Reconnaissance Flora and Vegetation Survey of the Redross-Higginsville Poweline Corridor, Higginsville (L15/368 and L15/377)

Prepared for

WESTGOLD GROUP

Avoca Mining Pty Ltd

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1 INTRODUCTION

West Gold Resources Pty Ltd is the owner of subsidiary Avoca Mining Pty Ltd, which operate the Higginsville Gold Operation (HGO). HGO proposes to develop a new infrastructure corridor the Redross-Higginsville Powerline, which extends southwest then northwest of the Higginsville mill. This proposed corridor falls within Miscellaneous Licenses L15/368 and L15/377. A mining proposal is currently being prepared, and will be submitted with the inclusion of this report.

The survey area within L15/368 and L15/377 is located approximately 50 km north of Norseman in the Coolgardie region (COO) of Western Australia (Figure 1).

The total survey area received from HGO covers 114.30 ha which envelopes current disturbances (haul road, railway corridor and related infrastructure) totalling 1.06 ha (0.93% of survey area). Actual disturbance footprints are not yet defined; however, clearing required within the boundary of the survey area is anticipated to be less than the total survey area. This report will encompass results of the Reconnaissance flora and vegetation survey within the newly proposed infrastructure survey area.

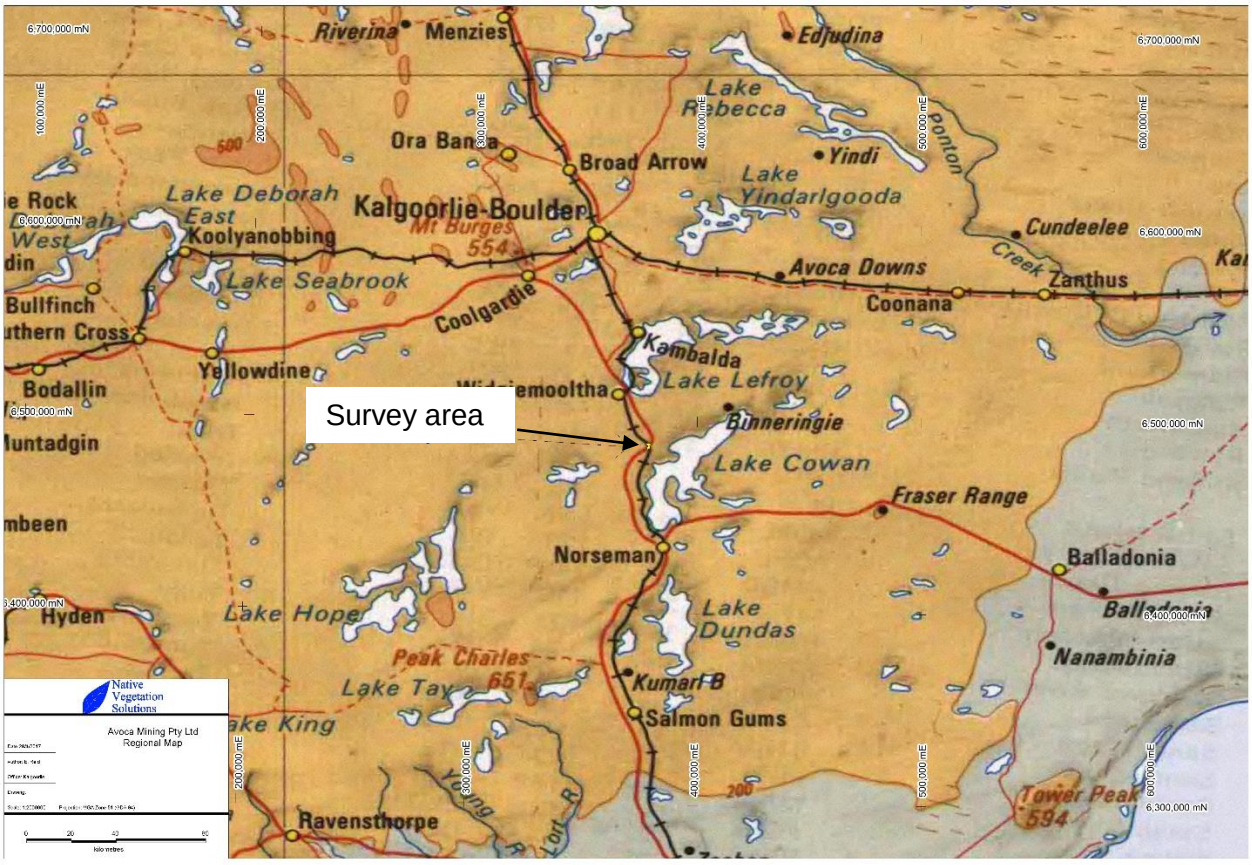

Figure 1: Regional map of survey location

HGO commissioned Native Vegetation Solutions (NVS) to complete a Reconnaissance Flora and Vegetation Survey of the survey area on the 4th of December 2017.

1.1 Objectives

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

