Reconnaissance
Flora and Vegetation Survey of the Proposed GSM Solar Farm- October 2018
(L38/88, L38/326, M38/397, M38/691 & M38/849)

Prepared for

GSM Mining Company Pty Ltd

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1 INTRODUCTION

Gold Fields Limited, via its subsidiary GSM Mining Company Pty Ltd (GSM), are proposing to construct a Solar Farm at the Granny Smith Mine, just south of the Wallaby Haul Road. The Solar Farm will produce electricity to supplement existing power supplies to the mine site.

A survey area was provided by GSM to Native Vegetation Solutions (NVS) and is located approximately 24km south of Laverton in the Murchison Bioregion of Western Australia (Figure 1). The total survey area received from GSM covers approximately 150.05 ha, and lies south of the Wallaby Haul Road, 6.5km southwest of the Granny Smith Mill, and adjacent to the existing gas power station. This report describes the results of a reconnaissance flora and vegetation survey conducted within the survey area, which will be utilised for future mining proposals and clearing permit applications.

The survey area is shown in Figures 1 & 2 and Appendix 4.

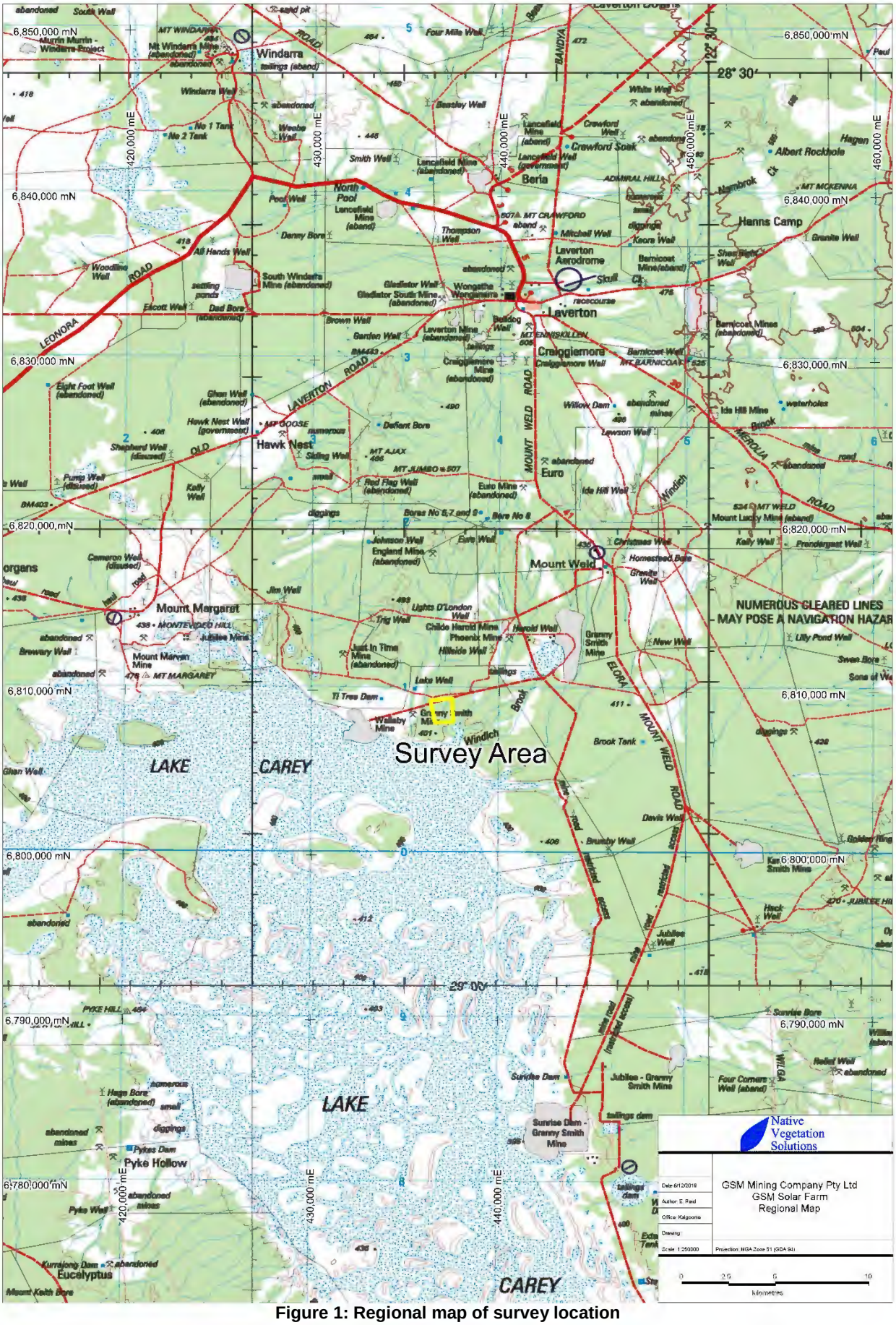

Figure 1: Regional map of survey location

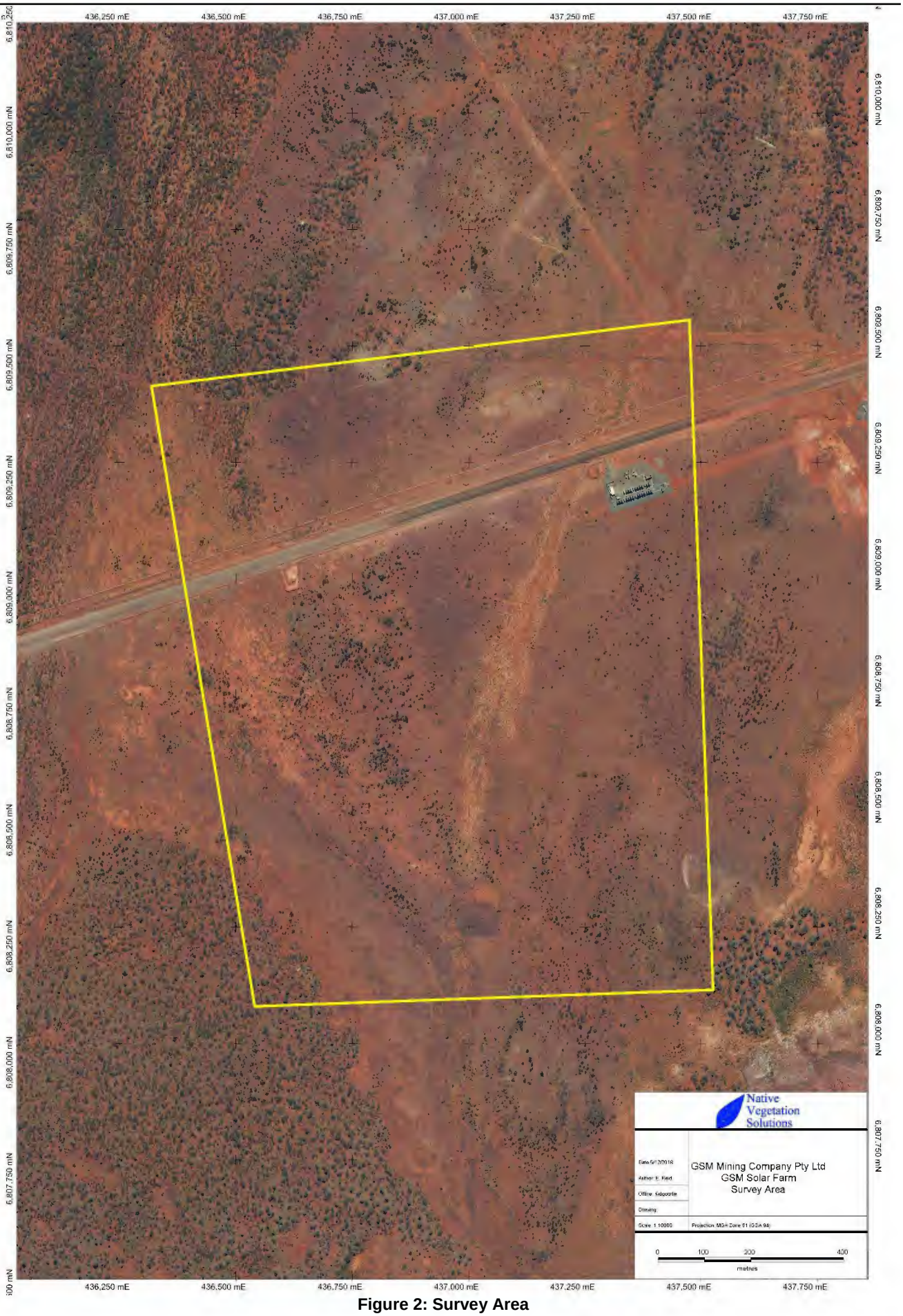

Figure 2: Survey Area

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 groups 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:

- 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

According to the Interim Biogeographic Regionalisation of Australia (IBRA, 2018), the survey area lies in the Murchison (MUR) bioregion within the Eastern Murchison (MUR01) subregion which totals over 7.8 million hectares (CALM, 2002). The MUR01 subregion is characterised by its internal drainage, and extensive areas of elevated red desert sandplains with minimal dune development. Salt lake systems are associated with the occluded Paleodrainage system and broad plains of red-brown soils and breakaway complexes as well as red sandplains are also common. Vegetation is dominated by Mulga Woodlands often rich in ephemerals; hummock grasslands, saltbush shrublands and *Tecticornia* shrublands. (CALM, 2002).

