Native Vegetation Solutions

Reconnaissance Flora and Vegetation Survey of Lot 350 Great Eastern Highway Kalgoorlie- September 2019

Prepared for

City of KALGOORLIE-BOULDER

City of Kalgoorlie-Boulder

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1 INTRODUCTION

The City of Kalgoorlie-Boulder is proposing to redevelop a parcel of land (Lot 350 Great Eastern Highway or the 'project area') into an industrial estate.

Native Vegetation Solutions was commissioned by the City of Kalgoorlie-Boulder (CKB) to undertake a Reconnaissance Flora and Vegetation survey of the project area.

The project area is approximately 2.5km south-west of the outskirts of Kalgoorlie and on the southern side of the Great Eastern Highway (Figure 1). The project area is regular in shape, flat in topography, and comprises approximately 213.6 ha (Figure2).

CKB commissioned Native Vegetation Solutions (NVS) to complete a reconnaissance Flora and Vegetation survey on 12th September 2019.

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

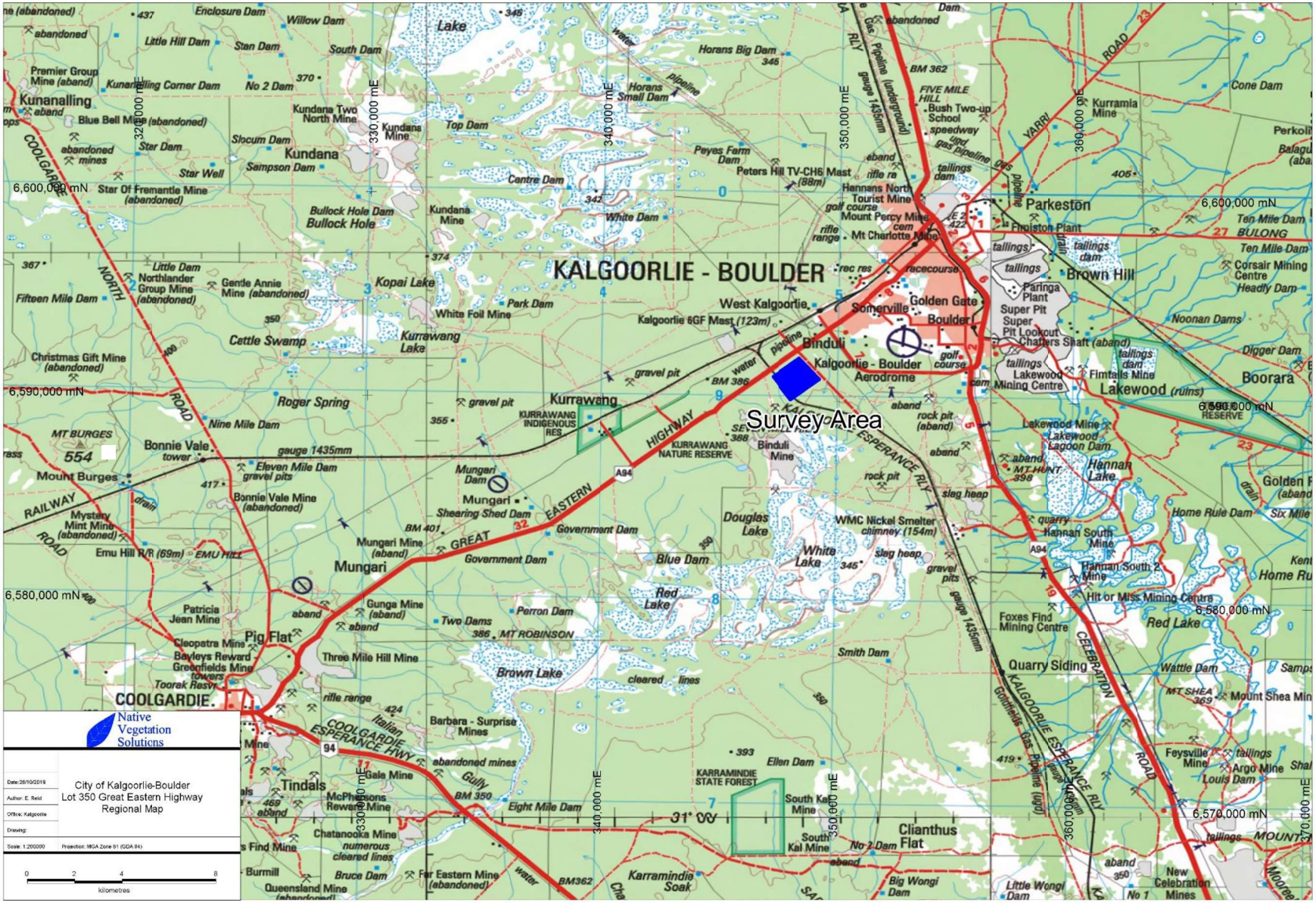

Figure 1: Regional Map of Project Area

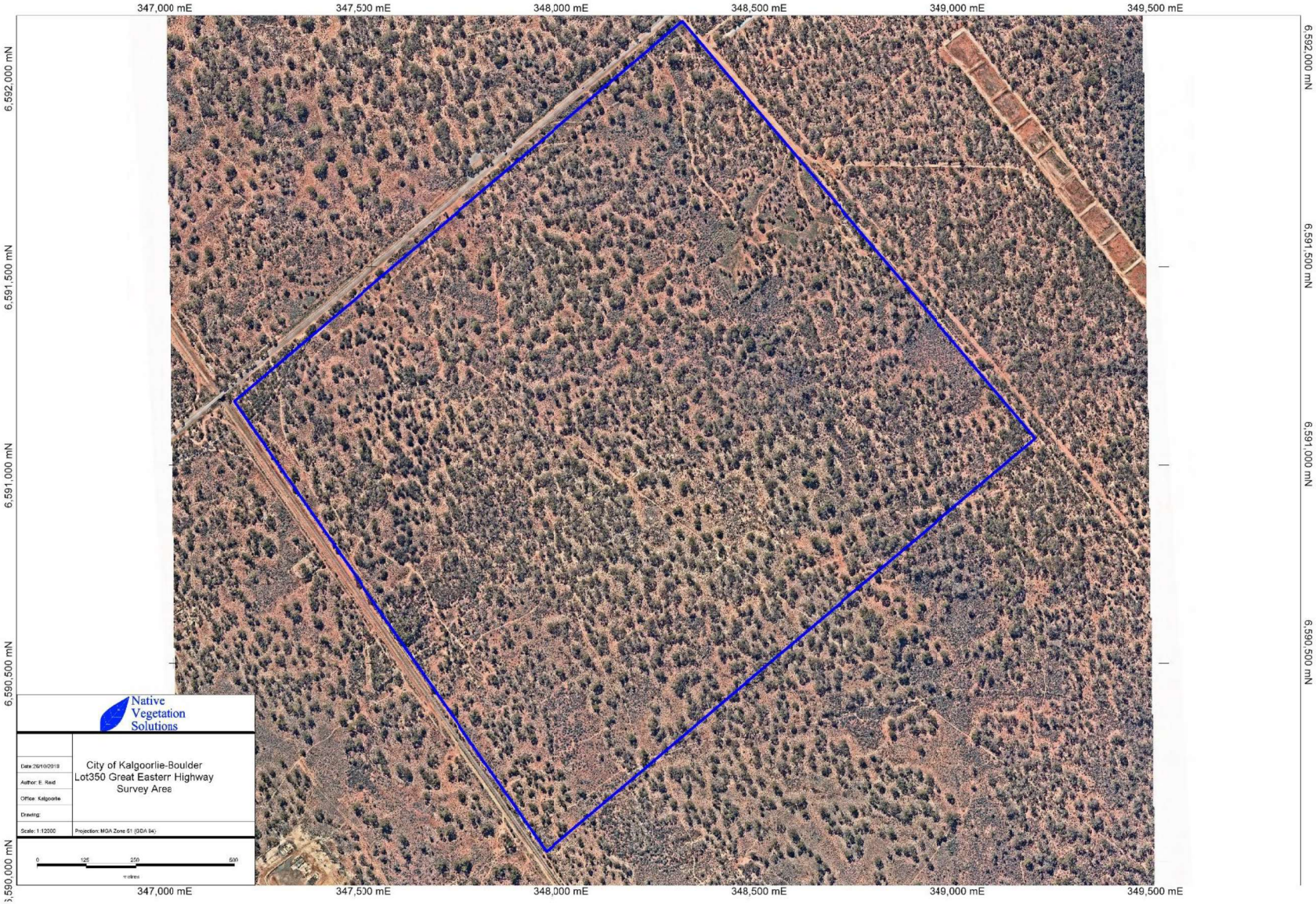

Figure 2: Lot 350 Survey Area

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 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:

- 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 Vegetation

According to the Interim Biogeographic Regionalisation of Australia (IBRA), 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 comprises vegetation dominated by Mallees, *Acacia* thickets and shrubheaths on sandplains, diverse *Eucalyptus* woodlands around salt lakes, on ranges, and in valleys, while salt lakes support dwarf shrublands of samphire. Woodlands and *Dodonaea* shrubland occur on basic graninulites of the Fraser Range. The subregion is rich in endemic Acacias (CALM, 2002).