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

A reconnaissance assessment has two components:

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

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

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

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

1.2 Geology and Vegetation

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

1.3 Climate

The climate is Arid to Semi-arid with 200-300 mm of rainfall, sometimes in summer but usually in winter (CALM, 2002). The nearest official meteorological weather station with the most complete and up to date information is Norseman, which is located approximately 50.0 km south of the survey area.

1.3.1 Temperature

Mean annual minimum temperature at Norseman Aero is 9.9°C and mean annual maximum temperature is 25.1°C. The coldest temperatures are attained in July (mean minimum temperature 4°C), the hottest is January (mean maximum temperature 32.4°C) and diurnal temperature variations are relatively consistent throughout the year (Figure 2).

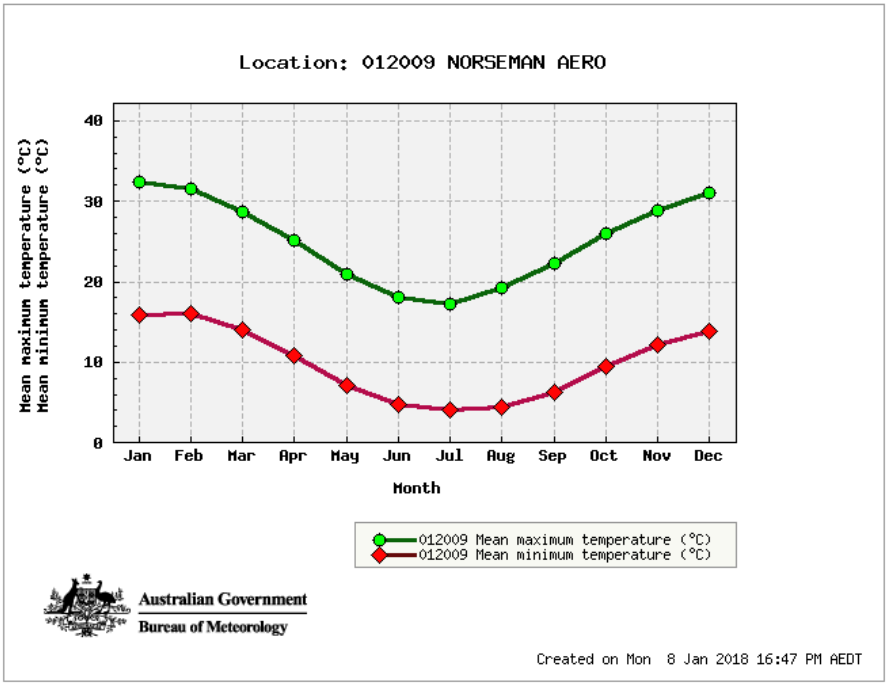

Figure 2: Mean temperature ranges for Norseman Aero weather station

1.3.2 Rainfall

The annual average rainfall at Norseman is 302.7 mm, which falls (>1 mm) on an average of 47.5 rain-days (BOM, 2018). Rainfall is relatively even throughout the year with slightly larger rainfall events falling between the months of November and March (Figure 3). In 2017, rainfall only in February, May, August and September exceeded monthly averages, with February and May receiving double the average rainfall., All other months received below average rainfall (BOM, 2018).

