies in the Coolgardie (COO) bioregion within the Eastern Goldfields (COO03) subregion which totals over 5.1 million hectares (CALM, 2002). The COO03 subregion lies on the Yilgarn Craton's 'Eastern Goldfields Terrains'. The relief is subdued and comprises of gently undulating plains interrupted in the west with low hills and ridges of Archaean greenstones and in the east by a horst of Proterozoic basic granulite. The underlying geology is of gneisses and granites eroded into a flat plane covered with tertiary soils and with scattered exposures of bedrock. Calcareous earths are the dominant soil group and cover much of the plains and greenstone areas. A series of large playa lakes in the western half are the remnants of an ancient major drainage line. The vegetation is of Mallees, *Acacia* thickets and shrubheaths on sandplains. Diverse *Eucalyptus* woodlands occur around salt lakes, on ranges, and in valleys. Salt lakes support dwarf shrublands of samphire. Woodlands and *Dodonaea* shrubland occur on basic graninulites of the Fraser Range. (CALM, 2002).

## 1.3 Climate

The climate is Arid to Semi-arid with 200-300 mm of rainfall, sometimes in summer but usually in winter (CALM, 2002). The nearest official meteorological weather station with the most complete and up to date information is Norseman, which is located approximately 44.6 km south of the survey area.

### 1.3.1 Temperature

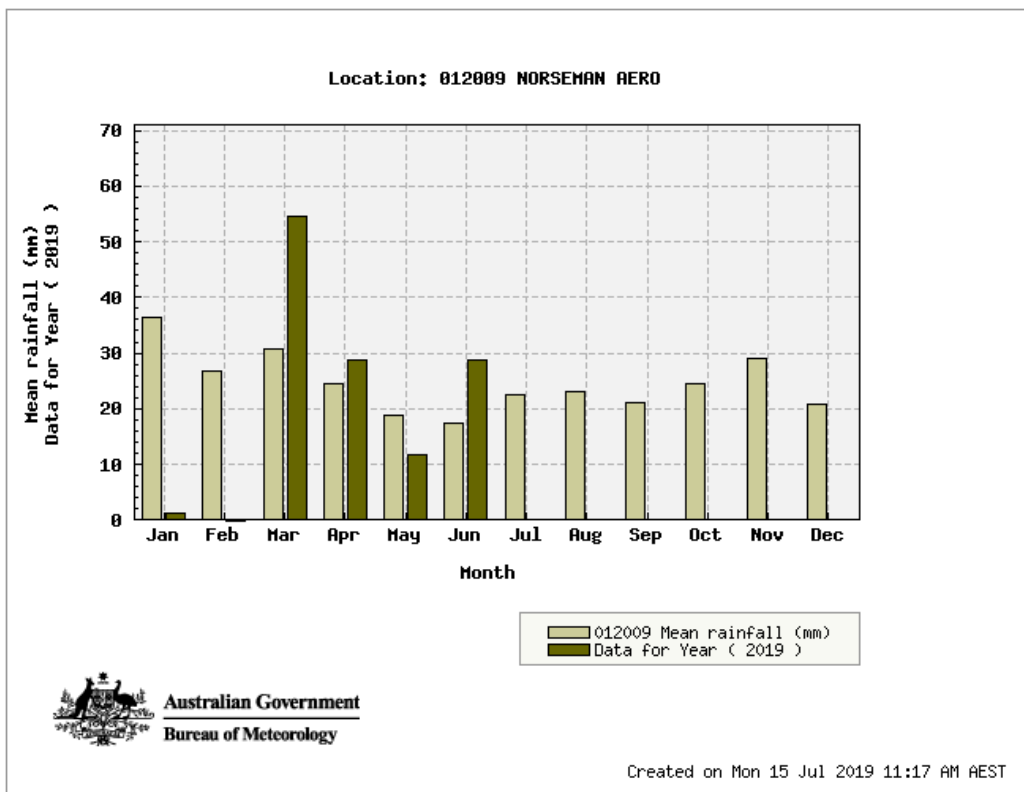
Mean annual minimum temperature at Norseman Aero is 9.9°C and mean annual maximum temperature is 25.2°C. The coldest temperatures are attained in July (mean minimum temperature 4.1°C), the hottest is January (mean maximum temperature 32.6°C) and diurnal temperature variations are relatively consistent throughout the year (Figure 2).



**Figure 2: Mean temperature ranges for Norseman Aero weather station**

### 1.3.2 Rainfall

The annual average rainfall at Norseman is 298 mm, which falls (>1 mm) on an average of 46.8 rain-days (BOM, 2019). Rainfall is relatively even throughout the year with slightly larger rainfall events occurring between the months of November and April (Figure 3). Prior to the survey in 2019, rainfall in March and April exceeded monthly averages, with March receiving almost double the average rainfall. January received 1.2 mm whilst February received no rainfall (BOM, 2019).



**Figure 3: Monthly and mean rainfall for Norseman Aero weather station 2019**



## **2. ASSESSMENT METHODOLOGY**

### **2.1 Personnel and Reporting**

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

- Mr Eren Reid (*BSc- Biological Science*), Principal Botanist, Native Vegetation Solutions, undertook the survey, vegetation mapping, data collation, field identification of flora, preparation and review of the report.

### **2.2 Preliminary Desktop Study**

A preliminary assessment of the survey area and its potential constraints was undertaken by reviewing relevant government agency managed databases (Sections 2.2.1 to 2.2.6, and Appendices 1 & 2) and consulting with government agencies where necessary. The following sections provide a summary of desktop searches undertaken for the project.

#### **2.2.1 Environment Protection and Biodiversity Conservation Act Protected Matters**

The *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* Protected Matters Search tool was utilised to provide results for matters of National Environmental Significance within the survey area using the survey area as the search criteria with a 2km buffer (DOTE, 2019).

(<http://www.environment.gov.au/arcgis-framework/apps/pmst/pmst-coordinate.jsf>)

#### **2.2.2 Threatened Flora and Communities**

The Threatened and Priority Flora Database managed by the Department of Biodiversity, Conservation and Attractions (DBCA) was searched for threatened and priority flora within a 30km radial area of a supplied shapefile (Reference: 15-0114FL).

The Threatened and Priority Ecological Communities (TECs and PECs) database was searched to determine the presence of PECs or TECs (Reference: 06-1111EC), with Geographic Information System (GIS) data supplied for assessment, within a 30km radial area of a supplied shapefile.

#### **2.2.3 Environmentally Sensitive Areas (ESAs) and Conservation Reserves**

The Department of Water and Environmental Regulation (DWER, 2019) Clearing Permit System Map Viewer was used to determine the location of any ESAs and Conservation Reserves (<https://cps.der.wa.gov.au/main.html>).

#### **2.2.4 Vegetation Type, Extent and Status**

Vegetation extent and status data was sourced from the Department of Agriculture and Food (DAFWA) report "Land-Use and Vegetation in Western Australia- National Land and Water Resources Audit Report" and its associated GIS file (Shepherd *et al*, 2002). This data comprises Beard's Pre-European vegetation groups.