1.3 Climate

The subregion 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 station to the survey area is located at Kalgoorlie-Boulder Airport, approximately 4.2 km east of the survey area. Recordings of the local climatic conditions commenced at Kalgoorlie-Boulder in 1939 (BOM, 2019) and data collected at this station 012038 was used for this report.

1.3.1 Temperature

Mean annual minimum temperature is 11.7°C and mean annual maximum temperature is 25.3°C. The coldest month is July (mean minimum temperature 5.1°C), the hottest is January (mean maximum temperature 33.7°C) and diurnal temperature variations are relatively consistent throughout the year (Figure 3).

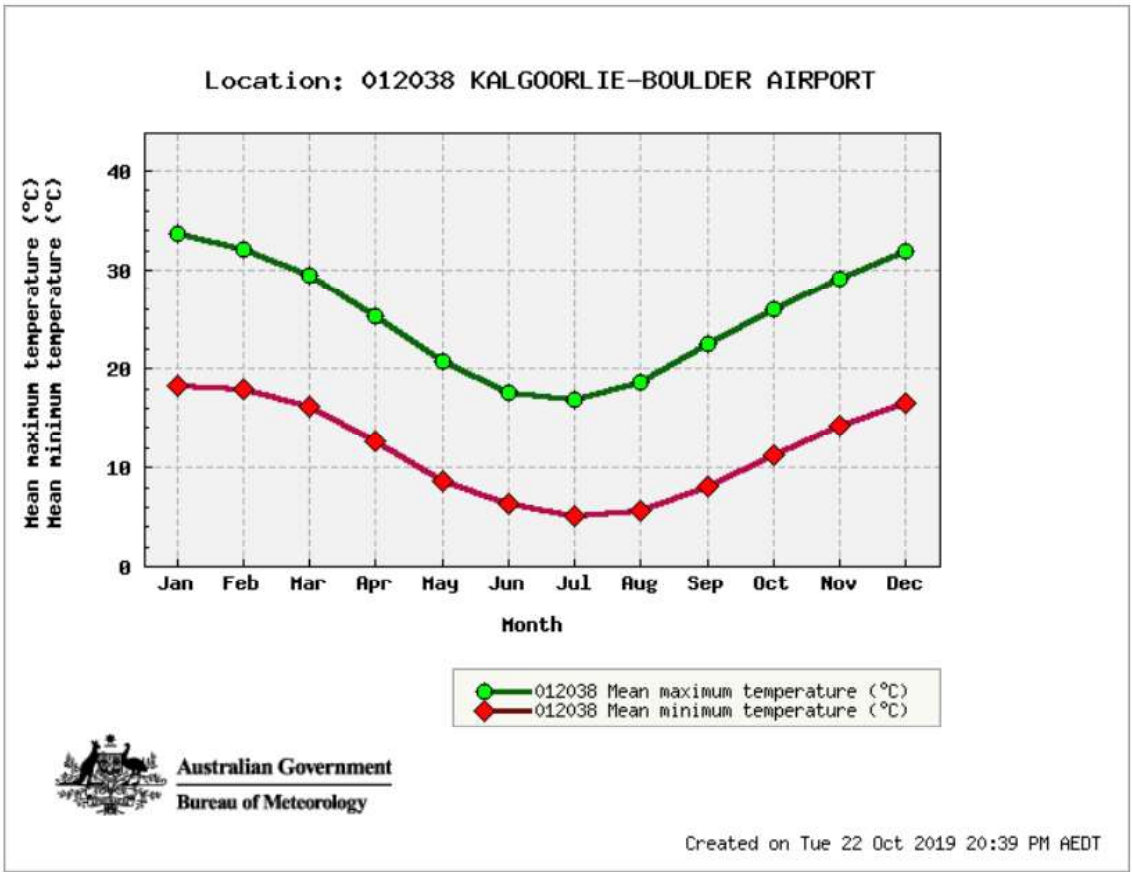

Figure 3: Mean Temperature ranges for the Kalgoorlie-Boulder Airport weather station

1.3.2 Rainfall

The area is arid and the annual average rainfall at Kalgoorlie-Boulder is 267.7 mm, which falls (>1 mm) on an average of 39.9 rain-days. Most of the rain usually falls between January and July and this amount varies greatly both seasonally and annually (Figure 4). Rainfall for April and June 2019 exceeded monthly averages, whilst August received average rainfall prior to the survey period (BOM, 2019).

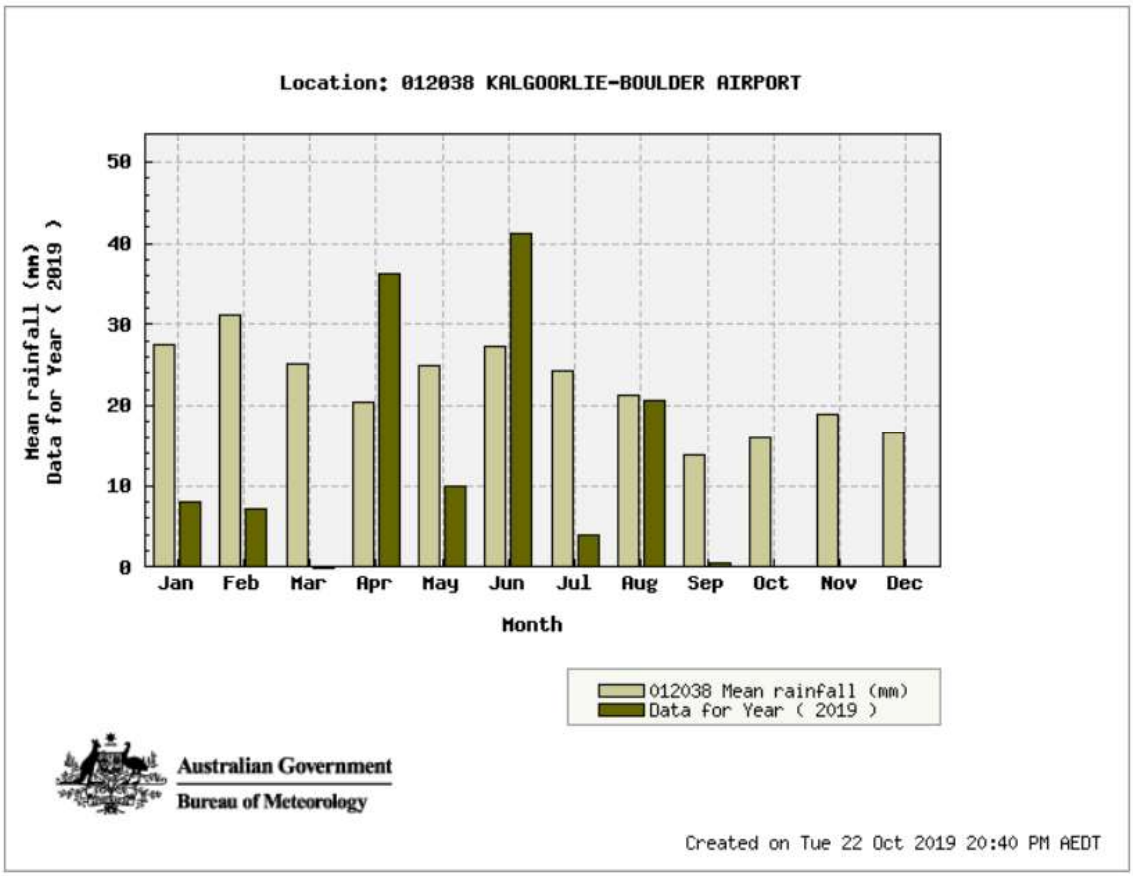

Figure 4: Monthly and mean rainfall for the Kalgoorlie-Boulder Airport weather station

2. ASSESSMENT METHODOLOGY

2.1 Personnel and Reporting

The following personnel were involved in the Lot 350 reconnaissance flora and vegetation survey:

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

2.2 Previous Surveys

In June 2018, NVS was commissioned by CKB to conduct a Reconnaissance Flora and Vegetation survey of Lot 500 Great Eastern Highway (NVS, 2018). Lot 500 lies directly and adjacent north of Lot 350. The results of the Lot 500 flora and vegetation survey revealed a total of 21 Families, 38 Genera and 77 Species within six major vegetation groups.