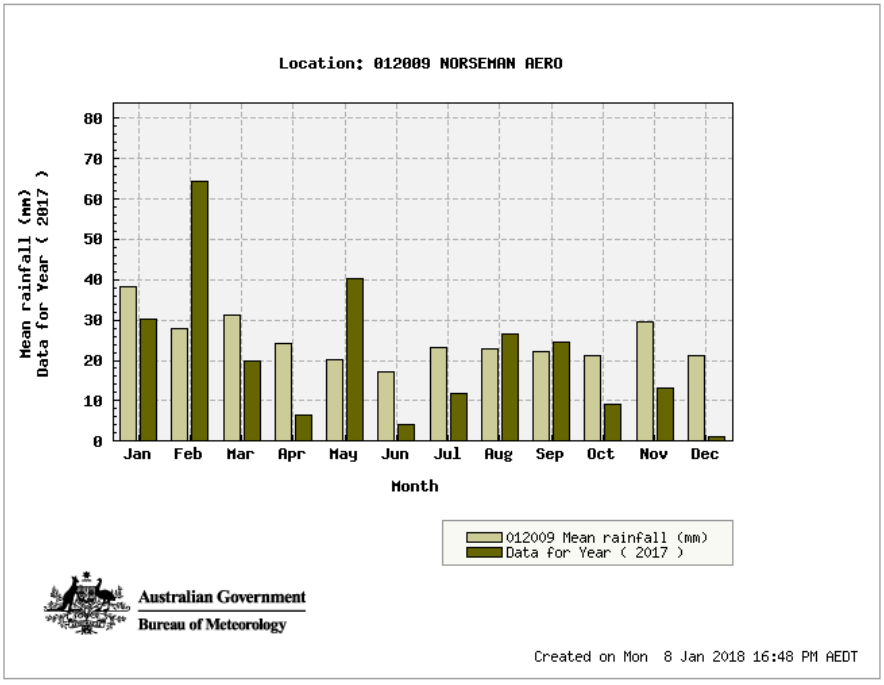

Figure 3: Monthly and mean rainfall for Norseman Aero weather station 2017

2. ASSESSMENT METHODOLOGY

2.1 Previous Flora Survey Reports

2.1.1 Two Boys and Fairplay Project Area and Proposed Infrastructure Corridors (NVS, 2017)

A site visit was carried out by Botanist Eren Reid from NVS from the 4th to 5th April 2017 to examine the broad flora and vegetation groups contained within the survey area. A total of 10 hours was spent on site traversing the survey area. While a vehicle was used to reach the site, all traverses were made on foot.

2.2 Personnel and Reporting

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

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

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 project.

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 survey area as the search criteria with a 2km buffer (DOTEE, 2018).
(http://www.environment.gov.au/arcgis-framework/apps/pmst/pmst-coordinate.jsf)

2.3.2 Threatened Flora and Communities

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

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

2.3.3 Environmentally Sensitive Areas (ESAs) and Conservation Reserves

The Department of Water and Environmental Regulation (DWER) 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.

DPAW's Statewide Vegetation Statistics (DPAW, 2018) 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, 2017).

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 (CALM, 2003).

2.4 Site Investigation

A site visit of the Redross-Higginsvile corridor survey area was carried out by Botanist Eren Reid from Native Vegetation Solutions on the 4th December 2017 to examine the flora and vegetation groups contained within the survey area. A total of 10 hours was spent on site traversing the survey area, by Kawasaki Mule and on foot.

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

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

2.4.1 Licenses

Field work was conducted under Scientific License SL012187, held by Mr ER Reid with expiry 18/09/2018.

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 established in appropriate locations, taking into account representativeness of the site to surrounding vegetation and vegetation boundaries. Relevé sites are represented in Appendix 4.

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

Data collected at each relevé included:

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

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

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

Vegetation groups were mapped (section 2.4.4 below).

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

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

2.4.3 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, 2017).

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 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, 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 DPAW.
Proportion of the task achieved	N	All tasks completed
Timing/Season	N	The targeted survey was conducted in Late Spring/early Summer 2017. Due to the above average rainfall in February May, August and September many species were still in flower with emergent annuals.
Disturbance in survey area	N	Disturbance was present in the form of historic clearing for roads and access corridors
Intensity of survey effort	N	Transects were walked through the survey area with all parts visited
Resources	N	Adequate resources were available
Access problems	N	No problems with access
Availability of contextual information on the region	N	Information on the Coolgardie (COO) Bioregion is readily available.