DBCA's Statewide Vegetation Statistics (DBCA, 2019b) was also referenced for the current extent of Beard's Vegetation Groups.

#### **2.2.5 Wetlands**

The potential of wetlands within the project area was determined by examining DWER's Clearing Permit System Map Viewer (DWER, 2019).

#### **2.2.6 Dieback**

Dieback is only considered a potential issue for the project if both the mean annual rainfall of the area is >400mm, and if the project area resides south of the 26<sup>th</sup> parallel (CALM, 2003).

## 2.3 Site Investigation

A site visit of the Eundynie Mining Project survey area was carried out by Botanist Eren Reid from Native Vegetation Solutions on the 27<sup>th</sup> June 2019, to examine the flora and vegetation groups contained within the survey area. A total of 8 hours was spent on site traversing the survey area, by Yamaha Viking and on foot.

The survey was conducted in accordance with relevant EPA's Statements and Guidelines (Section 1.1).

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

### 2.3.1 Licenses

Field work was conducted under Scientific License SL012445, held by Mr ER Reid with expiry 18/09/2019.

### 2.3.2 Field Methods

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

In the field, these sites were visited and non-permanent 20 x 20m relevé sites established in appropriate locations, considering representativeness of the site to surrounding vegetation and vegetation boundaries. Relevé sites are represented in Appendix 4.

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

Data collected at each relevé included:

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

Specimens of taxa not recognised by the Botanists were collected and pressed along with specimens of taxa recognised as, or thought to be, conservation-significant species.

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

Vegetation groups were mapped (section 2.4.4 below).

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

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

### 2.3.3 Post-Field Methods

Unknown specimens collected in the field were identified post field work by Eren Reid with reference to published keys, NVS' reference herbarium and information published on Florabase (WAHERB, 2019).

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

### 2.3.4 Mapping

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

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

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

### 2.3.5 IBSA Data Package

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

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

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

## 2.4 Limitations

Table 1 lists potential limitations that may have affected the survey. As shown, this survey was not limited by any factors listed below.

**Table 1: List of potential survey limitations**

Potential Limitations	Constraint (Y/N)	Comment
Competency and experience of the consultants undertaking the survey	N	Mr Eren Reid is an experienced botanist who has conducted many flora and vegetation surveys in the Goldfields, Pilbara and South-west regions of WA.
Proportion of flora identified during survey	N	As the survey was planned to target species of conservation significance and flora within a small survey area, a complete census of the species present was attempted (Approx. 95%). Sufficient identifications were made to allow vegetation descriptions to be made.
Sources of information	N	Threatened and Priority Flora GIS information was available from DBCA.
Proportion of the task achieved	N	All tasks completed
Timing/Season	N	The targeted survey was conducted in Winter 2019. Conditions were slightly dry due to the lack of rain in January and February, however recent above average rainfalls for March and April encouraged enough flowering material of perennial plants for identification purposes.
Disturbance in survey area	N	Disturbance was present in the form of historic exploration.
Intensity of survey effort	N	Transects were walked through the survey area with all parts visited
Resources	N	Adequate resources were available
Access problems	N	No problems with access
Availability of contextual information on the region	N	Information on the Coolgardie (COO) Bioregion is readily available.

### 3. RESULTS

#### 3.1 Preliminary Desktop Assessment

##### 3.1.1 EPBC Act Protected Matters

The EPBC Protected Matters search tool revealed that the Eundynie Mining Project survey area could possibly be suitable habitat for the weed species *Carrichtera annua* (Ward's Weed) (DOTEE, 2019).

##### 3.1.2 Threatened Flora and Communities

The DBCA database searches revealed a potential for no Threatened and 25 Priority Flora species to occur within a 30km radius of the survey area (DBCA, 2014). No known locations of these Flora occur within the survey area, while the closest location occurs approximately 10 km northeast of the survey area.

Results of the threatened flora database search are included in Appendix 2.

The PEC/TEC search (DBCA, 2011) revealed that the survey area lies within the buffer zone of the Fraser Range Vegetation Complex (Priority 1).

“Plant assemblages of the Fraser Range Vegetation Complex: *Allocasuarina huegeliana* and *Pittosporum angustifolia* open woodland over *Beyeria lechenaultii* and *Dodonaea microzyga* Scrub and *Aristida contorta* bunch grasses (granite complex), on the slopes and summits of hills; *Acacia acuminata* Tall Shrubland dominated by *Melaleuca uncinata* and *Triodia scariosa* on uplands with shallow loamy sands; *Eucalyptus aff. uncinata* (KRN 7854) over *Senna artemisioides* subsp. *helmsii*, *Cryptandra miliaris*, *Dodonaea boroniifolia*, *D. stenozyga* and *Triodia scariosa* (*Eucalyptus effusa* Mallee) on colluvial flats with loamy clay sands, and; *E. oleosa*, *E. transcontinentalis*, *E. flocktoniae* Woodland on flats.”

Vegetation groups within the survey area do not compare to this description of the Fraser Range Vegetation Complex.

##### 3.1.3 Environmentally Sensitive Areas and Conservation Reserves

No ESA's are located within the survey area (DWER, 2019 and DOTEE, 2019).

##### 3.1.4 Vegetation Type, Extent and Status

One vegetation unit defined by Beard (1990) was identified as part of the desktop assessment. The vegetation unit identifies the Pre-European extent of vegetation, as mapped by Beard (1990).

Information relating to known Beard (1990) vegetation units within the survey area has been summarised in Table 2 below. This information has been compiled through both desktop assessments and the site visit.

**Table 2: Summary of information regarding Pre-European and current vegetation extent of Vegetation Association 501 within the survey area**

Factor	Value				
Beard Vegetation Association*	501				
Vegetation Association Description*	Medium woodland; goldfields blackbutt				
Pre-European Extent (ha)	Scale				
	<b>By Association (WA)</b>	<b>By Association (WA)</b>	<b>By IBRA Region (COO)</b>	<b>By IBRA Sub-region (COO03)</b>	<b>By Shire (Shire of Coolgardie)</b>
	47,731*	48,022**	43,938**	43,871**	5,797**
% Pre-European Extent Remaining	100.00%*	99.72%**	99.70%**	99.70%**	97.70%**
Surrounding Land Use***	Mining, Exploration, Pastoral Lease, Nature Reserve				
Weed prevalence***	Low				

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

\*\*Source: DBCA, (2019)

\*\*\*Source: Field Assessment

### 3.1.5 Wetlands

No wetlands recorded on the DWER Clearing Permit System Map Viewer occur within the survey area (DWER, 2019).

### 3.1.6 Dieback

The survey area lies south of the 26<sup>th</sup> parallel, however receives average annual rainfall of 298 mm, below the 400mm threshold mark. There is no record of *Phytophthora cinnamomi* establishing in natural ecosystems in regions receiving <400mm rainfall per annum (CALM, 2003). Therefore, Dieback is not considered an issue for this survey area, however all measures should be taken to prevent any possible soil contamination (seeds of non-native species *etc.*) which poses a risk in the survey area during seasonally favourable conditions.