1.3 Climate

The subregional climate is Arid with mainly winter rainfall of 200mm annually (CALM, 2002).

The nearest official meteorological weather station with the most complete and up to date information is Laverton Aero weather station, which is located approximately 26 km north-northeast of the survey area. Recordings of the local climatic conditions commenced at Laverton Aero in 1991 (BOM, 2018) and data collected at this station 012305 was used for this report.

1.3.1 Temperature

Mean annual minimum temperature at Laverton is 13.9°C and mean annual maximum temperature is 27.1°C. The coldest temperatures occur in July (mean minimum temperature 5.9°C), the hottest is January (mean maximum temperature 35.5°C) and diurnal temperature variations are relatively consistent throughout the year (Figure 3).

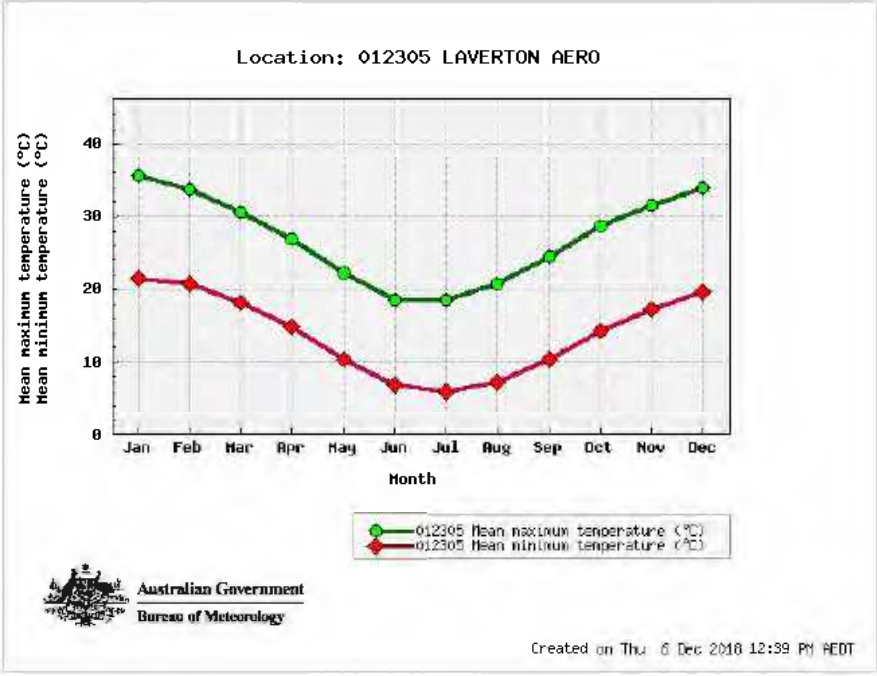

Figure 3: Mean temperature ranges for Laverton Aero weather station

1.3.2 Rainfall

The annual average rainfall at Laverton Aero is 301.2mm over an average 36.6 rain days (BOM, 2018). Average rainfall varies across the months, with slightly larger rainfall events falling between November and March (Figure 4), and the least average rainfall received in September. Rainfall in 2018 almost doubled the mean monthly rainfall in January and more than trippled November's monthly average. June, August and October also received above average rainfall, however monthly rainfall was lower than mean monthly rainfall for the remaining months, (excluding incomplete data for December) as depicted in Figure 4 below (BOM, 2018).

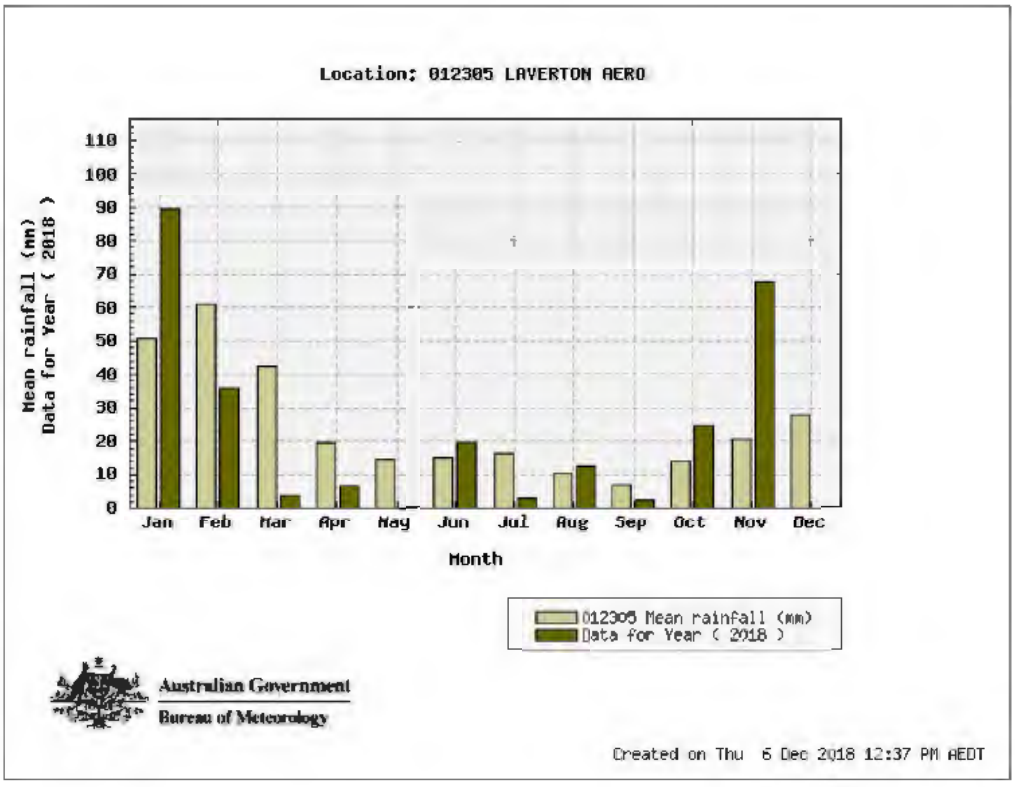

Figure 4: Monthly and mean rainfall for Laverton Aero weather station 2018

2. ASSESSMENT METHODOLOGY

2.1 Personnel and Reporting

The following personnel were involved in the Level 1 flora and vegetation survey:

- Mr Eren Reid (*BSc- Biological Science),* Principal Botanist, Native Vegetation Solutions, undertook the survey, vegetation mapping, data collation, field identification of flora, preparation and review of the report.
- Mr Frank Obbens (*BSc*), Consultant Botanist, Bushtech Consultancy, undertook identification of unknown plant taxa collected in the field.