3. RESULTS

3.1 Preliminary Desktop Assessment

3.1.1 Previous Flora Survey Reports

3.1.1.1 Two Boys and Fairplay Project Area and Proposed Infrastructure Corridors (NVS, 2017)

A total of 21 Families, 48 Genera and 106 Species were recorded within the Two Boys survey area. Four major vegetation groups were recorded in the survey area, and were in Very Good, Good or Degraded condition (using the scale of Keighery 1994). A summary of the vegetation groups and relevant vegetation codes can be seen below:

- *Eucalyptus griffithsii* over *Acacia acuminata* over sclerophyll shrubland (A);
- *Eucalyptus salmonophloia* woodland over sclerophyll shrubland (B);
- *Eucalyptus torquata* woodland over mixed sclerophyll shrubland (C); and
- Mixed *Eucalyptus* woodland over mixed sclerophyll shrubland (D).

No flora located in the survey area, were 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.

Priority species *Diocirea acutifolia* (P3) was recorded in the survey area, with a total of 451 plants counted at numerous locations.

Allocasuarina eriochlamys subsp. *grossa* (P3) was recorded in one location within vegetation group A, a total of 30 plants were recorded.

No TEC's or PEC's were located in the Two Boys survey area.

3.1.2 EPBC Act Protected Matters

The EPBC Protected Matters search tool revealed that the Redross-Higginsville Corridor survey area could possibly be suitable habitat for the weed species *Carrichtera annua* (Wards Weed) (DOTEE, 2017).

3.1.3 Threatened Flora and Communities

The DPAW database searches revealed a potential for no Threatened and 25 Priority Flora species to occur within a 30km radius of the Redross-Higginsville Corridor survey area (DPAW, 2014). No known locations of these Flora occur within the survey area, while the closest location occurs approximately 610 m south of the survey area.

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

The PEC/TEC search (DPAW, 2011) revealed that there are no TECs or PECs in the survey area.

3.1.4 Environmentally Sensitive Areas and Conservation Reserves

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

3.1.5 Vegetation Type, Extent and Status

Three vegetation units defined by Beard (1990) were identified as part of the desktop assessment. These vegetation units identify 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 Tables 2, 3 and 4 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 8 within the survey area

Factor	Value				
Beard Vegetation Association*	8				
Vegetation Association Description*	Medium woodland; salmon gum (*E. salmonophloia*) & gimlet (*E. salubris*)				
Pre-European Extent (ha)	Scale				
	***By Association** (WA)*	***By Association** (WA)*	***By IBRA Region** (COO)*	***By IBRA Sub-region** (COO03)*	***By Shire** (Shire of Coolgardie)*
	1,096,450*	694,638**	280,248**	226,086**	160,584**
% Pre-European Extent Remaining	*57.63%**	*49.89%***	*98.34%***	*99.53%***	*99.34%***
Surrounding Land Use***	Mining, Exploration, Pastoral Lease, Nature Reserve				
Weed prevalence***	Low				

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

Table 3: Summary of information regarding Pre-European and current vegetation extent of Vegetation Association 522 within the survey area

Factor	Value				
Beard Vegetation Association*	522				
Vegetation Association Description*	Medium woodland; redwood (*E. transcontinentalis*) & merrit (*E. flocktoniae*)				
Pre-European Extent (ha)	Scale				
	***By Association** (WA)*	***By Association** (WA)*	***By IBRA Region** (COO)*	***By IBRA Sub-region** (COO03)*	***By Shire** (Shire of Coolgardie)*
	676,324*	709,715**	688,407**	208,175**	313,238**
% Pre-European Extent Remaining	*100.00%**	*99.93%***	*99.93%***	*99.78%***	*99.86%***
Surrounding Land Use***	Mining, Exploration, Pastoral Lease, Nature Reserve				
Weed prevalence***	Low				

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

Table 4: Summary of information regarding Pre-European and current vegetation extent of Vegetation Association 936 within the survey area

Factor	Value				
Beard Vegetation Association*	936				
Vegetation Association Description*	Medium woodland; salmon gum				
Pre-European Extent (ha)	Scale				
	By Association *(WA)*	***By Association*** *(WA)*	***By IBRA Region*** *(COO)*	***By IBRA Sub-region*** *(COO03)*	***By Shire*** *(Shire of Coolgardie)*
	924,675*	698,752**	586,792**	310,897**	359,112**
% Pre-European Extent Remaining	*96.46%**	*96.84%***	*99.58%***	*99.22%***	*99.32%***
Surrounding Land Use***	Mining, Exploration, Pastoral Lease, Nature Reserve				
Weed prevalence***	Low				

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

3.1.6 Wetlands

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

3.1.7 Dieback

The survey area lies south of the 26th parallel, however receives average annual rainfall of 302.7 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.