## 3.2 Field Assessment

### 3.2.1 Threatened Flora

No flora located in the survey area, are gazetted as Threatened pursuant to Section 5(1) of the *Biodiversity Conservation Act 2016*. No plant taxa listed as Threatened pursuant to Schedule 1 of the *Environment Protection and Biodiversity Conservation Act 1999* were located within the survey area.

No Priority Flora were recorded in the survey area.

### 3.2.2 Vegetation Type, Extent and Status

A total of 20 Families, 37 Genera and 80 Species were recorded within the survey area. Four major vegetation groups were recorded in the survey area and are in Very Good or Good condition (using the scale of Keighery 1994, see Appendix 3). Existing disturbance within the survey is comprised of historic exploration.

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

The summary of vegetation groups contained within the survey area is summarised in Table 3 below. Maps of the survey area can be seen in Appendix 4.

**Table 3: Vegetation Group Summary**

Vegetation Group	Families	Genera	Species	Area (ha)	Percentage of Survey Area (%)
Mixed <i>Eucalyptus</i> woodland over mixed shrubland	13	24	42	34.17	25.25%
Open <i>Eucalyptus salmonophloia</i> woodland	14	22	38	36.57	27.02%
Mixed sclerophyll shrubland	15	27	43	2.20	1.62%
<i>Eucalyptus torquata</i> and <i>Eucalyptus lesouefii</i> over mixed sclerophyll shrubland on undulating hills	16	26	50	60.72	44.87%
Existing disturbance	2	4	12	1.69	1.25%
<b>Total</b>	<b>20*</b>	<b>37*</b>	<b>80*</b>	<b>135.34#</b>	<b>100.00%#</b>

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

The Eundynie Mining Project vegetation groups are described in more detail below.

### 3.2.2.1 Mixed *Eucalyptus* woodland over mixed shrubland

This vegetation group consisted of 13 Families, 24 Genera and 42 Species. The vegetation group was approximately 34.17 ha which makes up 25.25% of the survey area.

Woodland (Muir, 1977) of transitional Eucalypts dominated by *Eucalyptus salmonophloia*, *Eucalyptus salubris* and *Eucalyptus lesouefii* over a mixed sclerophyll shrubland including *Alyxia buxifolia*, *Cratystylis subspinescens*, *Atriplex nummularia* subsp. *spathulata*, *Atriplex vesicaria*, *Acacia tetragonophylla*, *Scaevola spinescens*, *Dodonaea lobulata*, *Eremophila scoparia* and *Eremophila glabra* subsp. *glabra*.



Figure 4: Mixed *Eucalyptus* woodland over mixed shrubland within the survey area



### 3.2.2.2 Open *Eucalyptus salmonophloia* woodland

This vegetation group consisted of 14 Families, 22 Genera and 38 Species. The vegetation group was approximately 36.57 ha which makes up 27.02% of the survey area.

Open Woodland (Muir, 1977) dominated by *Eucalyptus salmonophloia*, over Chenopod and sclerophyll shrublands including *Eremophila scoparia*, *Atriplex nummularia* subsp. *spathulata*, *Atriplex vesicaria*, *Tecticornia disarticulata*, *Maireana triptera*, *Eremophila glabra* subsp. *glabra*, *Scaevola spinescens* and *Olearia muelleri*.



**Figure 5: Open *Eucalyptus salmonophloia* woodland within the survey area**

### 3.2.2.3 Mixed sclerophyll shrubland

This vegetation group consisted of 15 Families, 27 Genera and 43 Species. The vegetation group was approximately 2.20 ha which makes up 1.62% of the survey area.

Heath B (Muir, 1977) of *Acacia quadrimarginea*, *Acacia tetragonophylla*, *Eremophila glabra* subsp. *glabra*, *Senna artemisioides* subsp. *filifolia*, *Scaevola spinescens*, *Acacia erinacea*, *Eremophila scoparia* and *Lycium australe*.



**Figure 6: Mixed sclerophyll shrubland within the survey area**

### 3.2.2.4 *Eucalyptus torquata* and *Eucalyptus lesouefii* over mixed sclerophyll shrubland on undulating hills

This vegetation group consisted of 16 Families, 26 Genera and 50 Species. The vegetation group was approximately 60.72 ha which makes up 44.87% of the survey area.

Low Forrest A (Muir, 1977) dominated by *Eucalyptus torquata* and *Eucalyptus lesouefii*, over *Eremophila glabra* subsp. *glabra*, *Dodonaea lobulata*, *Eremophila scoparia*, *Westringia rigida*, *Eremophila parvifolia* subsp. *auricampa*, *Acacia erinacea* and *Alyxia buxifolia*.



Figure 7: *Eucalyptus torquata* and *Eucalyptus lesouefii* over mixed sclerophyll shrubland on undulating hills within the survey area

### 3.2.2.5 Existing Disturbance

This vegetation group consisted of 2 Families, 4 Genera and 12 Species. The vegetation group was approximately 1.69 ha which makes up 1.25% of the survey area.

Open Dwarf Scrub C (Muir, 1977) of degraded vegetation due to historical exploration and associated clearing. Dominated by *Atriplex nummularia* subsp. *spathulata* and other mixed sclerophyll shrubs.



Figure 8: Existing Disturbance within the survey area

### **3.2.3 Weeds**

No weed species were recorded within the survey area.

### **3.2.4 Vegetation Condition**

Evidence of historic exploration was observed during the field assessment.

Overall, the condition of the vegetation was determined to be “Very Good” with areas which were affected by historic exploration in “Good” or “Degraded” condition. A map of the vegetation condition within the survey is depicted in Appendix 4.

#### 4. DISCUSSION

The field assessment established that the condition of the vegetation in the proposed disturbance area is overall "Very Good", with certain areas affected by historical exploration in "Good" or "Degraded" condition. No areas of vegetation were assessed to be in "Pristine" condition.

No Weed species were recorded the survey area.

No Threatened Flora, TECs or PECs were recorded in the survey area. No Priority Flora were recorded within the survey area.

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

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

The following recommendations arise from the reconnaissance flora survey:

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

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## 6. GLOSSARY

### Acronyms:

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

### Definitions:

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

#### T Threatened species:

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

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

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

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

#### CR Critically endangered species

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

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



**EN Endangered species**

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

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

**VU Vulnerable species**

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

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

**Extinct species:**

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

**EX Extinct species**

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

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

**EW Extinct in the wild species**

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

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

**Specially protected species**

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

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

**MI Migratory species**

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

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

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

**CD Species of special conservation interest (conservation dependent fauna)**

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

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

**OS Other specially protected species**

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

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

**P Priority Species**

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

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

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

**Priority 1: Poorly-known species**

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

**Priority 2: Poorly-known species**

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

**Priority 3: Poorly-known species**

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

**Priority 4: Rare, Near Threatened and other species in need of monitoring**

(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.

(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.