No flora located in the survey area, were recognised 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 species were recorded in the survey area.

2.3 Preliminary Desktop Study

A preliminary assessment of the survey area and its potential constraints was undertaken by reviewing relevant government agency managed databases (Sections 2.3.1 to 2.3.6, and Appendices 1 & 2) and consulting with government agencies where necessary. The following sections provide a summary of desktop searches undertaken for the Lot 350 project area.

2.3.1 *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 GPS Coordinates GDA94 51J 348100mE 6591096mN with a 2km buffer (DOTEE, 2019).
(http://www.environment.gov.au/arcgis-framework/apps/pmst/pmst-coordinate.jsf)

2.3.2 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 30km buffer of the shapefile of the survey area (Reference: 18-0618FL). 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 30km buffer of the shapefile of the survey area (Reference: 16-0618EC).

2.3.3 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).

2.3.4 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, 2019) was also referenced for the current extent of Beard's Vegetation Groups.

2.3.5 Wetlands

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

2.3.6 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.

2.4 Site Investigation

A site visit was carried out by Botanist Eren Reid from Native Vegetation Solutions on the 12th of September 2019 to examine the flora and vegetation groups contained within the survey area.

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 IBRA region, a reconnaissance flora and vegetation survey was deemed adequate.

2.4.1 Licenses

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

2.4.2 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.

2.4.3 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® worksheets representing presence/absence of species per vegetation group.

2.4.4 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 also 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.

2.5 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, Murchison, Pilbara and South-west regions of WA.
Proportion of flora identified during survey	N	The survey was planned to target species of conservation significance as well as document species present. 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 Spring 2019. Above Average rainfall in April and June 2019, as well as average rainfall in August allowed the emergence of ephemeral species, with many other species in flower.
Disturbance in survey area	N	Disturbance was present with some minor access tracks present, as well as clearing associated with exploration in certain areas.
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 Bioregion area 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 survey area could possibly be suitable habitat for Threatened species *Gastrolobium graniticum* (Granite Poison) (DOTEE, 2019), however this species is restricted to granite outcrops, and no such outcrops occur in the survey area. Therefore, it is unlikely that this species occurs in the survey area.

The EPBC Protected Matters search tool revealed that the survey area could possibly be suitable habitat for weed species *Carrichtera annua* (Ward's Weed) and *Lycium ferocissimum* (African Boxthorn) (DOTEE, 2019). These species were not recorded in the survey area.

The EPBC Protected Matters report indicated no TECs or Commonwealth Reserves within a 2km buffer region of survey area (DOTEE, 2019). However, it did recognise the Goldfields Water Supply Scheme nearby.

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 a potential for One Threatened and 38 Priority Flora species to occur within a 30km radius of the survey area (DBCA, 2018b).

No known locations of Priority Flora occur within the survey area. The closest location of Priority Flora occurs 1.24km northeast of the survey area.

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

The PEC/TEC search (DBCA, 2018a) revealed that the survey area does not contain any TEC/PECs or lie within any nearby TEC/PEC buffer regions.

3.1.3 Environmentally Sensitive Areas and Conservation Reserves

No ESAs are located within the survey area (DWER, 2019).

No Conservation Reserves were identified within the survey area (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. This 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 9 within the survey area

Factor	Value				
Beard Vegetation Association*	9				
Vegetation Association Description*	Medium woodland; coral gum (*E. torquata*) & Goldfields blackbutt (*E. lesouefii*) (also some e10,11)				
Pre-European Extent (ha)	**Scale**				
	***By Association** (WA)*	***By Association** (WA)*	***By IBRA Region** (Coolgardie-COO)*	***By IBRA Sub-region** (Eastern Goldfields-COO03)*	***By Shire** (City of Kalgoorlie-Boulder)*
	244,735*	240,509**	240,441**	235,047**	38,706**
% Pre-European Extent Remaining	*100.00%**	*97.78%***	*97.78%***	*97.75%***	*96.17%***
Surrounding Land Use***	Mining, Exploration, Pastoral Lease				
Weed prevalence***	Low				

* Source: Shepherd *et al.* (2002) Appendix 2
**Source: DBCA, (2019)
*** 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, 2019).

3.1.6 Dieback

The survey area lies south of the 26th parallel however receives an average annual rainfall of 267.7mm, 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 species were recorded in the survey area.

3.2.2 Vegetation Type, Extent and Status

A total of 23 Families, 44 Genera and 89 Species were recorded within the Lot 350 survey area. Nine major vegetation groups were recorded in the survey area including a heavily disturbed area to the east of the survey area. A summary of the vegetation groups can be seen in Table 3 below.

Table 3: Lot 350 Vegetation Group Summary

Vegetation Group	Family	Genus	Species	Hectares (ha)	Percentage of Survey Area (%)
Chenopod Shrubland	12	18	26	9.68	4.53%
Eucalyptus ravida woodland	9	11	13	8.864	4.15%
Sclerophyll shrubland	10	12	18	17.604	8.24%
Eucalyptus griffithsii woodland	7	9	10	2.521	1.18%
Eucalyptus yilgarnensis over sclerophyll shrubland	14	20	25	5.367	2.51%
Eucalyptus oleosa and *Eucalyptus lesouefii* over *Maireana sedifolia* and mixed shrubland	12	19	36	1.77	0.83%
Transitional *Eucalyptus* woodland over sclerophyll shrubland	16	28	56	82.843	38.78%
Eucalyptus salmonophloia and *Eucalyptus transcontinentalis* open woodland	14	24	42	78.286	36.65%
Existing Disturbance	14	17	19	6.668	3.12%
Total	**23***	**44***	**89***	**213.60#**	**100.00%#**

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

Most vegetation groups are in “Very Good” condition; with some areas “Good” (using the scale of Keighery 1994, see Appendix 3). One area on the eastern side of the survey area was quite disturbed and is in “Degraded” condition. Maps of the survey area can be seen in Appendix 4.

The Lot 350 vegetation groups are described in more detail in the sections below.

3.2.2.1 Chenopod Shrubland

This vegetation group (Figure 5) consisted of 12 Families, 18 Genera and 26 Species. The vegetation group was approximately 9.68 ha which makes up 4.53% of the survey area.

Dominant species were *Maireana sedifolia, Maireana triptera, Tecticornia disarticulata* with some emergent *Eucalyptus oleosa* subsp. *oleosa* and *Eucalyptus salubris.*

Figure 5: Chenopod shrubland within the survey area

3.2.2.2 *Eucalyptus ravida* woodland

This vegetation group (Figure 6) consisted of 9 Families, 11 Genera and 13 Species. The vegetation group was approximately 8.86 ha which makes up 4.15% of the survey area.

Dominant species were *Eucalyptus ravida, Eremophila interstans* subsp. *virgata, Halgania andromedifolia, Eremophila scoparia, Maireana sedifolia* and *Eremophila glabra* subsp*. glabra.*

Figure 6: *Eucalyptus ravida* woodland within the survey area

3.2.2.3 Sclerophyll shrubland

This vegetation group (Figure 7) consisted of 10 Families, 12 Genera and 18 Species. The vegetation group was approximately 17.60 ha which makes up 8.24% of the survey area.