Priority species *Diocirea acutifolia* (P3) and *Allocasuarina eriochlamys* subsp. *grossa* (P3) were recorded in the survey area, with a total of 6,450 and 30 plants recorded respectively (Table 5 and Appendices 4 & 6).

Diocirea acutifolia (P3) is both widespread and in large numbers throughout the local and regional area, and is well documented by previous flora surveys. DBCA known locations range from Coolgardie, Norseman, Kambalda, Widgiemooltha and Madoonia Downs.

Allocasuarina eriochlamys subsp. *grossa* (P3) was recorded in one location within vegetation group A.

Table 5: Priority Flora locations recorded during the survey

Species	Conservation Code	Zone	Easting (m)	Northing (m)	Number of Plants Inside Survey Area	Number of Plants Outside Survey Area	Total Plants Counted in Local Populations	Percentage of Local Populations to be affected	Total Percentage affected in Local Populations
Allocasuarina eriochlamys subsp. *grossa*	P3	51 J	378295	6487880	30	230	260	**11.54%**	**11.54%**
Diocirea acutifolia	P3	51 J	377249	6487275	1000			**2.13%**	
Diocirea acutifolia	P3	51 J	376767	6487496	30			**0.06%**	
Diocirea acutifolia	P3	51 J	376515	6487817	1000			**2.13%**	
Diocirea acutifolia	P3	51 J	375221	6489219	200			**0.43%**	
Diocirea acutifolia	P3	51 J	374883	6489599	20	40451	46901	**0.04%**	**13.75%**
Diocirea acutifolia	P3	51 J	374603	6489892	2000			**4.26%**	
Diocirea acutifolia	P3	51 J	374500	6490047	200			**0.43%**	
Diocirea acutifolia	P3	51 J	372993	6491676	2000			**4.26%**	
Diocirea acutifolia	P3	51 J	372878	6491826					

3.2.2 Vegetation Type, Extent and Status

A total of 23 Families, 49 Genera and 111 Species were recorded within the survey area. Nine major vegetation groups were recorded in the survey area, and are in Very Good, Good or Degraded condition (using the scale of Keighery 1994, see Appendix 3). Existing disturbance within the survey totalled 1.06 ha (0.93% of survey area). The summary of Vegetation groups contained within the survey area is summarised in Table 6 below. Maps of the survey area can be seen in Appendix 4.

Table 6: Vegetation Group Summary

Vegetation Group Code	Vegetation Group	Families	Genera	Species	Area (ha)	Percentage of Survey Area (%)
A	*Eucalyptus torquata* woodland over mixed sclerophyll shrubland	16	29	51	13.19	11.53%
B	*Eucalyptus salmonophloia* woodland over sclerophyll shrubland	13	20	45	13.89	12.15%
C	*Eucalyptus salmonophloia* and *E. transcontinentalis woodland* over *Eucalyptus yilgarnensis* over *Melaleuca sheathiana* over *Maireana sedifolia* and *Tecticornia disarticulata shrubland*	7	14	21	13.29	11.62%
D	Mixed *Eucalyptus* woodland over sclerophyll and chenopod shrubland	17	37	75	31.63	27.66%
E	*Eucalyptus lesouefii and E. salmonophloia over chenopod shrubland*	11	19	32	4.23	3.70%
F	*Eucalyptus griffithsii* woodland	10	12	16	3.15	2.76%
G	*Eucalyptus lesouefii* over *Melaleuca sheathiana* woodland	12	16	21	20.54	17.96%
H	*Eucalyptus oleosa* over *Melaleuca sheathiana* over sclerophyll shrubland	11	13	16	6.85	5.99%
I	*Eucalyptus salubris* over sclerophyll shrubland	12	14	17	6.51	5.69%
J	Existing disturbance	N/A	N/A	N/A	1.06	0.93%
	Total	**23***	**49***	**111***	**114.32#**	**100.00%#**

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

The Redross-Higginsville Corridor vegetation groups compare similarly to the previous Two Boys report (NVS, 2017) via Table 7 below.