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 with a 1km buffer (DOTEE, 2018). (http://www.environment.gov.au/arcgis-framework/apps/pmst/pmst-coordinate.jsf)

2.2.2 Threatened Flora and Communities

The Species and Communities Branch of the Department of Biodiversity, Conservation and Attractions (DBCA) was contacted for a search of their databases containing known populations of threatened flora within a 40km radial area of GPS coordinates GDA94 51J 422500mE 6812300mN (Reference: 19-0316FL). Threatened flora include Declared Rare Flora (DRF-extant, now redefined as 'Threatened') and Priority Flora.

The presence of Threatened and Priority Ecological Communities (TECs & PECs) was determined by examining Geographic Information System (GIS) data supplied by the DBCA upon request within a 40km radial area of GPS coordinates GDA94 51J 422500mE 6812300mN (Reference: 04-0416EC).

2.2.3 Environmentally Sensitive Areas (ESAs) and Conservation Reserves

The Department of Water and Environmental Regulation (DWER, 2018) 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, 2018) 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, 2018).

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 26th parallel.

2.3 Site Investigation

A site visit was carried out by Botanist Eren Reid from Native Vegetation Solutions, accompanied by Scott Thompson from Terrestrial Ecosystms on the 22nd October 2018 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 four-wheel-drive vehicle 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 Murchison 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 were 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 2.3.4 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, relevés 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, 2018). Further unknown specimens were identified by Consultant Botanist, Frank Obbens from Bushtech Consultancy, at the WAHERB Reference Library.

Species information was transferred into Microsoft Excel® 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 survey was conducted in Spring 2018. Due to the above average rainfall in January, June, August and October, some species were still in flower, and some emergent annuals were also present.
Disturbance in survey area	N	Disturbance was present with some minor access tracks present.
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 Murchison Bioregion is readily available.

3. RESULTS

3.1 Preliminary Desktop Assessment

3.1.1 EPBC Protected Matters

The EPBC Protected Matters search tool revealed that the survey area could possibly be suitable habitat for non-native plant species *Carrichtera annua* (Ward's Weed) and *Cenchrus ciliaris* (Buffel-grass).

C. annua was introduced into Australia from the eastern Mediterranean, and is now widespread throughout South Australia, the Interior, and Western Australia (Lamp & Collet, 1999). This species is not listed as a declared plant by DPIRD (2018), however according to the EPBC search tool this invasive weed species is considered a threat to the rangeland biodiversity within the Southern Australian Sheep and Cattle Grazing Land Management Zone (DOTEE, 2018).

Buffel-grass is not listed as a declared plant by DPIRD (2018), however according to the EPBC search tool it can impact directly on biodiversity values, for example through competition, and indirectly through increasing the frequency and intensity of fires. Buffel-grass is a high-biomass tussock grass that is generally long-lived, deep-rooted and able to out-compete native vegetation. It can flower and fruit rapidly following rainfall for prolonged periods and produce a large amount of seed which disperses easily. Buffel-grass is tolerant to drought, fire and grazing and can naturalise on a wide range of soil types and landscapes. Hotter fires attributed to buffel-grass can affect groundcover vegetation (including bush foods important to Indigenous communities) and carry into the canopy of keystone arid zone trees such as river red gums (*Eucalyptus camaldulensis*), corkwoods (*Hakea* species) and beefwoods (*Grevillea striata*) with flow-on effects to other plants and animals. They can also increase the risk of damage to infrastructure and cultural sites (DOTEE, 2018).

The EPBC Protected Matters report indicated no TEC's or Commonwealth Reserves within a 1km buffer region of the survey area area.

The results of the EPBC Protected Matters search are included in Appendix 1

3.1.2 Threatened Flora and Communities

The DBCA database searches revealed that 1 Threatened and 41 Priority Flora species occur within a 40km radius of the search area (DBCA, 2016a). These taxa are considered to have the potential to occur within the survey area, based on their proximity and similar habitat. None of these known locations occur within the survey area, while the closest location occurs approximately 9.3km northeast of the survey area (DBCA, 2016a).

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

The PEC/TEC search (DBCA, 2016) revealed that there are no TECs or PECs within the survey area.

3.1.3 Environmentally Sensitive Areas and Conservation Reserves

No ESA's are located within the survey area (DWER, 2018).

No Conservation Reserves were identified within the survey area (DOTEE, 2018).

3.1.4 Vegetation Type, Extent and Status

Information relating to known vegetation 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 18 within the survey area

Factor	Value				
Beard Vegetation Association*	18				
Vegetation Association Description*	Low woodland; mulga (*Acacia aneura*)				
Pre-European Extent (ha)	Scale				
	By Association *(WA)*	***By Association*** *(WA)*	***By IBRA Region*** *(MUR)*	***By IBRA Sub-region*** *(MUR01)*	***By Shire*** *(Shire of Laverton)*
	22,029,557*	19,892,306**	12,403,172**	10,269,896**	2,878,673**
% Pre-European Extent Remaining	*100.00%**	*99.76%***	*99.68%***	*99.66%***	*99.61%***
Surrounding Land Use***	Mining, Exploration, Pastoral Lease				
Weed prevalence***	Low				

* Source: Shepherd *et al.* (2002) Appendix 2
**Source: DBCA, (2018)
***Source: Field Assessment

3.1.5 Wetlands

No wetlands which are recorded on the DWER Clearing Permit System Map Viewer occur within the survey area (DWER, 2018).

3.1.6 Dieback

The survey area lies south of the 26th parallel, however receives average annual rainfall of 301.2 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 species were located or recorded in the survey area.

3.2.2 Vegetation Type, Extent and Status

A total of 20 Families, 37 Genera and 66 Species were recorded within the survey area. Five major vegetation groups were recorded in the survey area, and are in “Good” to “Very Good” condition (using the scale of Keighery 1994, see Appendix 3). Disturbance occurring in the survey area included historic access tracks, haul roads and powerline corridors. 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 Groups	Family	Genus	Species	Area (ha)	Percentage of Survey Area (%)
Chenopod Shrubland- Drainage Line	8	17	34	43.99	29.32%
Open Mulga woodland over Chenopod shrubland	8	11	18	89.63	59.73%
Mulga over Ironstone outcrops	18	27	42	2.35	1.57%
Mulga woodland over sandy plains	10	18	23	6.27	4.18%
***Tecticornia* shrubland**	2	2	2	0.61	0.41%
Existing Disturbance	N/A	N/A	N/A	7.2	4.80%
Total	**20***	**37***	**66***	**150.05#**	**100.00%#**

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

The vegetation groups are described in more detail below.