Dominant species were *Eremophila scoparia, Scaevola spinescens, Acacia hemiteles, Alyxia buxifolia, Olearia pimelioides* and *Casuarina pauper.*

Figure 7: Sclerophyll shrubland within the survey area

3.2.2.4 *Eucalyptus griffithsii* woodland

This vegetation group (Figure 8) consisted of 7 Families, 9 Genera and 10 Species. The vegetation group was approximately 2.52 ha which makes up 1.18% of the survey area.

Dominant species were *Eucalyptus griffithsii Eremophila caperata, Eremophila scoparia, Acacia hemiteles* and *Maireana sedifolia.*

Figure 8: *Eucalyptus griffithsii* woodland within the survey area

3.2.2.5 *Eucalyptus yilgarnensis* over sclerophyll shrubland

This vegetation group (Figure 9) consisted of 14 Families, 20 Genera and 25 Species. The vegetation group was approximately 5.37 ha which makes up 2.51% of the survey area.

Dominant species were *Eucalyptus yilgarnensis, Acacia hemiteles, Eremophila scoparia, Senna artemisioides* subsp. *filifolia, Maireana sedifolia, Olearia muelleri, and Casuarina pauper.*

Figure 9: *Eucalyptus yilgarnensis* over sclerophyll shrubland within the survey area

3.2.2.6 *Eucalyptus oleosa* and *Eucalyptus lesouefii* over *Maireana sedifolia* and mixed shrubland

This vegetation group (Figure 10) consisted of 12 Families, 19 Genera and 36 Species. The vegetation group was approximately 1.77 ha which makes up 0.83% of the survey area.

Dominant species were *Eucalyptus oleosa* subsp. *oleosa, Eucalyptus lesouefii, Maireana sedifolia, Eremophila scoparia, Scaevola spinescens, Olearia muelleri and Eragrostis setifolia.*

Figure 10: *Eucalyptus oleosa* and *Eucalyptus lesouefii* over *Maireana sedifolia* and mixed shrubland within the survey area

3.2.2.7 Transitional *Eucalyptus* woodland over sclerophyll shrubland

This vegetation group (Figure 11) consisted of 16 Families, 28 Genera and 56 Species. The vegetation group was approximately 82.84 ha which makes up 38.78% of the survey area.

Dominant species were numerous *Eucalyptus* species over a sclerophyll shrubland of *Melaleuca sheathiana*, *Eremophila scoparia, Olearia muelleri, Acacia hemiteles, Scaevola spinescens, Maireana triptera, Ptilotus obovatus* and *Exocarpos aphyllus.*

Figure 11: Transitional *Eucalyptus* woodland over sclerophyll shrubland within the survey area

3.2.2.8 *Eucalyptus salmonophloia* and *Eucalyptus transcontinentalis* open woodland

This vegetation group (Figure 12) consisted of 14 Families, 24 Genera and 42 Species. The vegetation group was approximately 78.29 ha which makes up 36.65% of the survey area.

Dominant species were *Eucalyptus salmonophloia, Eucalyptus transcontinentalis, Maireana sedifolia, Maireana triptera, Eremophila scoparia, Acacia hemiteles, Eremophila glabra* subsp. *glabra, Eremophila oldfieldii* subsp. *angustifolia* and *Scaevola spinescens.*

Figure 12: *Eucalyptus salmonophloia* and *Eucalyptus transcontinentalis* open woodland within the survey area

3.2.2.9 Existing Disturbance

This vegetation group (Figure 13) consisted of 14 Families, 17 Genera and 19 Species. The vegetation group was approximately 6.67 ha which makes up 3.12% of the survey area.

Dominant species were *Eucalyptus lesouefii, Eremophila caperata, Maireana brevifolia, Atriplex holocarpa, Sclerolaena densiflora*. Non-native species were mostly concentrated in this disturbed area.

Figure 13: Existing Disturbance within the survey area

3.2.3 Weeds

Four weed species were recorded in the survey area; *Carrichtera annua* (Ward's Weed), *Lysimachia arvensis* (Pimpernel), *Echium plantagineum* (Paterson's Curse) and *Salvia verbenaca* (Wild Sage).

Only *Echium plantagineum* is considered a Declared Pest s22(2) (exempt) in Western Australia (DPIRD, 2019). This species is subject to control requirements under the *Biosecurity and Agriculture Management Act 2007* and may also be regulated by other legislation such as the *Biodiversity Conservation Act 2016*.

3.2.4 Vegetation Condition

Evidence of rabbits was observed during the field assessment.

Overall, the condition of the vegetation was determined to be "Very Good" with some areas in "Good" condition. Most disturbances were in the form of historic exploration activities. A Map of the Vegetation Condition can be seen in Appendix 4.

3.2.5 Assessment of the Clearing Principles

The Department of Water and Environment Regulation (DWER) assesses clearing permits against ten principles relating to the effect of clearing. NVS submits the following comments regarding the Clearing principles;

(a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

Vegetation communities are predominately Eucalypt woodlands on broad loamy plains and low rises. While 89 flora taxa representing 23 families and 44 genera were found during the field survey, the vegetation is typical of the region and surrounding regions and not considered to be unusually diverse.

Floristically this project is not likely to be at variance to this Principle.

(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

This was not assessed in this report.

(c) Native vegetation should not be cleared if it includes, or is necessary for, the continued existence of rare flora.

No DRF or Threatened Flora were located within the survey area.

No Priority Flora were recorded in the survey area.

The Project is not at variance to this Principle.

(d) Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of a threatened ecological community.

There are no known Threatened or Priority Ecological communities recorded in the survey area, and no vegetation groups recorded in the survey area are regarded as such.

The Project is not at variance to this Principle.

(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

As demonstrated in section 3.1.4, the Beard vegetation association which occurs within the survey area is considered to have between 96-100% of its spatial area remaining, post European settlement, and is not adversely affected by extensive clearing such as farming.

The Project is not at variance to this Principle.

(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

The survey area contains no wetlands or watercourses, as identified by DWER Clearing Permit System Map Viewer (DWER, 2019).

There are no permanent watercourses or wetlands within the area proposed to be cleared.

The Project is not at variance to this Principle.

(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

This was not assessed in this report

(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

No conservation areas will be affected by clearing within the survey area.

The proposed clearing is not at variance to this Principle

(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

This was not assessed in this report

(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

This was not assessed in this report

4. DISCUSSION

The field assessment established that the condition of the vegetation in the proposed disturbance area is overall “Very Good”, with few areas of “Good” vegetation condition, where existing tracks and historic exploration disturbances were more common. One area to the east of the survey area was in a “Degraded” condition.

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

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 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 prior to and following clearing.

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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)
COO	Coolgardie Bioregion, IBRA
COO03	Eastern Goldfields Subregion, IBRA
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
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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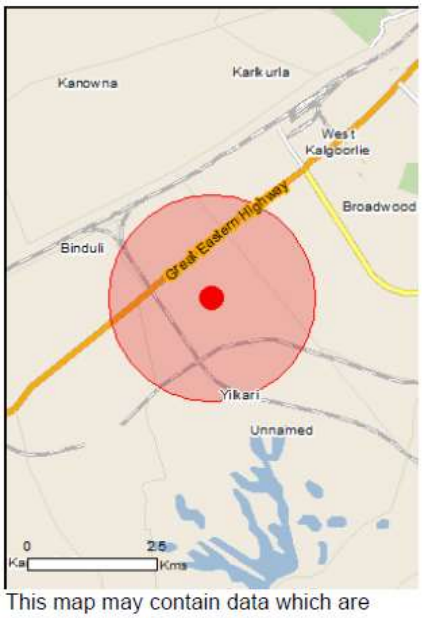

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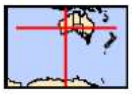


Summary

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:	1
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	5
Listed Migratory Species:	7

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	12
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:	14
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

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

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area
Plants		
Gastrolobium graniticum Granite Poison [14872]	Endangered	Species or species habitat likely to occur within area

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

Name	Threatened	Type of Presence
Calidris 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
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
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

Name	Threatened	Type of Presence
Thinornis rubricollis		
Hooded Plover [59510]		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
Streptopelia chinensis		
Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis		
Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris		
Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus		
Goat [2]		Species or species habitat likely to occur within area
Equus asinus		
Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus		
Horse [5]		Species or species habitat likely to occur within area
Felis catus		
Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
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