(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

## **Appendix 1**

### **Relevant Government Database Search Results**



## EPBC Act Protected Matters Report

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

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

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

Report created: 15/07/19 17:01:23

[Summary](#)

[Details](#)

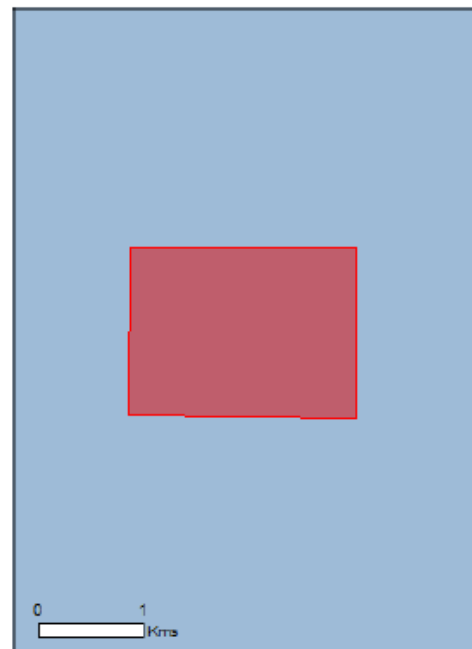
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

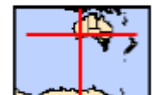
[Acknowledgements](#)



This map may contain data which are  
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[Coordinates](#)

[Buffer: 2.0Km](#)



## 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](#).

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance:</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	None
<a href="#">Listed Threatened Species:</a>	4
<a href="#">Listed Migratory Species:</a>	6

### Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <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.

<a href="#">Commonwealth Land:</a>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	11
<a href="#">Whales and Other Cetaceans:</a>	None
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None

### Extra Information

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

<a href="#">State and Territory Reserves:</a>	None
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	9
<a href="#">Nationally Important Wetlands:</a>	None
<a href="#">Key Ecological Features (Marine)</a>	None

## Details

### Matters of National Environmental Significance

Listed Threatened Species		[ Resource Information ]
Name	Status	Type of Presence
<b>Birds</b>		
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Leipoa ocellata</a> Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
<a href="#">Pezoporus occidentalis</a> Night Parrot [59350]	Endangered	Species or species habitat may occur within area
<b>Mammals</b>		
<a href="#">Dasyurus geoffroi</a> 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
<b>Migratory Marine Birds</b>		
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<b>Migratory Terrestrial Species</b>		
<a href="#">Motacilla cinerea</a> Grey Wagtail [642]		Species or species habitat may occur within area
<b>Migratory Wetlands Species</b>		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area

## Other Matters Protected by the EPBC Act

### Listed Marine Species [ Resource Information ]

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

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

#### Birds

##### [Actitis hypoleucos](#)

Common Sandpiper [59309]		Species or species habitat may occur within area
--------------------------	--	--

##### [Apus pacificus](#)

Fork-tailed Swift [678]		Species or species habitat likely to occur within area
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##### [Ardea alba](#)

Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
----------------------------------	--	--

##### [Ardea ibis](#)

Cattle Egret [59542]		Species or species habitat may occur within area
----------------------	--	--

##### [Calidris acuminata](#)

Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
------------------------------	--	--

##### [Calidris ferruginea](#)

Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
------------------------	-----------------------	--

##### [Calidris melanotos](#)

Pectoral Sandpiper [858]		Species or species habitat may occur within area
--------------------------	--	--

##### [Chrysococcyx osculans](#)

Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
--------------------------	--	--

##### [Merops ornatus](#)

Rainbow Bee-eater [670]		Species or species habitat may occur within area
-------------------------	--	--

##### [Motacilla cinerea](#)

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

##### [Thinornis rubricollis](#)

Hooded Plover [59510]		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 Resources Audit, 2001.

Name	Status	Type of Presence
------	--------	------------------

#### Birds

Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
--	--	--

#### Mammals

Camelus dromedarius Dromedary, Camel [7]		Species or species
---	--	--------------------

Name	Status	Type of Presence
Canis lupus familiaris Domestic Dog [82654]		habitat likely to occur within area  Species or species habitat likely to occur within area
Capra hircus Goat [2]		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
<b>Plants</b>		
Carrichtera annua Ward's Weed [9511]		Species or species habitat likely to occur within area



## Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

## Coordinates

-31.7739 121.8071,-31.7739 121.8264,-31.7862 121.8264,-31.786 121.807,-31.7739 121.8071

## 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](#)
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- [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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- Clearing Regulations - Environmentally ...
- Local Government Authority
- Overview Towns
- Transport/Railway Stations
- Roads

HIGGINSVILLE

Survey Location

WIDGIEMOOLTHA

SLIP  
POWERED BY LANDGATE

mapworks

2 km

121.786892 -31.840628

wa.gov.au

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DWER's Clearing Permit System Map Viewer showing no ESA's (dark green shaded areas) within the survey area (DWER, 2019)

https://cps.dwer.wa.gov.au/main x +

https://cps.dwer.wa.gov.au/main.html#%5B%7B"xclass"%3A"app.map.Main"%7D%2C%7B"xclass"%3A"app.Content"%7D%5D

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  - Waterbodies - Very Small
  - Waterbodies - Small
  - Waterbodies - Medium
  - Waterbodies - Large
- Reserves
- Imagery

HIGGINSVILLE

Survey Location

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500 m

mapworks

121.811697 -31.796551

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DWER Clearing Permit System Map Viewer showing no wetland areas within the survey area (DWER, 2019)

## **Appendix 2**

### **Threatened Flora Databases Search Results**

GIS information provided in the Search results (Reference: 15-0114FL) listed the following species within a 30km radius of the survey area:

<b>Species</b>	<b>Conservation Code</b>
<i>Acacia dissona</i> var. <i>indoloria</i>	P3
<i>Acacia dorsenna</i>	P1
<i>Allocasuarina eriochlamys</i> subsp. <i>grossa</i>	P3
<i>Austrostipa blackii</i>	P3
<i>Austrostipa</i> sp. Carlingup Road (S. Kern & R. Jasper LCH 18459)	P1
<i>Diocirea acutifolia</i>	P3
<i>Eremophila annosocaulis</i>	P3
<i>Eremophila lucida</i>	P1
<i>Eremophila perglandulosa</i>	P1
<i>Eremophila praecox</i>	P1
<i>Eucalyptus kruseana</i>	P4
<i>Eucalyptus x brachyphylla</i>	P4
<i>Grevillea phillipsiana</i>	P1
<i>Lepidosperma lyonsii</i>	P3
<i>Melaleuca coccinea</i>	P3
<i>Myriophyllum petraeum</i>	P4
<i>Newcastelia insignis</i>	P2
<i>Phebalium clavatum</i>	P2
<i>Philothea apiculata</i>	P2
<i>Phlegmatospermum eremaeum</i>	P3
<i>Pityrodia scabra</i> subsp. <i>dendrotricha</i>	P3
<i>Prostanthera splendens</i>	P1
<i>Stylidium choreanthum</i>	P3
<i>Tecticornia flabelliformis</i>	P1
<i>Trachymene pyrophila</i>	P2