3.2.2.1 Chenopod shrubland- Drainage Line

This vegetation group consisted of 8 Families, 17 Genera and 34 Species. The vegetation group was approximately 43.99 ha which makes up 29.32% of the survey area.

Dominant species were *Maireana pyramidata, Cratystylis subspinescens, Hakea preissii* and *Lawrencia squamata.*

Figure 5: Chenopod shrubland- Drainage Line within the survey area

3.2.2.2 Open Mulga woodland over Chenopod shrubland

This vegetation group consisted of 8 Families, 11 Genera and 18 Species. The vegetation group was approximately 89.63 ha which makes up 59.73% of the survey area.

Dominant species were *Acacia aneura, Acacia mulganeura, Acacia masliniana, Hakea preissii, Eremophila glabra* subsp*. glabra, Atriplex bunburyana* and *Maireana pyramidata.*

Figure 6: Open Mulga woodland over Chenopod shrubland within the survey area

3.2.2.3 Mulga over ironstone outcrops

This vegetation group consisted of 18 Families, 27 Genera and 42 Species. The vegetation group was approximately 2.35 ha which makes up 1.57% of the survey area.

Dominant species were *Acacia mulganeura, Acacia aneura, Acacia ayersiana, Philotheca breucei* subsp*. brucei, Eremophila latrobei* subsp. *latrobei, Dodnaea viscosa,* subsp*. angustissima* and *Acacia tetragonophylla.*

Figure 7: Mulga over ironstone outcrops within the survey area

3.2.2.4 Mulga woodland over sandy plains

This vegetation group consisted of 10 Families, 18 Genera and 23 Species. The vegetation group was approximately 6.27 ha which makes up 4.18% of the survey area.

Dominant species were *Acacia ayersiana, Acacia pteraneura, Maireana pyramidata, Rhagodia drummondii, Aristida contorta, Eragrostis eriopoda, Solanum lasiophyllum* and *Enchylaena tomentosa* var*. tomentosa.*

Figure 8: Mulga woodland over sandy plains within the survey area

3.2.2.5 *Tecticornia* shrubland

This vegetation group consisted of 2 Families, 2 Genera and 2 Species. The vegetation group was approximately 0.61 ha which makes up 0.41% of the survey area.

Dominant species were *Tectocornia disarticulata* and *Frankenia pauciflora.*

Figure 9: *Tecticornia* shrubland within the survey area

3.2.2.6 Existing Disturbance

Existing disturbance consisted of historic clearing for mining purposes including a power station, haul road, powerline corridor and access tracks. Disturbace was approximately 7.2 ha which makes up 4.8% of the survey area.

3.2.3 Weeds

One Weed species was recorded in the survey area, *Cenchrus ciliaris* (Buffel-grass). This species was located at three locations within the survey area. Details are included in Table 4 below.

Table 4: Non-native weed species recorded in the survey area

Species	Approximate Number	GDA94 51 Easting (m)	GDA94 51 Northing (m)
Cenchrus ciliaris	50	437196	6809114
Cenchrus ciliaris	50	437423	6808226
Cenchrus ciliaris	50	437512	6808145

3.2.4 Vegetation Condition

Overall, the condition of the vegetation was determined to be “Good” to “Very Good”. No areas of vegetation were assessed to be in “Pristine” condition.

A map of the vegetation condition is included in Appendix 4.

4. DISCUSSION

A total of 20 Families, 37 Genera and 66 Species were recorded within the survey area. Five major vegetation groups were recorded in the survey area

The field assessment established that the condition of the vegetation in the proposed disturbance area is overall “Good” to “Very Good”. No areas of vegetation were assessed to be in “Pristine” condition.

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

One weed species, *Cenchrus ciliaris* (Buffel-grass) was recored at three locations within the survey area.

Any proposed disturbance/clearing of vegetation will result in a loss of species from the survey area. However, given the size of the area and the extent of the Beard (1990) vegetation associations 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 and vegetation survey:

- Where possible, clearing be aligned to existing roads, tracks and other barriers or follow the boundaries of broad-scale intact native vegetation; and
- Weed control measures to be implemented during and following clearing

5. REFERENCES

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6. GLOSSARY

Acronyms:

BOM	Bureau of Meteorology, Australian Government
BSc	Bachelor of Science
CALM	Department of Conservation and Land Management (now DBCA)
CPS	Clearing Permit System (DWER)
DBCA	Department of Biodiversity, Conservation and Attractions, Western Australia
DMIRS	Department of Mines, Industry Regulation and Safety, Western Australia
DOTEE	Department of the Environment and Energy, Australian Government
DPAW	Department of Parks and Wildlife, Western Australia (now DBCA)
DPIRD	Department of Primary Industries and Regional Development, Western Australia
DRF	Declared Rare Flora
DWER	Department of Water and Environmental Regulation, Western Australia
EPA	Environmental Protection Authority, Western Australia
EP Act	*Environmental Protection Act 1986*, Western Australia
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth Act)
ESA	Environmentally Sensitive Area
GIS	Geographical Information System
ha	Hectare (10,000 square metres)
IBRA	Interim Biogeographic Regionalisation for Australia, DOTEE
IUCN	International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union
km	Kilometres
m	Metres
MUR	Murchison Bioregion, IBRA
MUR01	Eastern Murchison Subregion, IBRA
NVS	Native Vegetation Solutions
PEC	Priority Ecological Community, Western Australia
Ramsar	A wetland site designated of international importance under the Ramsar Convention (UNESCO)
TEC	Threatened Ecological Community
UNESCO	United Nations Educational, Scientific and Cultural Organization
WA	Western Australia
WAHERB	Western Australian Herbarium, DBCA

Definitions:

{DPAW (2017) Conservation Codes for Western Australian Flora and Fauna. Department of Parks and Wildlife, Western Australia, May 2017}: -

T Threatened species:
Published as Specially Protected under the *Wildlife Conservation Act 1950,* listed under Schedules 1 to 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora (which may also be referred to as Declared Rare Flora).

Threatened fauna is that subset of 'Specially Protected Fauna' declared to be 'likely to become extinct' pursuant to section 14(4) of the Wildlife Conservation Act.

Threatened flora is flora that has been declared to be 'likely to become extinct or is rare, or otherwise in need of special protection', pursuant to section 23F(2) of the Wildlife Conservation Act. 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. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

EN Endangered species
Threatened species considered to be facing a very high risk of extinction in the wild. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

VU Vulnerable species

Threatened species considered to be facing a high risk of extinction in the wild. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

EX Presumed extinct species
Species which have been adequately searched for and there is no reasonable doubt that the last individual has died. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora.

IA Migratory birds protected under an international agreement
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 the Bonn Convention, relating to the protection of migratory birds. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice.

CD Conservation dependent fauna
Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice.

OS Other specially protected fauna
Fauna otherwise in need of special protection to ensure their conservation. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice.

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 flora or fauna. 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 One - 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 Two - 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 Three - 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 Four - Rare, Near Threatened and other species in need of monitoring:
(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands.
(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for Vulnerable, but are not listed as Conservation Dependent.
(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Appendix 1

Relevant Government Database Search Results

Australian Government
Department of the Environment and Energy

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.