Name	Status	Type of Presence
Vulpes vulpes		
Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Carrichtera annua		
Ward's Weed [9511]		Species or species habitat likely to occur within area
Lycium ferocissimum		
African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus		
Asian House Gecko [1708]		Species or species habitat likely to occur within area

Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-30.80350084 121.4122027

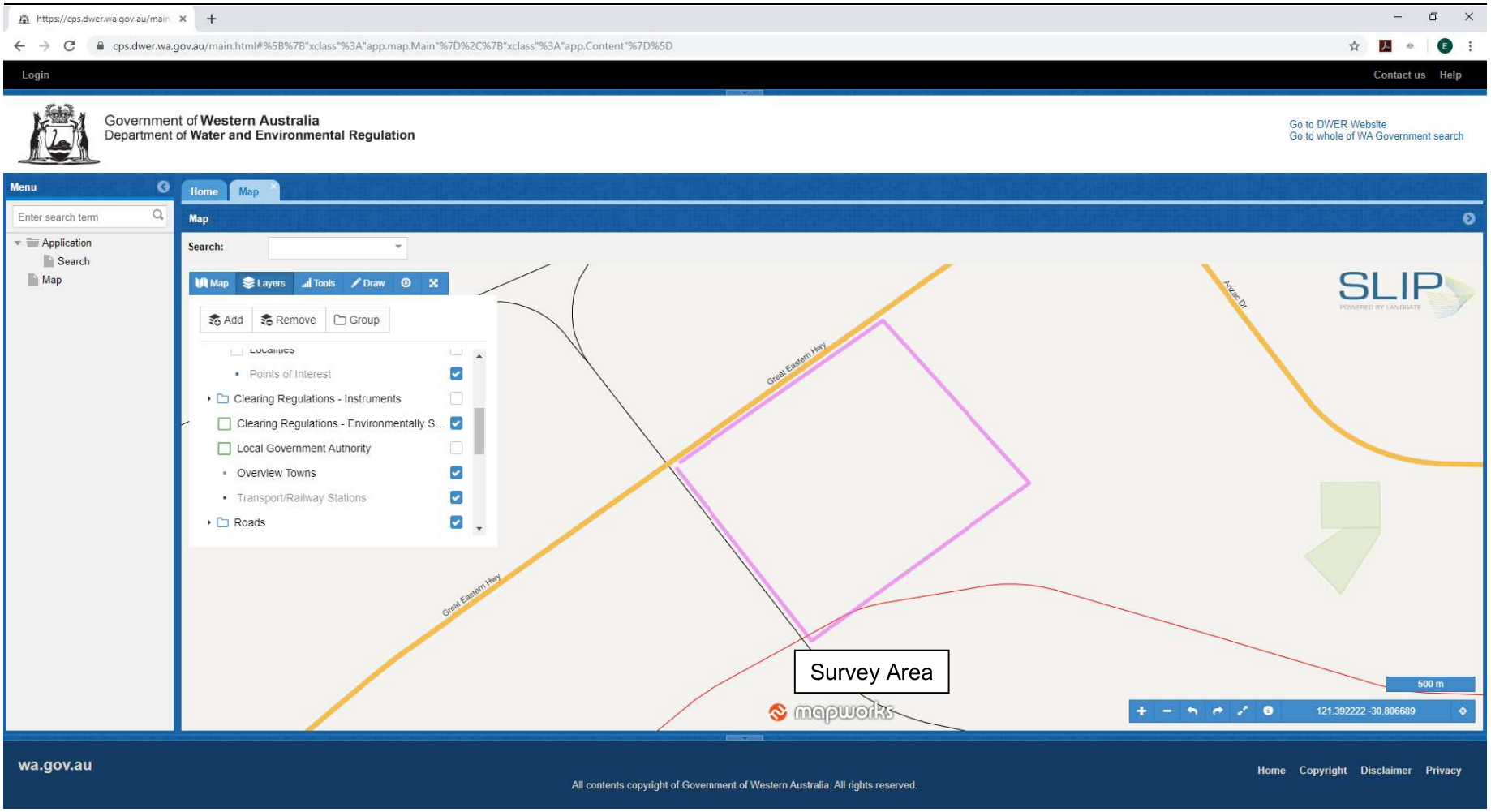
Acknowledgements

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

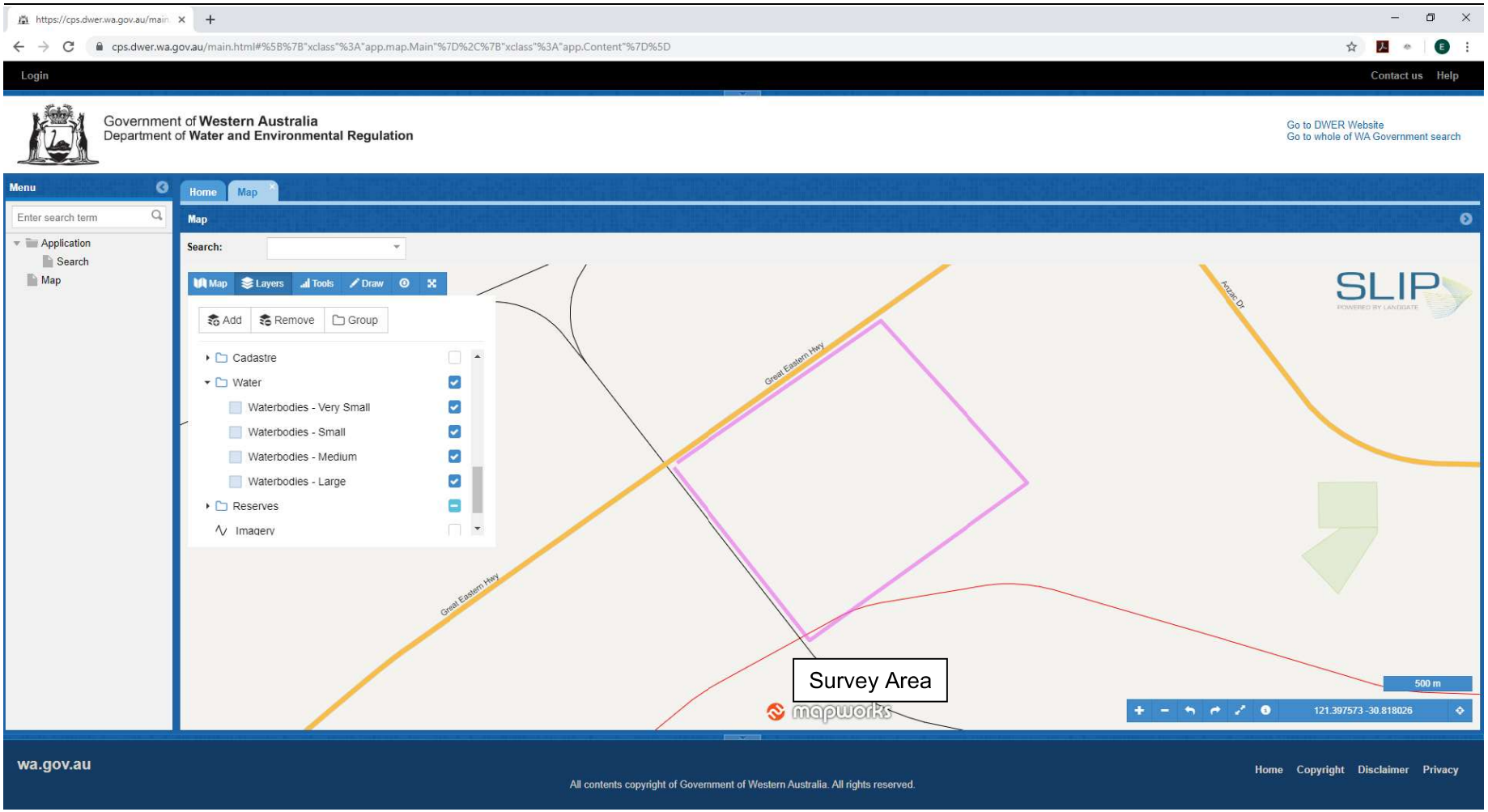
-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, 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 Clearing Permit System Map Viewer showing no ESA's (dark green shaded areas) within the survey area (DWER, 2019)