## **Appendix 3**

### **Vegetation Condition Scale (Keighery, 1994)**

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

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

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

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

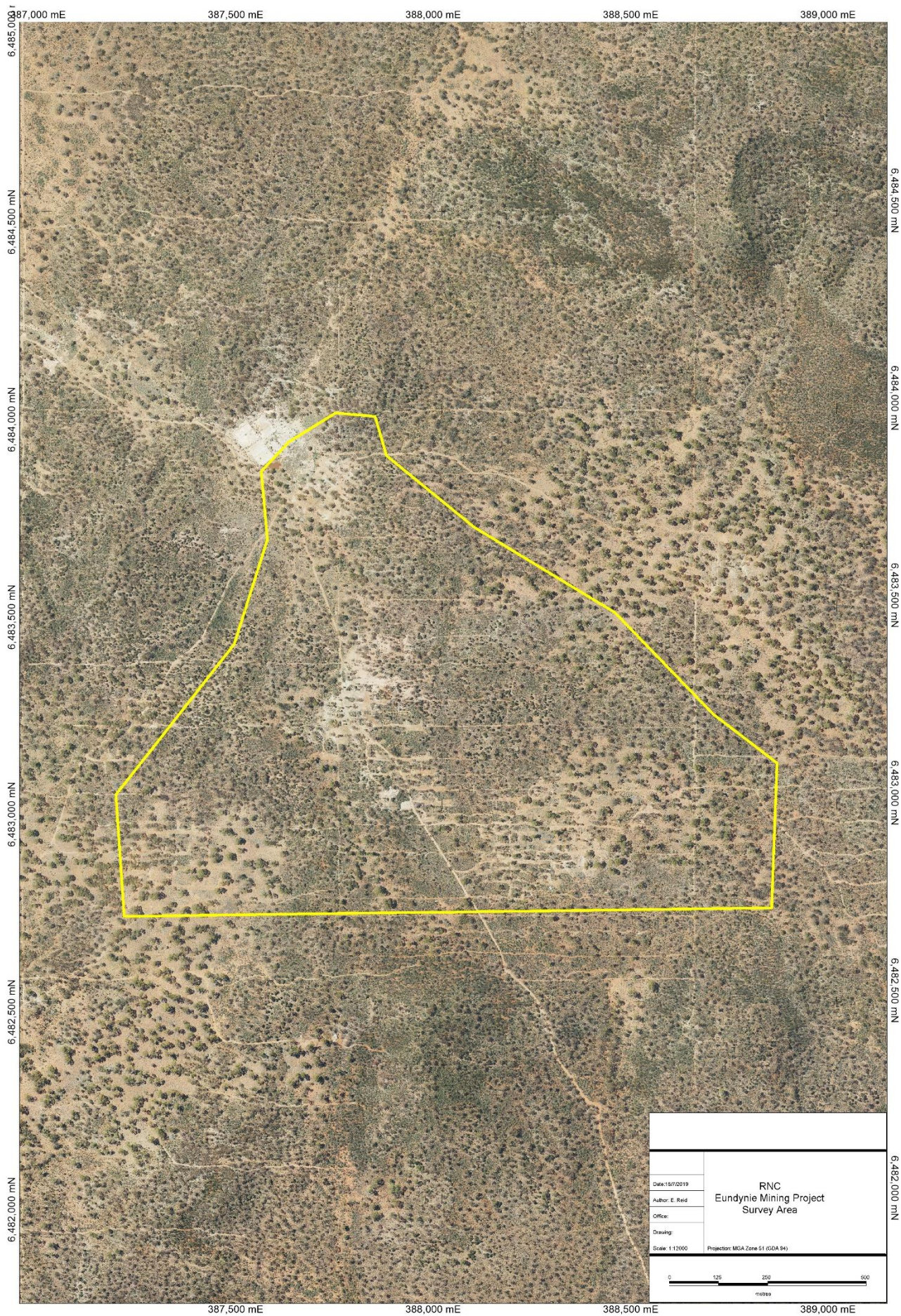
**Degraded (5).** Basic vegetation structure severely impacted by disturbance.  
Scope for regeneration but not to a state approaching good condition without intensive management.  
For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds,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

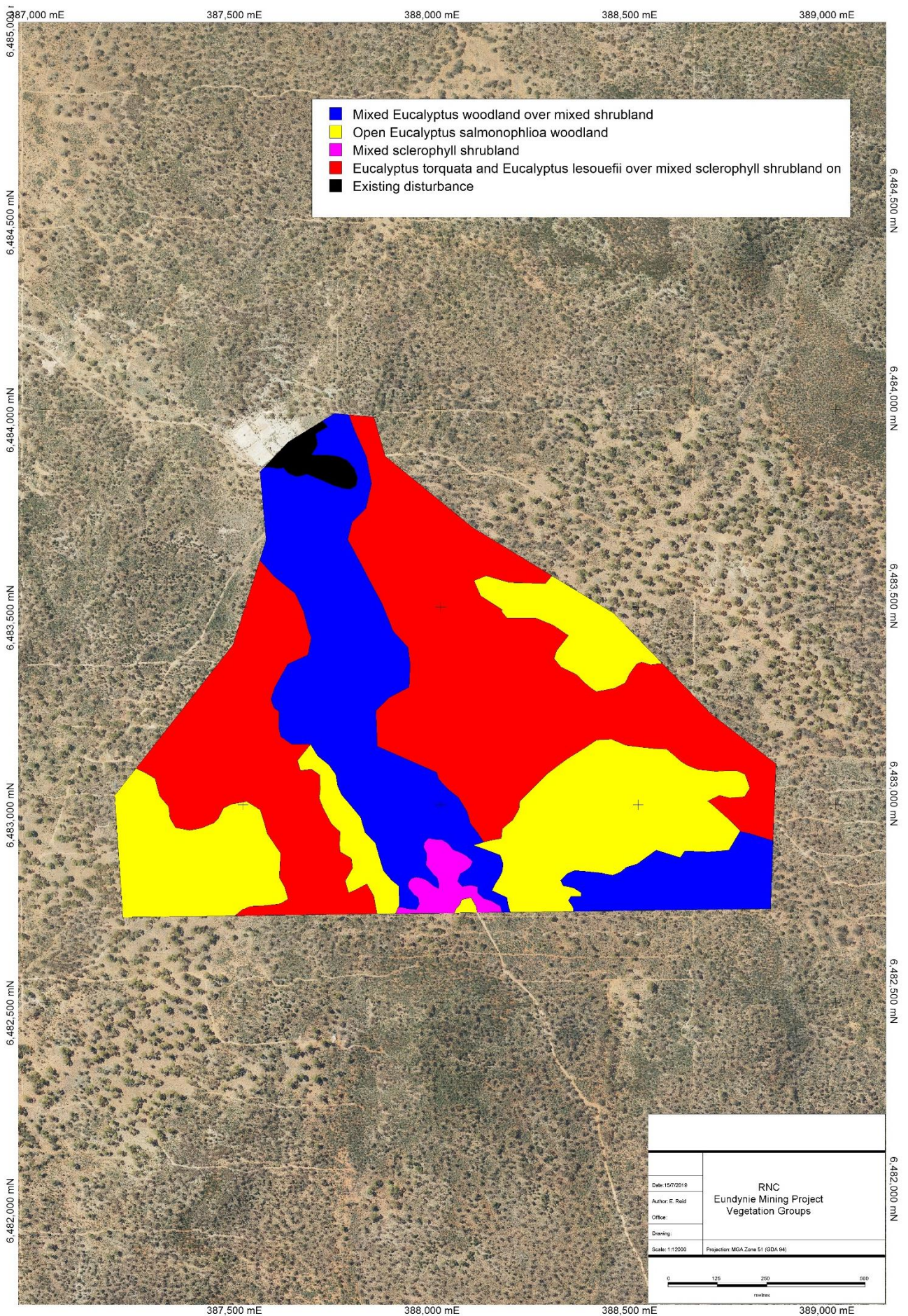
**Completely Degraded (6).** The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.  
These areas are often described as 'parkland cleared' with the flora compromising weed or crop species with isolated trees or shrubs.