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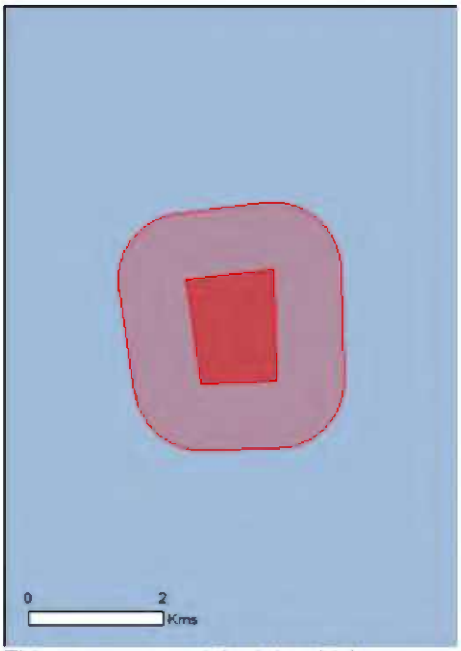

This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
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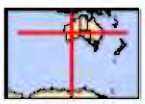


Summary

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:	2
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:	10
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Leipoa ocellata		
Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Polytelis alexandrae		
Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
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 may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Extra Information

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water 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
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
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Carrichtera annua Ward's Weed [9511]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area

Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-28.841377 122.347185,-28.840148 122.359047,-28.853153 122.35949,-28.853422 122.349387,-28.841377 122.347185

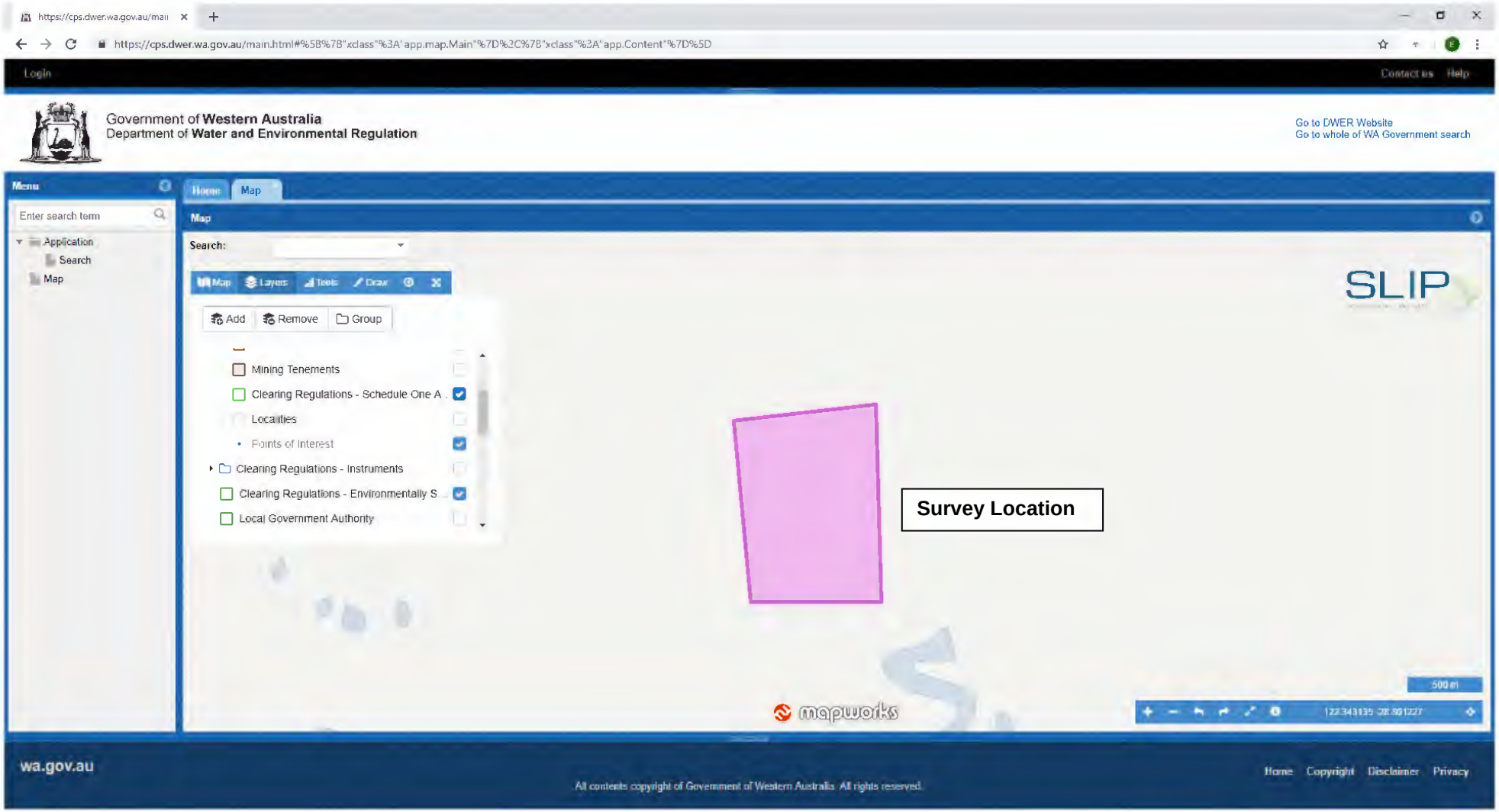
Acknowledgements

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

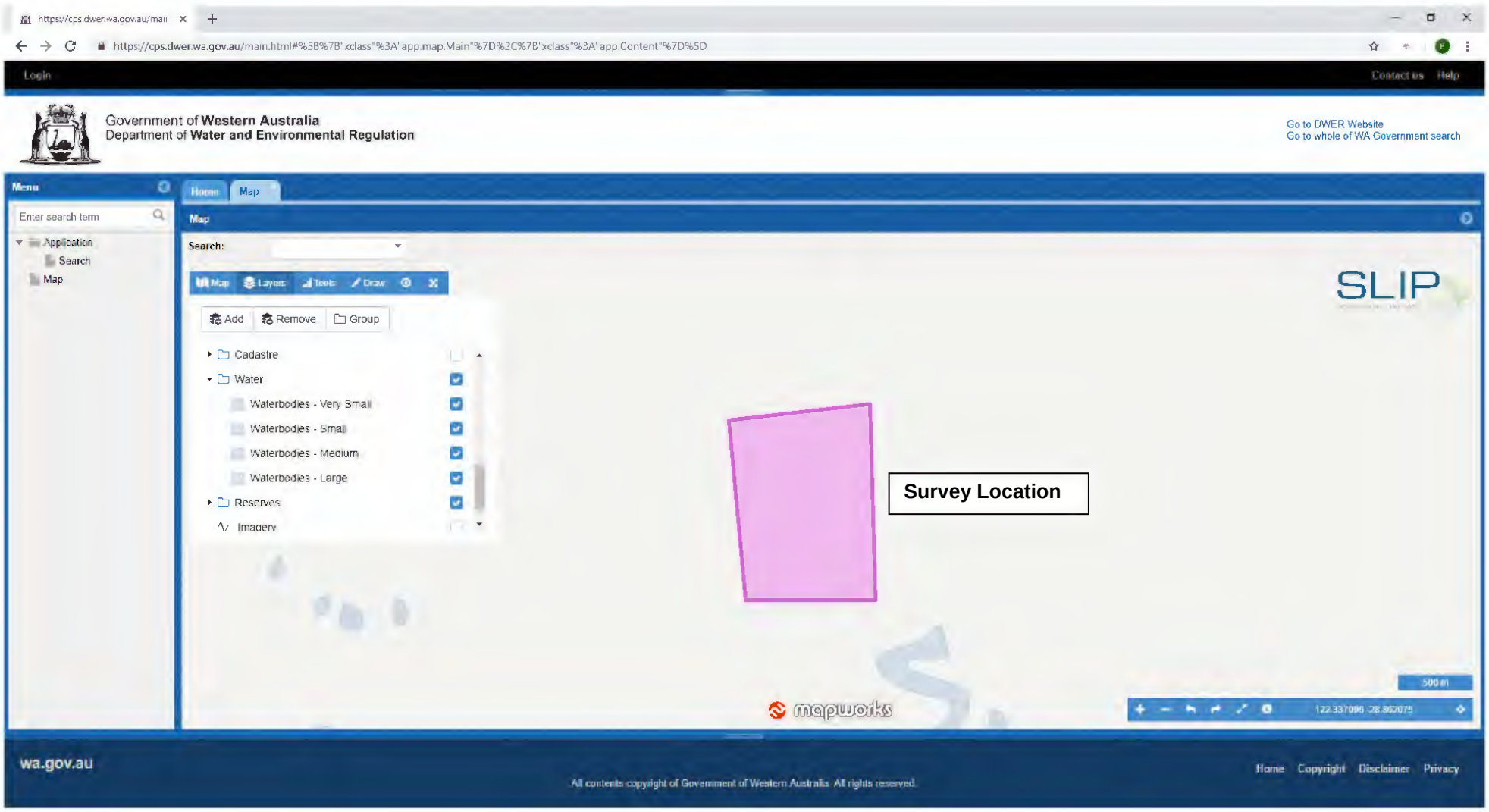
-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, 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.