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

Appendix 2

Threatened Flora Databases Search Results

Taxon	Status	Distribution	Flowering Period
Acacia coatesii	1	Coolgardie	
Acacia websteri	1	Bencubbin, Coolgardie	-
Alyxia tetanifolia	3	Kalgoorlie, Diemals, Goongarri, Boogardie, Mt Magnet	May
Angianthus prostratus	3	Glenorn Stn, Baladjie Lake NR, Quairading, Lake Barlee, Bulga Downs Stn, Kalgoorlie	Jul-Sept
Austroparmelina macrospora	3	Kalgoorlie, Ninghan Stn, Wanjarri NR,Mount Harry, Kathleen, Bullfinch, Kalbarri	
Banksia lullfitzii	3	Southern Cross, Frank Hann N.P., Coolgardie, Mt Manning Range, Ravensthorpe	Mar-May
Bossiaea concinna	3	Cunderdin, Woolgangie, Coolgardie, Lake Mason Stn, Jerramungup, Pithara	Sep,Oct
Chrysocephalum apiculatum subsp. norsemanense	3	Norseman, Fraser Range, Coolgardie, Boorabbin N.P., Walling Rock Stn.	
Cyathostemon verrucosus	3	Bungalbin Hill, Helena & Aurora Ranges, Queen Victoria Rocks, Kalgoorlie, Boorabbin	Sep-Dec,Mar
Dampiera plumosa	1	Sandstone, Coolgardie, Lake Barlee	Oct
Diocirea acutifolia	3	Coolgardie, Kambalda, Widgiemooltha	Nov-Dec
Elachanthus pusillus	2	Orchid Rock, Cocklebiddy, Kalgoorlie, Jaurdi Stn	Oct
Eremophila caerulea subsp. merrallii	4		
Eremophila praecox	1	Five Mile Hill, (Kurrawang), Kalgoorlie, Kanowna Belle	Aug-Sep,Dec
Eremophila veronica	3	Queen Victoria Rock, Coolgardie	Oct-Nov
Eucalyptus jutsonii subsp. jutsonii	4		
Eucalyptus websteriana subsp. norsemanica	1	Norseman, Coolgardie	-
Eucalyptus x brachyphylla	4		
Frankenia glomerata	4		
Gastrolobium graniticum	T	Coolgardie,Gnamma Hill,Narembeen,Yellowdine, Bullabulling	Aug-Nov
Goodenia salina	2		
Hakea rigida	2		
Hakea sp. Great Victoria Desert (L. Cockram LAC 139)	1	E Kalgoorlie	
Isolepis australiensis	3		
Lepidium fasciculatum	3	Salmon Gums, Kalgoorlie, Esperance, Mingenew	Oct-Feb
Lepidium merrallii	2		
Melaleuca coccinea	3		
Melichrus sp. Coolgardie (K.R. Newbey 8698)	1	Coolgardie	
Notisia intonsa	3		
Persoonia leucopogon	1	Between Coolgardie & Laverton, Comet Vale (Menzies)	-
Phebalium appressum	1		
Phlegmatospermum eremaeum	3	Coolgardie, Norseman, Cocklebiddy, Forrest, Bruce Rock, Helena and Aurora Range, Caiguna	Aug-Oct
Psammomoya ephedroides	3	Toolonga N.R., Kalbarri, Woolgorong, Mount Gibson, Coolgardie, Albany	
Ptilotus chortophytus	1		
Ptilotus procumbens	1		
Rhodanthe uniflora	1	Kalgoorlie, Warburton, SA., QLD., NSW., VIC	Oct
Thryptomene sp. Coolgardie (E. Kelso s.n. 1902)	1	Coolgardie	
Thryptomene sp. Londonderry (R.H. Kuchel 1763)	1	Coolgardie, Kambalda	
Xanthoparmelia dayiana	3	Kalgoorlie, Northern Territory, Karara	

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.

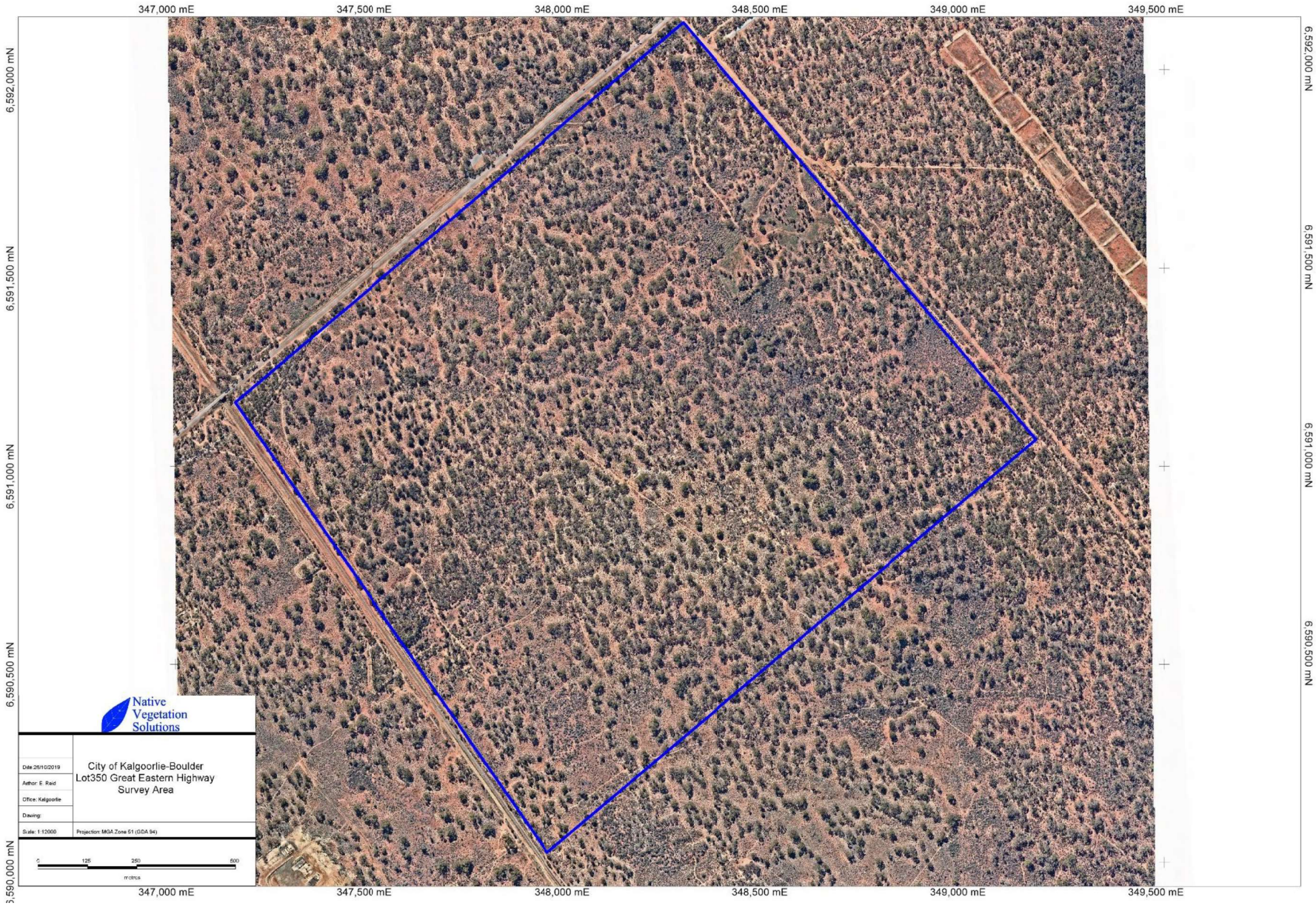
Good (4). Vegetation structure significantly altered by very obvious signs of multiple disturbance.
Retains basic vegetation structure or ability to regenerate it.
For example, disturbance to vegetation structure caused by frequent fires, the presence of some very aggressive weeds at high density, partial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