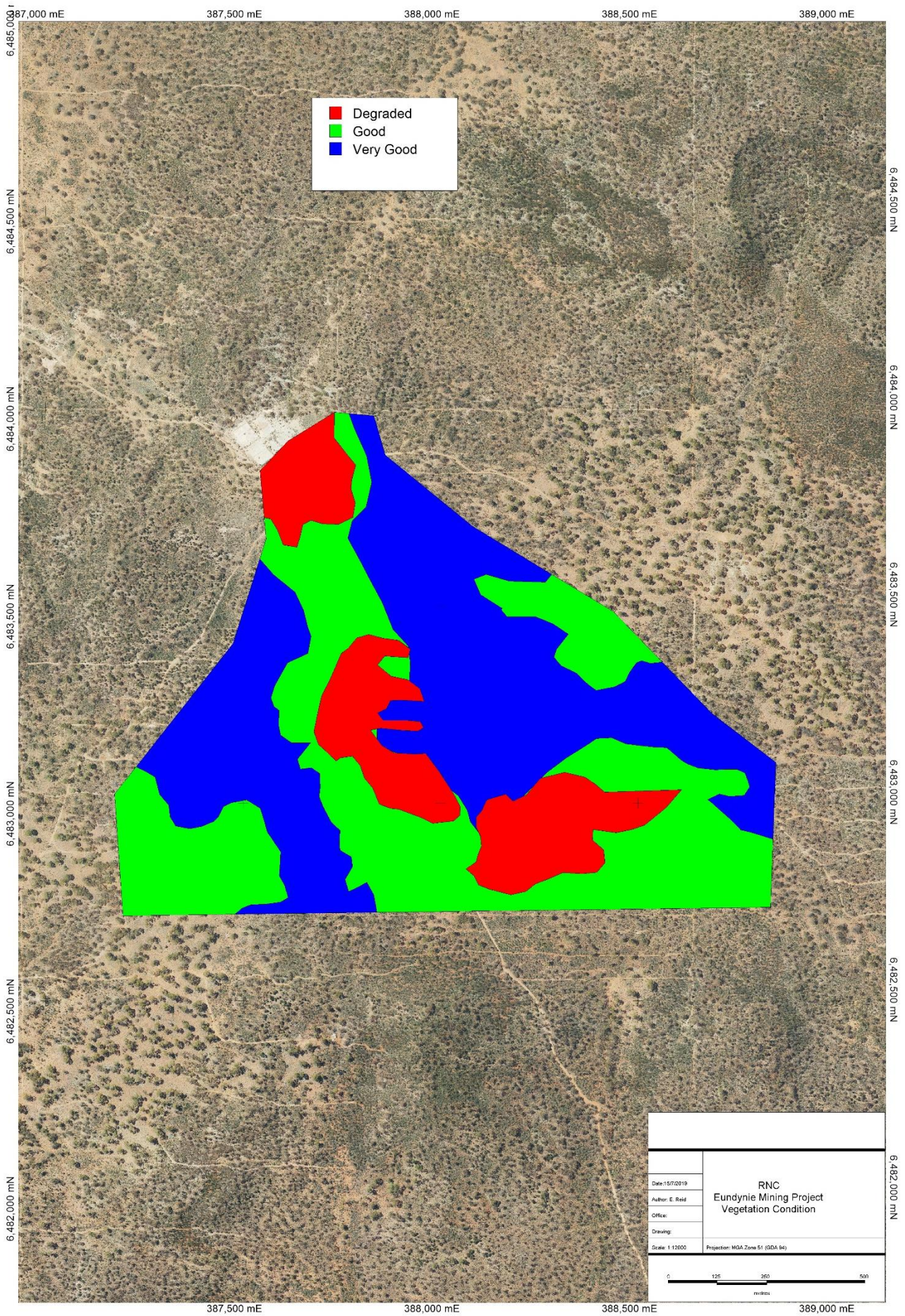


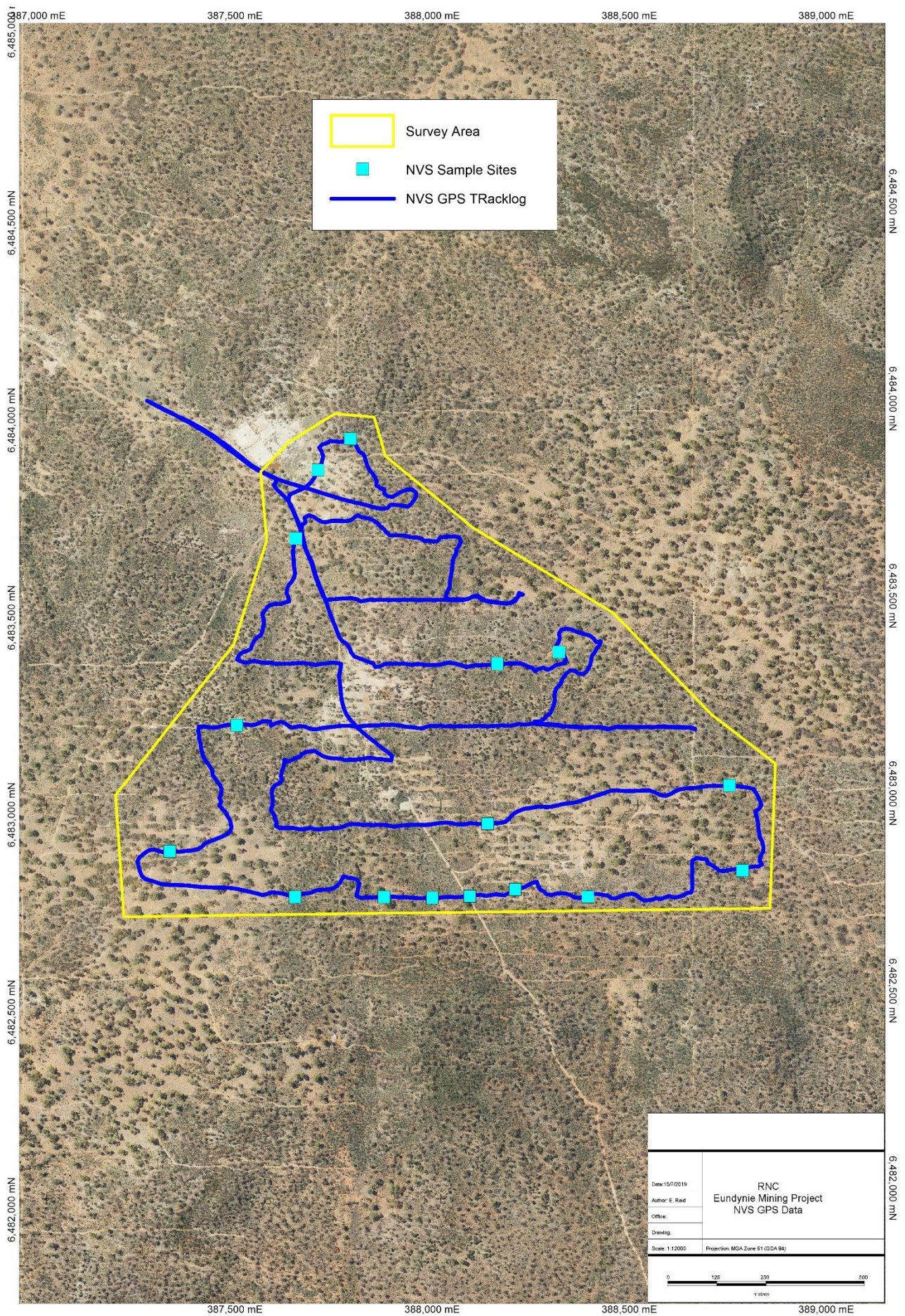
## **Appendix 4**

# **Vegetation Mapping**









# **Appendix 5**

## **Species List**

Family	Genus	Species		Perennial (P) Annual (A) Non Native (NN)	Mixed <i>Eucalyptus</i> woodland over mixed shrubland	Open <i>Eucalyptus salmonophloia</i> woodland	Mixed sclerophyll shrubland	<i>Eucalyptus torquata</i> and <i>Eucalyptus lesouefii</i> over mixed sclerophyll shrubland on undulating hills	Existing disturbance
Aizoaceae	<i>Carpobrotus</i>	<i>modestus</i>	<i>Carpobrotus modestus</i>	P			*		
Amaranthaceae	<i>Ptilotus</i>	<i>obovatus</i>	<i>Ptilotus obovatus</i>	P	*	*	*	*	
Apocynaceae	<i>Alyxia</i>	<i>buxifolia</i>	<i>Alyxia buxifolia</i>	P	*	*	*	*	
Apocynaceae	<i>Marsdenia</i>	<i>australis</i>	<i>Marsdenia australis</i>	P			*	*	
Asteraceae	<i>Brachyscome</i>	<i>ciliaris</i>	<i>Brachyscome ciliaris</i>	A			*		
Asteraceae	<i>Cratystylis</i>	<i>conocephala</i>	<i>Cratystylis conocephala</i>	P		*	*	*	
Asteraceae	<i>Cratystylis</i>	<i>subspinescens</i>	<i>Cratystylis subspinescens</i>	P	*		*		
Asteraceae	<i>Olearia</i>	<i>muelleri</i>	<i>Olearia muelleri</i>	P	*	*		*	
Asteraceae	<i>Olearia</i>	<i>subspicata</i>	<i>Olearia subspicata</i>	P				*	
Asteraceae	<i>Rhodanthe</i>	<i>charsleyae</i>	<i>Rhodanthe charsleyae</i>	A	*				
Asteraceae	<i>Rhodanthe</i>	<i>floribunda</i>	<i>Rhodanthe floribunda</i>	A	*		*		
Boraginaceae	<i>Halgania</i>	<i>andromedifolia</i>	<i>Halgania andromedifolia</i>	P				*	
Chenopodiaceae	<i>Atriplex</i>	<i>bunburyana</i>	<i>Atriplex bunburyana</i>	P	*				*
Chenopodiaceae	<i>Atriplex</i>	<i>holocarpa</i>	<i>Atriplex holocarpa</i>	A					*
Chenopodiaceae	<i>Atriplex</i>	<i>nummularia</i> subsp. <i>spathulata</i>	<i>Atriplex nummularia</i> subsp. <i>spathulata</i>	P	*	*	*	*	*
Chenopodiaceae	<i>Atriplex</i>	<i>stipitata</i>	<i>Atriplex stipitata</i>	P	*	*	*	*	*
Chenopodiaceae	<i>Atriplex</i>	<i>vesicaria</i>	<i>Atriplex vesicaria</i>	P	*	*	*	*	*