DWER's Clearing Permit System Map Viewer showing no ESA's (dark green shaded areas) within the survey area (DWER, 2018)



DWER Clearing Permit System Map Viewer showing no wetland areas within the survey area (DWER, 2018).

Appendix 2

Threatened Flora Databases Search Results

Taxon	Status	Distribution	Flowering Period
Acacia eremophila numerous-nerved variant (A.S. George 11924)	3	Norseman, Neale Junction, Great Victoria Desert, Balladonia, Plumridge Lakes	Sep,Jul
Acacia websteri	1		
Angianthus prostratus	3	Glenorn Stn, Baladjie Lake NR, Quairading, Lake Barlee, Bulga Downs Stn, Kalgoorlie	Jul-Sept
Beyeria lapidicola	1	Bulga Downs, Weld Range, Lake Way Stn.	Jul
Bossiaea eremaea	3	Merolia Stn, Sandstone, White Cliffs Stn	Jul-Sep
Caesia talingka	2	Plumridge Lakes N.R.	
Calytrix hislopii	3	Black Range Stn., Lake Mason Stn., White Cliffs Stn.	Sep
Calytrix praecipua	3	Melita Station, Laverton, Youno Downs, Wanjarri, Marymia, Erong Hmstd, Niagara Dam	Jun-Nov
Cratystylis centralis	3	Barwidgee Stn, Leonora	Aug-Nov
Dicrastylis cundeeleensis	4	Cundeelee, Plumridge Lakes, Rawlinna	Apr, Oct-Dec
Eremophila annosocaulis	3	Mt Morgans Mine (South of Leonora-Laverton Rd), Von Treuer Tableland	
Eremophila arachnoides subsp. tenera	1	Kambalda, Laverton	Sep,Dec
Eremophila dendritica	2	Rawlinna, Plumridge Lakes	Sep-Oct
Eremophila eversa	1	Yerilla	Oct
Eremophila mirabilis	2	Niagara, Morapoi, Kookynie, Woolgorong, Menzies	Aug-Sep
Eremophila simulans subsp. megacalyx	3	Mt Narryer, Boolardy Stn, Leonora	Aug-Sep
Goodenia lyrata	3	Laverton, Newman	
Gunniopsis propinqua	3	Laverton, Mt Margaret, Lake Carnegie, Windidda, Mt Eureka, Mt James, Menzies	Aug-Sep
Hemigenia exilis	4	Lake Darlot, Yakabindie, Leinster, Leonora, Mt Keith	Apr,May,Aug
Homalocalyx echinulatus	3	Carnegie Stn, Wiluna, Doolgunna Stn, Weld Range, Mount Hale, Windidda, Wongawal Stn	Dec
Hybanthus floribundus subsp. chloroxanthus	3	Leonora, Laverton	Aug-Oct
Lechenaultia aphylla	1	Cosmo Newbey - Laverton, SA	
Lechenaultia divaricata	1	Plumridge Lakes	Oct
Micromyrtus placoides	3	Cue, Weld Range, Mt Narryer, Tallering Peak	Aug,Sep
Micromyrtus serrulata	3	Karonie, Coonana, Melita, Jeedamya, Niagara Dam NR, Cardunia Rocks, Queen Victoria Spring NR	Mar,Jun,Nov
Mirbelia stipitata	3	Nth Sandstone, Nth Laverton	-
Olearia arida	4	Neale Junction, Plumridge Lakes, Great Victoria Desert	Jul
Olearia mucronata	3		
Persoonia leucopogon	1	Between Coolgardie & Laverton, Comet Vale (Menzies)	-
Philotheca linearis	1	White Cliffs Stn, Central Australia	Jul
Philotheca tubiflora	1	E of Laverton	Jun,Aug,Oct
Phyllanthus baeckeoides	3	Laverton, Merolia Stn, White Cliffs Stn, Windimurra Station, Cashmere Downs Stn, Leinster, Banjawarn Stn	Jul-Sep
Prostanthera petrophila	3	Cue, Mt Barloweerie, Woolgorong, Weld Range,	Jul-Aug
Ptilotus blackii	3	Plumridge Lakes N.R., Zanthus, Queen Victoria Springs N.R., S.A. N.T.	May-Sep
Ptilotus tetrandrus	1	Glenorn Station, Little Sandy Desert	Oct
Tecticornia cymbiformis	3		
Tecticornia mellaria	1		
Tecticornia sp. Lake Way (P. Armstrong 05/961)	1		
Thryptomene nealensis	3	Leinster, White Cliffs Stn, Neale Junction, Gt Victoria Desert	Oct
Thryptomene wittweri	T	Hamersley Range, Mt Augustus, Carnarvon Range, White Cliffs Stn, NT	Aug-Oct
Vittadinia cervicularis var. oldfieldii	1	Merredin, Laverton	
Vittadinia pustulata	3	Plumridge Lakes N.R., Morgan Range	

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.