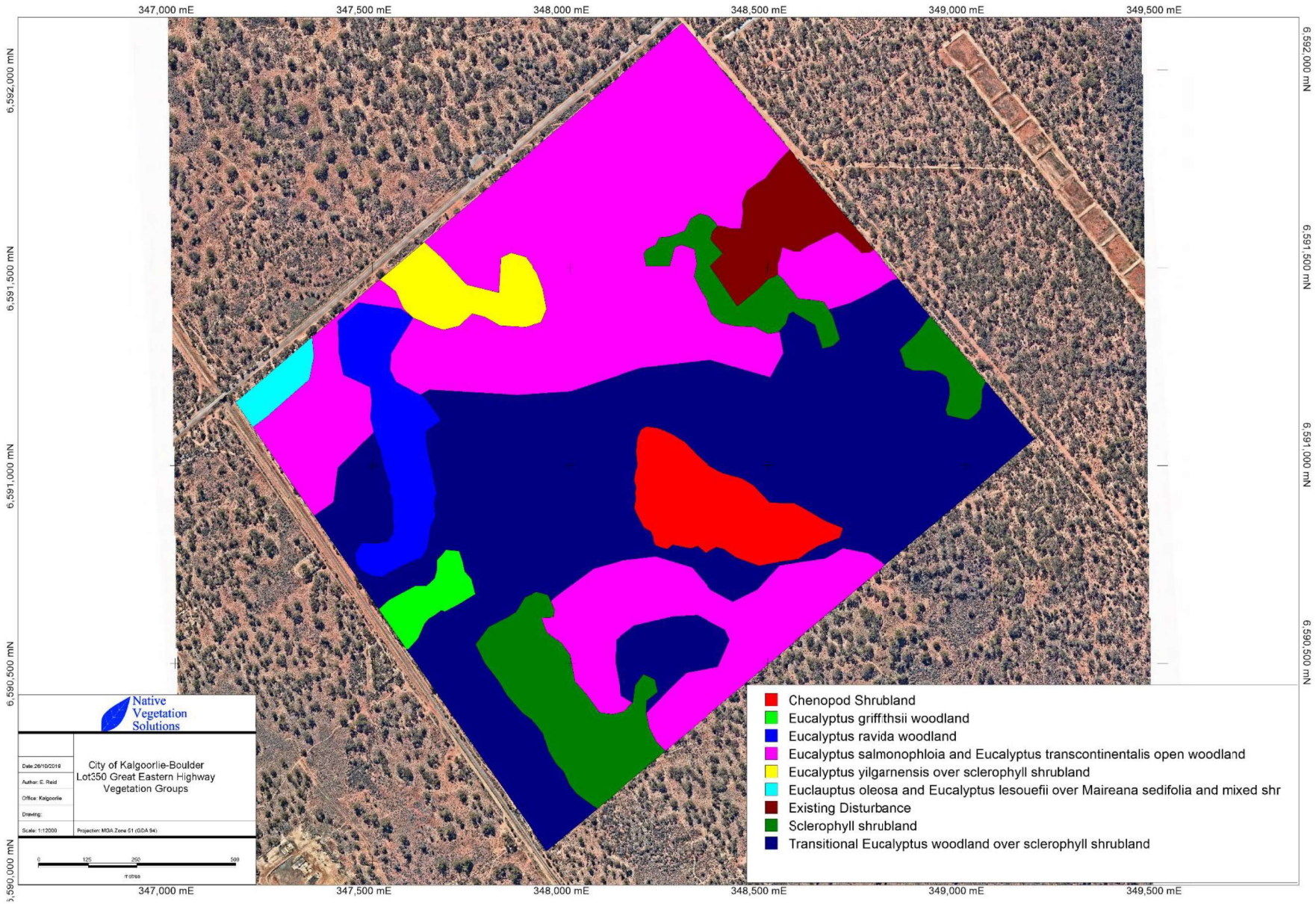
Degraded (5). Basic vegetation structure severely impacted by disturbance.
Scope for regeneration but not to a state approaching good condition without intensive management.
For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial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

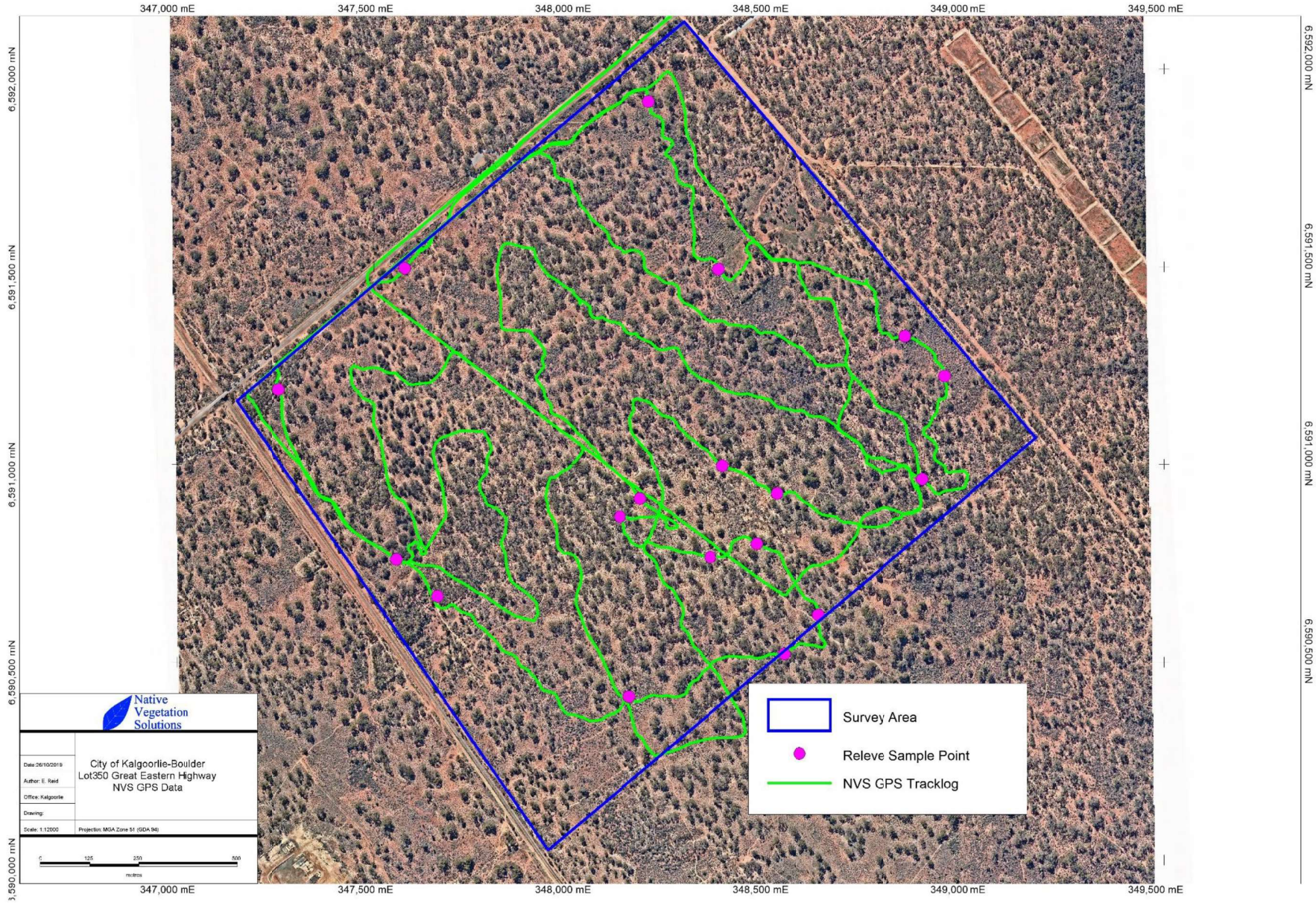
Completely Degraded (6). The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.
These areas are often described as 'parkland cleared' with the flora compromising weed or crop species with isolated trees or shrubs.