Chenopodiaceae	<i>Chenopodium</i>	<i>gaudichaudianum</i>	<i>Chenopodium gaudichaudianum</i>	P	*			*	
Chenopodiaceae	<i>Enchylaena</i>	<i>tomentosa</i> var. <i>tomentosa</i>	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	P	*	*	*	*	
Chenopodiaceae	<i>Eriochiton</i>	<i>sclerolaenoides</i>	<i>Eriochiton sclerolaenoides</i>	P	*	*		*	
Chenopodiaceae	<i>Maireana</i>	<i>georgei</i>	<i>Maireana georgei</i>	P	*	*	*	*	
Chenopodiaceae	<i>Maireana</i>	<i>pentatropis</i>	<i>Maireana pentatropis</i>	P		*	*		
Chenopodiaceae	<i>Maireana</i>	<i>sedifolia</i>	<i>Maireana sedifolia</i>	P	*	*			
Chenopodiaceae	<i>Maireana</i>	<i>tomentosa</i>	<i>Maireana tomentosa</i>	P	*	*		*	
Chenopodiaceae	<i>Maireana</i>	<i>triptera</i>	<i>Maireana triptera</i>	P		*			
Chenopodiaceae	<i>Sclerolaena</i>	<i>cuneata</i>	<i>Sclerolaena cuneata</i>	P		*		*	*
Chenopodiaceae	<i>Sclerolaena</i>	<i>densiflora</i>	<i>Sclerolaena densiflora</i>	P	*	*	*	*	*
Chenopodiaceae	<i>Sclerolaena</i>	<i>diacantha</i>	<i>Sclerolaena diacantha</i>	P	*	*	*	*	*
Chenopodiaceae	<i>Sclerolaena</i>	<i>patenticuspis</i>	<i>Sclerolaena patenticuspis</i>	P		*	*		*
Chenopodiaceae	<i>Tecticornia</i>	<i>disarticulata</i>	<i>Tecticornia disarticulata</i>	P		*			*
Fabaceae	<i>Acacia</i>	<i>collettioides</i>	<i>Acacia collettioides</i>	P				*	
Fabaceae	<i>Acacia</i>	<i>erinacea</i>	<i>Acacia erinacea</i>	P		*	*	*	
Fabaceae	<i>Acacia</i>	<i>quadrifolia</i>	<i>Acacia quadrifolia</i>	P			*	*	
Fabaceae	<i>Acacia</i>	<i>tetragonophylla</i>	<i>Acacia tetragonophylla</i>	P	*	*	*	*	
Fabaceae	<i>Senna</i>	<i>artemisioides</i> subsp. <i>artemisioides</i>	<i>Senna artemisioides</i> subsp. <i>artemisioides</i>	P			*	*	
Fabaceae	<i>Senna</i>	<i>artemisioides</i> subsp. <i>filifolia</i>	<i>Senna artemisioides</i> subsp. <i>filifolia</i>	P		*	*	*	
Fabaceae	<i>Senna</i>	<i>cardiosperma</i>	<i>Senna cardiosperma</i>	P			*		
Frankeniaceae	<i>Frankenia</i>	<i>interioris</i>	<i>Frankenia interioris</i>	P	*	*	*		
Frankeniaceae	<i>Frankenia</i>	<i>pauciflora</i>	<i>Frankenia pauciflora</i>	P	*		*		