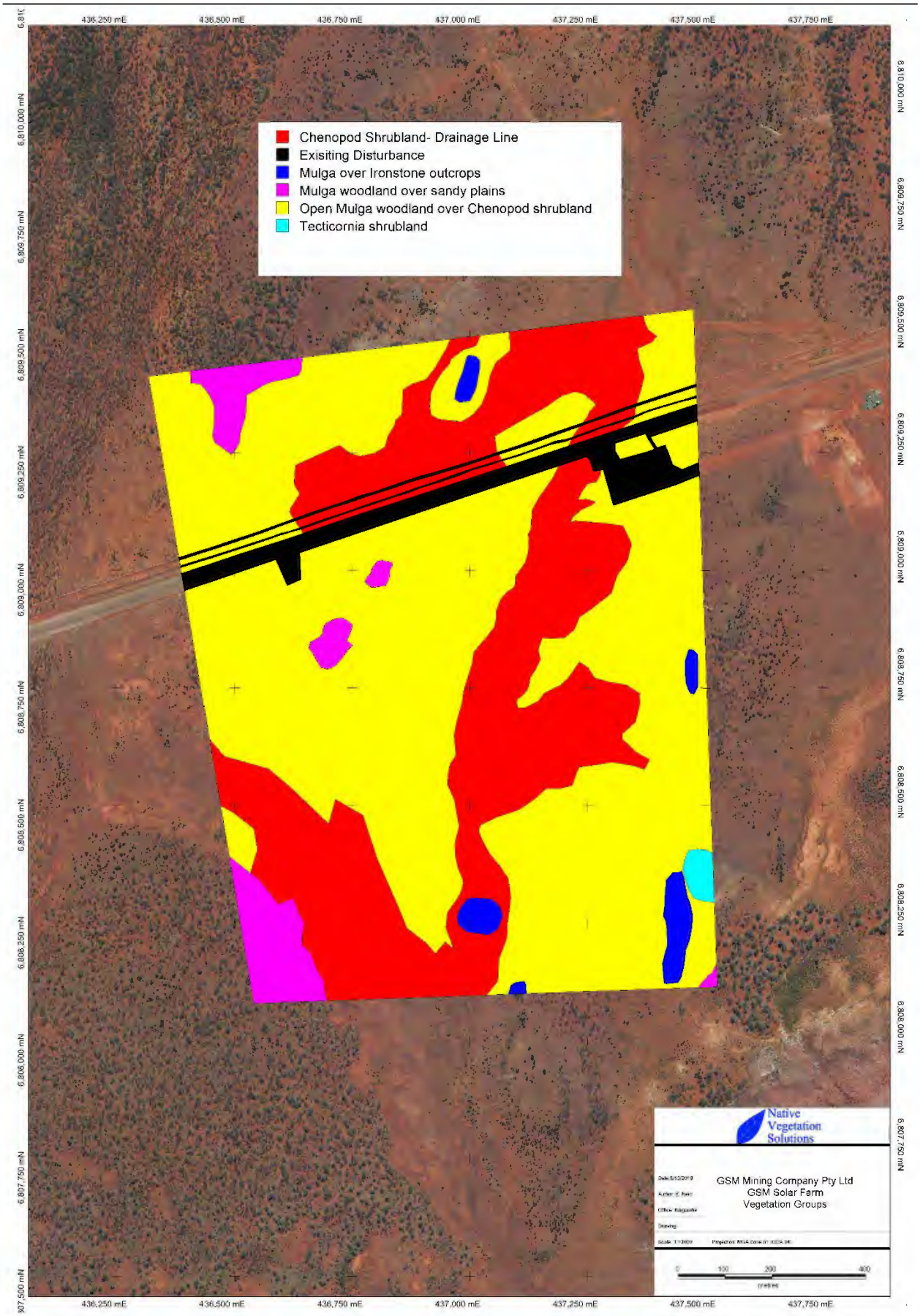
Degraded (5). Basic vegetation structure severely impacted by disturbance.
Scope for regeneration but not to a state approaching good condition without intensive management.
For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial 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 comprising weed or crop species with isolated trees or shrubs.

Appendix 4

Vegetation Mapping


436,250 mE
436,500 mE
436,750 mE
437,000 mE
437,250 mE
437,500 mE
437,750 mE
6,810,000 mN
6,809,750 mN
6,809,500 mN
6,809,250 mN
6,809,000 mN
6,808,750 mN
6,808,500 mN
6,808,250 mN
6,808,000 mN
6,807,750 mN
Native Vegetation Solutions
GSM Mining Company Pty Ltd
GSM Solar Farm
Survey Area


436,250 mE
436,500 mE
436,750 mE
437,000 mE
437,250 mE
437,500 mE
437,750 mE
6,810,000 mN
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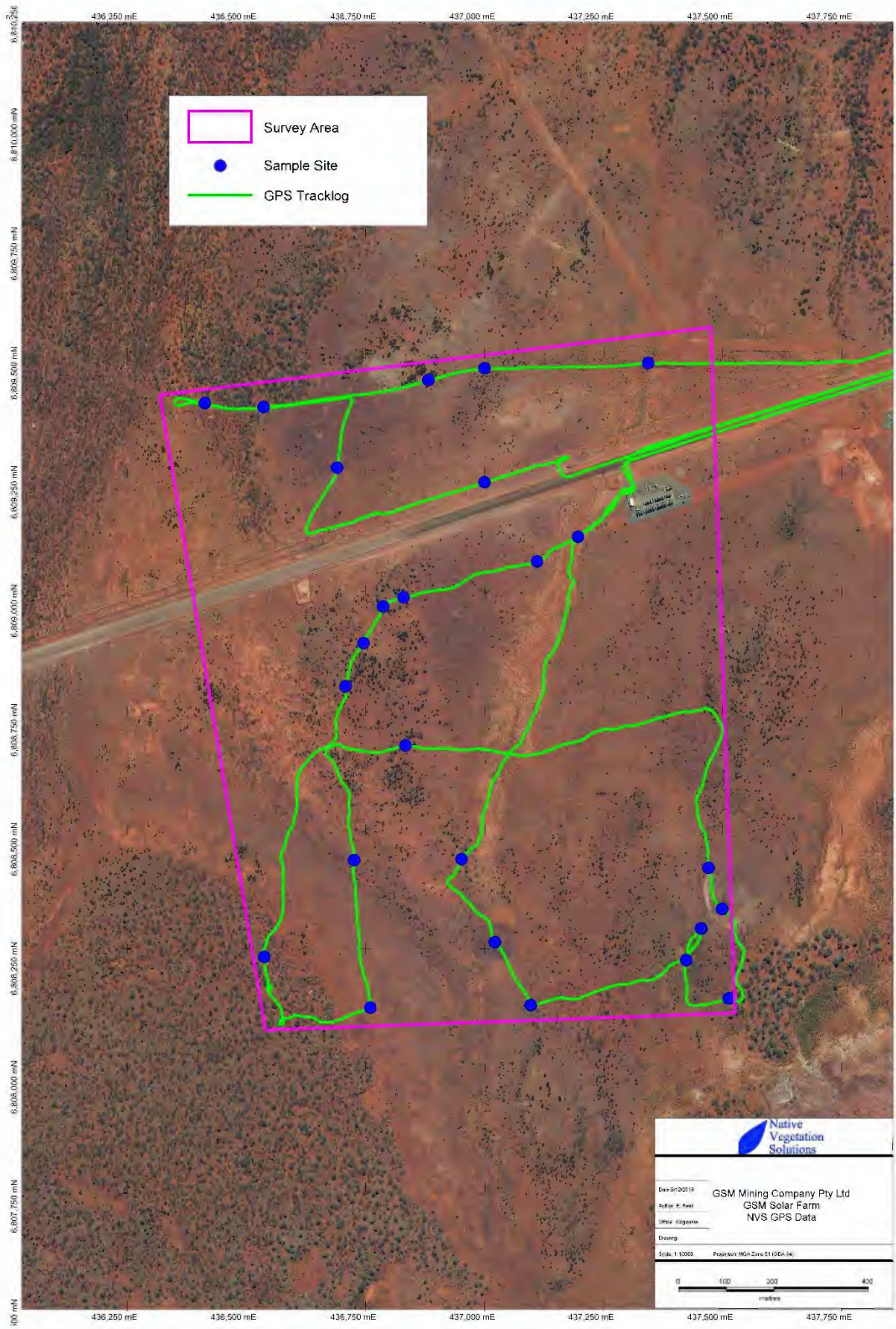
6,809,500 mN
6,809,250 mN
6,809,000 mN
6,808,750 mN
6,808,500 mN
6,808,250 mN
6,808,000 mN
6,807,750 mN
Chenopod Shrubland- Drainage Line
Exisiting Disturbance
Mulga over Ironstone outcrops
Mulga woodland over sandy plains
Open Mulga woodland over Chenopod shrubland
Tecticornia shrubland
Native Vegetation Solutions
GSM Mining Company Pty Ltd
GSM Solar Farm
Vegetation Groups
0
100
200
400
metres