Appendix 4

Vegetation Mapping







Appendix 5

Species List

Family	Genus	Species	A, P, NN	Chenopod Shrubland	*Eucalyptus ravida* woodland	Sclerophyll shrubland	*Eucalyptus griffithsii* woodland	*Eucalyptus yilgarnensis* over sclerophyll shrubland	*Eucalyptus oleosa* and *Eucalyptus lesouefii* over *Maireana sedifolia* and mixed shrubland	Transitional *Eucalyptus* woodland over sclerophyll shrubland	*Eucalyptus salmonophloia* and *Eucalyptus transcontinentalis* open woodland	Existing Disturbance
Amaranthaceae	*Ptilotus*	*exaltatus*	A						*			
Amaranthaceae	*Ptilotus*	*obovatus*	P	*	*	*	*	*	*	*	*	
Apocynaceae	*Alyxia*	*buxifolia*	P			*						*
Apocynaceae	*Marsdenia*	*australis*	A					*	*	*	*	
Asteraceae	*Cratystylis*	*conocephala*	P					*	*	*		
Asteraceae	*Cratystylis*	*microphylla*	P							*		
Asteraceae	*Cratystylis*	*subspinescens*	P								*	
Asteraceae	*Olearia*	*humilis*	P					*				
Asteraceae	*Olearia*	*muelleri*	P		*			*	*	*	*	
Asteraceae	*Olearia*	*pimelioides*	P			*						*
Asteraceae	*Podolepis*	*capillaris*	A	*								
Asteraceae	*Roebuckiella*	*ciliocarpa*	A	*								
Boraginaceae	*Echium*	*plantagineum**	A, NN									*
Boraginaceae	*Halgania*	*andromedifolia*	P		*			*	*	*		*
Brassicaceae	*Carrichtera*	*annua**	A, NN									*
Casuarinaceae	*Casuarina*	*pauper*	P			*		*				*
Chenopodiaceae	*Atriplex*	*holocarpa*	A									*
Chenopodiaceae	*Atriplex*	*lindleyi* subsp. *inflata*	A							*	*	
Chenopodiaceae	*Atriplex*	*nummularia* subsp. *spathulata*	P		*				*			*
Chenopodiaceae	*Atriplex*	*stipitata*	P	*			*		*	*	*	
Chenopodiaceae	*Atriplex*	*vesicaria*	P	*				*	*	*	*	
Chenopodiaceae	*Carpobrotus*	*modestus*	P	*								
Chenopodiaceae	*Enchylaena*	*tomentosa* subsp. *tomentosa*	P							*	*	
Chenopodiaceae	*Maireana*	*brevifolia*	P									*
Chenopodiaceae	*Maireana*	*georgei*	P	*		*				*	*	
Chenopodiaceae	*Maireana*	*pentatropis*	P						*			
Chenopodiaceae	*Maireana*	*sedifolia*	P	*	*	*	*	*	*	*	*	
Chenopodiaceae	*Maireana*	*tomentosa*	P							*	*	
Chenopodiaceae	*Maireana*	*trichoptera*	P	*					*	*	*	
Chenopodiaceae	*Maireana*	*triptera*	P			*			*	*	*	
Chenopodiaceae	*Rhagodia*	*drummondii*	P		*	*		*		*	*	
Chenopodiaceae	*Sclerolaena*	*densiflora*	P	*					*			*
Chenopodiaceae	*Sclerolaena*	*diacantha*	P							*	*	
Chenopodiaceae	*Sclerolaena*	*eurotioides*	P							*	*	
Chenopodiaceae	*Sclerolaena*	*patenticuspis*	P	*								
Chenopodiaceae	*Tecticornia*	*disarticulata*	P	*								
Fabaceae	*Acacia*	*acuminata*	P							*	*	
Fabaceae	*Acacia*	*hemiteles*	P			*	*	*		*	*	
Fabaceae	*Acacia*	*ligulata*	P			*		*		*	*	
Fabaceae	*Acacia*	*prainii*	P							*		
Fabaceae	*Senna*	*artemisioides* subsp. *artemisioides*	P						*			
Fabaceae	*Senna*	*artemisioides* subsp. *filifolia*	P	*		*	*	*		*	*	
Fabaceae	*Senna*	*cardiosperma*	P			*						
Frankeniaceae	*Frankenia*	*interioris*	P	*								
Geraniaceae	*Erodium*	*crinitum*	P							*	*	
Goodeniaceae	*Scaevola*	*spinescens*	P			*	*	*	*	*	*	
Lamiaceae	*Salvia*	*verbenaca**	P, NN	*								*
Lamiaceae	*Westringia*	*rigida*	P							*		
Myrtaceae	*Eucalyptus*	*griffithsii*	P				*		*	*		
Myrtaceae	*Eucalyptus*	*lesouefii*	P					*	*	*		*

Family	Genus	Species	A, P, NN	Chenopod Shrubland	*Eucalyptus ravida* woodland	Sclerophyll shrubland	*Eucalyptus griffithsii* woodland	*Eucalyptus yilgarnensis* over sclerophyll shrubland	*Eucalyptus oleosa* and *Eucalyptus lesouefii* over *Maireana sedifolia* and mixed shrubland	Transitional *Eucalyptus* woodland over sclerophyll shrubland	*Eucalyptus salmonophloia* and *Eucalyptus transcontinentalis* open woodland	Existing Disturbance
Myrtaceae	*Eucalyptus*	*oleosa* subsp. *oleosa*	P	*					*	*		
Myrtaceae	*Eucalyptus*	*ravida*	P		*							
Myrtaceae	*Eucalyptus*	*salmonophloia*	P							*	*	
Myrtaceae	*Eucalyptus*	*salubris*	P	*					*	*	*	
Myrtaceae	*Eucalyptus*	*transcontinentalis*	P						*	*	*	*
Myrtaceae	*Eucalyptus*	*yilgarnensis*	P					*	*	*		
Myrtaceae	*Melaleuca*	*sheathiana*	P							*		
Pittosporaceae	*Pittosporum*	*angustifolium*	P					*		*	*	
Poaceae	*Aristida*	*contorta*	A	*					*	*	*	
Poaceae	*Austrostipa*	*elegantissima*	P		*				*	*	*	
Poaceae	*Austrostipa*	*nitida*	A					*	*	*	*	
Poaceae	*Enteropogon*	*ramosus*	P							*	*	
Poaceae	*Eragrostis*	*setifolia*	P						*			
Poaceae	*Monachather*	*paradoxus*	P									*
Portulacaceae	*Calandrinia*	*eremaea*	A									*
Primulaceae	*Lysimachia*	*arvensis**	A, NN									*
Santalaceae	*Exocarpos*	*aphyllus*	P	*		*		*	*	*		*
Santalaceae	*Santalum*	*acuminata*	P							*		
Santalaceae	*Santalum*	*spicatum*	P					*	*	*	*	
Sapindaceae	*Alectryon*	*oleifolius*	P			*				*	*	
Sapindaceae	*Dodonaea*	*lobulata*	P							*	*	
Sapindaceae	*Dodonaea*	*viscosa* subsp. *angustissima*	P							*	*	
Scrophulariaceae	*Eremophila*	*alternifolia*	P			*						
Scrophulariaceae	*Eremophila*	*caperata*	P				*			*		*
Scrophulariaceae	*Eremophila*	*decipiens* subsp. *decipiens*	P	*		*			*	*	*	
Scrophulariaceae	*Eremophila*	*georgei*	P	*								
Scrophulariaceae	*Eremophila*	*glabra* subsp. *glabra*	P		*			*	*	*	*	
Scrophulariaceae	*Eremophila*	*granitica*	P							*	*	
Scrophulariaceae	*Eremophila*	*interstans* subsp. *interstans*	P						*	*		
Scrophulariaceae	*Eremophila*	*interstans* subsp. *virgata*	P		*					*		
Scrophulariaceae	*Eremophila*	*oldfieldii* subsp. *angustifolia*	P						*	*	*	
Scrophulariaceae	*Eremophila*	*parvifolia* subsp. *auricampa*	P					*	*	*	*	
Scrophulariaceae	*Eremophila*	*scoparia*	P	*	*	*	*	*	*	*	*	
Solanaceae	*Lycium*	*australe*	P	*	*		*	*	*	*	*	
Solanaceae	*Solanum*	*lasiophyllum*	P	*					*			
Solanaceae	*Solanum*	*nummularium*	P							*	*	
Solanaceae	*Solanum*	*orbiculatum*	P	*				*				
Thymelaeaceae	*Pimelea*	*microcephala* subsp. *microcephala*	P	*	*							
Zygophyllaceae	*Roepera*	*aurantiaca* subsp. *aurantiaca*	A									*

Note: A= Annual
P= Perennial
* and NN= Non-Native

APPENDIX 3: TERRESTRIAL ECOSYSTEMS LEVEL 1 VERTEBRATE FAUNA RISK ASSESSMENT