Family	Genus	Species		Perennial (P) Annual (A) Non Native (NN)	Mixed Eucalyptus woodland over mixed shrubland	Open Eucalyptus salmonophloia woodland	Mixed sclerophyll shrubland	Eucalyptus torquata and Eucalyptus lesouefii over mixed sclerophyll shrubland on undulating hills	Existing disturbance
Goodeniaceae	<i>Scaevola</i>	<i>spinescens</i>	<i>Scaevola spinescens</i>	P	*	*	*	*	
Lamiaceae	<i>Westringia</i>	<i>rigida</i>	<i>Westringia rigida</i>	P				*	
Myrtaceae	<i>Eucalyptus</i>	<i>celastroides</i>	<i>Eucalyptus celastroides</i>	P	*				
Myrtaceae	<i>Eucalyptus</i>	<i>lesouefii</i>	<i>Eucalyptus lesouefii</i>	P	*	*		*	
Myrtaceae	<i>Eucalyptus</i>	<i>oleosa</i> subsp. <i>oleosa</i>	<i>Eucalyptus oleosa</i> subsp. <i>oleosa</i>	P				*	
Myrtaceae	<i>Eucalyptus</i>	<i>ravida</i>	<i>Eucalyptus ravida</i>	P	*			*	
Myrtaceae	<i>Eucalyptus</i>	<i>salmonophloia</i>	<i>Eucalyptus salmonophloia</i>	P	*	*			
Myrtaceae	<i>Eucalyptus</i>	<i>salubris</i>	<i>Eucalyptus salubris</i>	P	*				
Myrtaceae	<i>Eucalyptus</i>	<i>torquata</i>	<i>Eucalyptus torquata</i>	P				*	
Myrtaceae	<i>Eucalyptus</i>	<i>yilgarnensis</i>	<i>Eucalyptus yilgarnensis</i>	P		*			
Myrtaceae	<i>Melaleuca</i>	<i>sheathiana</i>	<i>Melaleuca sheathiana</i>	P	*			*	
Poaceae	<i>Austrostipa</i>	<i>elegantissima</i>	<i>Austrostipa elegantissima</i>	P	*		*	*	
Poaceae	<i>Austrostipa</i>	<i>nitida</i>	<i>Austrostipa nitida</i>	P	*	*	*	*	
Poaceae	<i>Eragrostis</i>	<i>dielsii</i>	<i>Eragrostis dielsii</i>	A			*		
Proteaceae	<i>Grevillea</i>	<i>acuarria</i>	<i>Grevillea acuarria</i>	P			*		
Rhamnaceae	<i>Trymalium</i>	<i>myrtillus</i> subsp. <i>myrtillus</i>	<i>Trymalium myrtillus</i> subsp. <i>myrtillus</i>	P				*	
Santalaceae	<i>Exocarpos</i>	<i>aphyllus</i>	<i>Exocarpos aphyllus</i>	P	*	*	*	*	
Santalaceae	<i>Santalum</i>	<i>acuminatum</i>	<i>Santalum acuminatum</i>	P		*	*	*	
Santalaceae	<i>Santalum</i>	<i>spicatum</i>	<i>Santalum spicatum</i>	P		*		*	
Sapindaceae	<i>Dodonaea</i>	<i>bursariifolia</i>	<i>Dodonaea bursariifolia</i>	P				*	
Sapindaceae	<i>Dodonaea</i>	<i>lobulata</i>	<i>Dodonaea lobulata</i>	P	*		*	*	
Sapindaceae	<i>Dodonaea</i>	<i>microzyga</i> var. <i>acrolobata</i>	<i>Dodonaea microzyga</i> var. <i>acrolobata</i>	P				*	
Sapindaceae	<i>Dodonaea</i>	<i>stenozyga</i>	<i>Dodonaea stenozyga</i>	P	*				
Scrophulariaceae	<i>Eremophila</i>	<i>alternifolia</i>	<i>Eremophila alternifolia</i>	P	*			*	
Scrophulariaceae	<i>Eremophila</i>	<i>decepiens</i> subsp. <i>decepiens</i>	<i>Eremophila decepiens</i> subsp. <i>decepiens</i>	P			*		
Scrophulariaceae	<i>Eremophila</i>	<i>georgei</i>	<i>Eremophila georgei</i>	P				*	
Scrophulariaceae	<i>Eremophila</i>	<i>glabra</i> subsp. <i>glabra</i>	<i>Eremophila glabra</i> subsp. <i>glabra</i>	P	*	*	*	*	
Scrophulariaceae	<i>Eremophila</i>	<i>interstans</i> subsp. <i>virgata</i>	<i>Eremophila interstans</i> subsp. <i>virgata</i>	P	*	*		*	*
Scrophulariaceae	<i>Eremophila</i>	<i>longifolia</i>	<i>Eremophila longifolia</i>	P	*				
Scrophulariaceae	<i>Eremophila</i>	<i>miniata</i>	<i>Eremophila miniata</i>	P			*		
Scrophulariaceae	<i>Eremophila</i>	<i>oppositifolia</i> subsp. <i>angustifolia</i>	<i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>	P				*	
Scrophulariaceae	<i>Eremophila</i>	<i>parvifolia</i> subsp. <i>auricampa</i>	<i>Eremophila parvifolia</i> subsp. <i>auricampa</i>	P		*	*	*	
Scrophulariaceae	<i>Eremophila</i>	<i>psilocalyx</i>	<i>Eremophila psilocalyx</i>	P				*	
Scrophulariaceae	<i>Eremophila</i>	<i>scoparia</i>	<i>Eremophila scoparia</i>	P	*	*	*	*	*
Scrophulariaceae	<i>Myoporum</i>	<i>platycarpum</i> subsp. <i>platycarpum</i>	<i>Myoporum platycarpum</i> subsp. <i>platycarpum</i>	P	*		*		
Solanaceae	<i>Duboisia</i>	<i>hopwoodii</i>	<i>Duboisia hopwoodii</i>	P	*		*		
Solanaceae	<i>Lycium</i>	<i>australe</i>	<i>Lycium australe</i>	P	*		*		
Solanaceae	<i>Solanum</i>	<i>nummularium</i>	<i>Solanum nummularium</i>	P	*	*	*	*	
Solanaceae	<i>Solanum</i>	<i>orbiculatum</i>	<i>Solanum orbiculatum</i>	P				*	



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Thymelaeaceae	<i>Pimelea</i>	<i>microcephala</i> subsp. <i>microcephala</i>	<i>Pimelea microcephala</i> subsp. <i>microcephala</i>	P		*	*	*	
Zygophyllaceae	<i>Zygophyllum</i>	<i>eremaum</i>	<i>Zygophyllum eremaum</i>	A		*			