Completely Degraded
Good
Very Good
436,250 mE
436,500 mE
436,750 mE
437,000 mE
437,250 mE
437,500 mE
437,750 mE
6,810,000 mN
6,809,750 mN
6,809,500 mN
6,809,250 mN
6,809,000 mN
6,808,750 mN
6,808,500 mN
6,808,250 mN
6,808,000 mN
6,807,750 mN
Native Vegetation Solutions
GSM Mining Company Pty Ltd
GSM Solar Farm
Vegetation Condition
0
100
200
400
metres


Survey Area
Sample Site
GPS Tracklog
436,250 mE
436,500 mE
436,750 mE
437,000 mE
437,250 mE
437,500 mE
437,750 mE
6,810,000 mN
6,809,750 mN
6,809,500 mN
6,809,250 mN
6,809,000 mN
6,808,750 mN
6,808,500 mN
6,808,250 mN
6,808,000 mN
6,807,750 mN
Native Vegetation Solutions
GSM Mining Company Pty Ltd
GSM Solar Farm
NVS GPS Data

Appendix 5

Species List

Family	Genus	Species	A, P or NN	Chenopod Shrubland- Drainage Line	Open Mulga woodland over Chenopod shrubland	Mulga over Ironstone outcrops	Mulga woodland over sandy plains	*Tecticornia* shrubland
Aizoaceae	*Gunniopsis*	*quadrifida*	P				*	
Amaranthaceae	*Ptilotus*	*obovatus*	P		*	*	*	
Amaranthaceae	*Ptilotus*	*schwartzii*	P		*	*		
Apocynaceae	*Marsdenia*	*australis*	P		*	*		
Campanulaceae	*Isotoma*	*petraea*	A			*		
Casuarinaceae	*Casuarina*	*pauper*	P			*		
Chenopodiaceae	*Atriplex*	*bunburyana*	P	*	*	*	*	
Chenopodiaceae	*Atriplex*	*codonocarpa*	A	*				
Chenopodiaceae	*Atriplex*	*stipitata*	P	*				
Chenopodiaceae	*Atriplex*	*vesicaria*	P	*				
Chenopodiaceae	*Cratystylis*	*subspinescens*	P	*	*	*		
Chenopodiaceae	*Enchylaena*	*tomentosa* var. *tomentosa*	P	*			*	
Chenopodiaceae	*Maireana*	*brevifolia*	P	*				
Chenopodiaceae	*Maireana*	*georgei*	P	*	*	*		
Chenopodiaceae	*Maireana*	*glomerifolia*	P	*		*		
Chenopodiaceae	*Maireana*	*pyramidata*	P	*	*	*	*	
Chenopodiaceae	*Maireana*	*tomentosa*	P	*		*		
Chenopodiaceae	*Maireana*	*triptera*	P	*	*	*	*	
Chenopodiaceae	*Rhagodia*	*drummondii*	P			*	*	
Chenopodiaceae	*Tecticornia*	*disarticulata*	P					*
Fabaceae	*Acacia*	*aneura*	P		*	*		
Fabaceae	*Acacia*	*ayersiana*	P			*	*	
Fabaceae	*Acacia*	*craspedocarpa*	P		*			
Fabaceae	*Acacia*	*masliniana*	P	*	*	*		
Fabaceae	*Acacia*	*mulganeura*	P		*	*		
Fabaceae	*Acacia*	*pteraneura*	P	*	*	*	*	
Fabaceae	*Acacia*	*tetragonophylla*	P	*		*		
Fabaceae	*Senna*	*artemisioides* subsp. *artemisioides*	P	*				
Fabaceae	*Senna*	*artemisioides* subsp. *filifolia*	P	*			*	
Fabaceae	*Senna*	*artemisioides* subsp. *helmsii*	P			*		
Fabaceae	*Senna*	*glutinosa* subsp. *chatelainiana*	P	*				
Frankeniaceae	*Frankenia*	*interioris*	P			*		
Frankeniaceae	*Frankenia*	*pauciflora*	P	*		*		*
Goodeniaceae	*Scaevola*	*spinescens*	P			*		
Lamiaceae	*Teucrium*	*teucriiflorum*	P			*		
Malvaceae	*Lawrencia*	*squamata*	P	*		*		
Malvaceae	*Sida*	*calyxhymenia*	P	*	*			
Malvaceae	*Sida*	*sp.* dark green fruits	P	*		*		
Malvaceae	*Sida*	*sp.* Golden calyces glabrous	P			*		
Poaceae	*Aristida*	*contorta*	A	*			*	
Poaceae	*Austrostipa*	*elegantissima*	P	*	*			
Poaceae	*Cenchrus*	*ciliaris*	P, NN	*		*	*	
Poaceae	*Cymbopogon*	*obtectus*	P				*	
Poaceae	*Enteropogon*	*ramosus*	P	*	*	*		

Family	Genus	Species	A, P or NN	Chenopod Shrubland- Drainage Line	Open Mulga woodland over Chenopod shrubland	Mulga over Ironstone outcrops	Mulga woodland over sandy plains	*Tecticornia* shrubland
Poaceae	*Eragrostis*	*eriopoda*	P				*	
Poaceae	*Eriachne*	*pulchella* subsp. *pulchella*	A	*				
Poaceae	*Monachather*	*paradoxus*	P			*		
Proteaceae	*Grevillea*	*berryana*	P				*	
Proteaceae	*Hakea*	*preissii*	P	*	*	*		
Pteridaceae	*Cheilanthes*	*sieberi* subsp. *sieberi*	P			*		
Rubiaceae	*Psydrax*	*rigidula*	P			*	*	
Rutaceae	*Philotheca*	*brucei* subsp. *brucei*	P			*		
Santalaceae	*Exocarpos*	*aphyllus*	P			*	*	
Santalaceae	*Santalum*	*lanceolatum*	P			*		
Sapindaceae	*Dodonaea*	*viscosa* subsp. *angustissima*	P			*		
Scrophulariaceae	*Eremophila*	*decipiens* subsp. *decipiens*	P	*				
Scrophulariaceae	*Eremophila*	*forrestii* subsp. *forrestii*	P				*	
Scrophulariaceae	*Eremophila*	*glabra* subsp. *glabra*	P	*	*		*	
Scrophulariaceae	*Eremophila*	*latrobei* subsp. *latrobei*	P	*		*		
Scrophulariaceae	*Eremophila*	*metallicorum*	P	*		*		
Scrophulariaceae	*Eremophila*	*oppositifolia* subsp. *angustifolia*	P			*		
Scrophulariaceae	*Eremophila*	*scoparia*	P	*				
Solanaceae	*Duboisia*	*hopwoodii*	P				*	
Solanaceae	*Solanum*	*ferocissimum*	P			*	*	
Solanaceae	*Solanum*	*lasiophyllum*	P	*		*	*	
Solanaceae	*Solanum*	*nummularium*	P				*	

Note:
A= Annual
P= Perennial
NN= Non Native