Table 7: Comparison of Cameron Well Vegetation Groups to Two Boys Vegetation Groups (NVS, 2017)

Redross-Higginsville Corridor Vegetation Group Code	Two Boys Vegetation Group Code (NVS, 2017)
A- (13.19 ha)	C- (35.02 ha)
B- (13.89 ha)	B- (81.87ha)
C- (13.29 ha)	No direct comparison
D- (31.63 ha)	D- (133.49 ha)
E- (4.23 ha)	No similar comparison
F- (3.15 ha)	A- (1.58 ha)
G- (20.54 ha)	No direct comparison
H- (6.85 ha)	No direct comparison
I- (6.51 ha)	No direct comparison

The Redross-Higginsville Corridor vegetation groups are described in more detail below.

3.2.2.1 *Eucalyptus torquata* woodland over mixed sclerophyll shrubland (A)

This vegetation group consisted of 16 Families,29 Genera and 51 Species. The vegetation group was approximately 13.19 ha which makes up 11.53% of the survey area.

Dominant species were *Eucalyptus torquata, Scaevola spinescens, Exocarpos aphyllus, Dodonaea lobulata, Dodonaea microzyga* subsp. *acrolobata, Eremophila interstans,* subsp. *virgata, Eremophila scoparia and Olearia muelleri.*

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

3.2.2.2 *Eucalyptus salmonophloia* woodland over sclerophyll shrubland (B)

This vegetation group consisted of 13 Families, 20 Genera and 45 Species. The vegetation group was approximately 13.89 ha which makes up 12.15% of the survey area.

Dominant species were *Eucalyptus salmonophloia, E. salubris, Melaleuca sheathiana, Atriplex nummularia* subsp. *spathulata, Eremophila interstans* subsp. *virgata, Maireana sedifolia, Cratystylis conocephala and Olearia muelleri.*

***Figure 5: Eucalyptus salmonophloia* woodland over sclerophyll shrubland within the survey area**

3.2.2.3 *Eucalyptus salmonophloia* and *E. transcontinentalis* woodland over *Eucalyptus yilgarnensis* over *Melaleuca sheathiana* over *Maireana sedifolia* and *Tecticornia disarticulata* shrubland (C)

This vegetation group consisted of 7 Families, 14 Genera and 21 Species. The vegetation group was approximately 13.29 ha which makes up 11.62% of the survey area.

Dominant species were *Eucalyptus salmonophloia, E. transcontinentalis, E. yilgarnensis, Melaleuca sheathiana, Maireana sedifolia* and *Tecticornia disrticulata.*

Figure 6: *Eucalyptus salmonophloia* and *E. transcontinentalis* woodland over *Eucalyptus yilgarnensis* over *Melaleuca sheathiana* over *Maireana sedifolia* and *Tecticornia disarticulata* shrubland within the survey area

3.2.2.4 Mixed *Eucalyptus* woodland over sclerophyll and chenopod shrubland (D)

This vegetation group consisted of 17 Families, 37 Genera and 75 Species. The vegetation group was approximately 31.63 ha which makes up 27.66% of the survey area.

Dominant species were *Eucalyptus lesouefii, Eucalyptus ravida, Eucalyptus salubris, Eucalyptus yilgarnensis, Eucalyptus campaspe*, *Eremophila scoparia, Alyxia buxifolia, Cratystylis conocephala, Olearia muelleri, Atriplex vesicaria, Acacia colletioides Acacia erinacea, Senna artemisioides,* subsp*. filifolia and Scaevola spinescens.*

Figure 7: Mixed *Eucalyptus* woodland over sclerophyll and chenopod shrubland within the survey area

3.2.2.5 *Eucalyptus lesouefii* and *E. salmonophloia* over chenopod shrubland (E)

This vegetation group consisted of 11 Families, 19 Genera and 32 Species. The vegetation group was approximately 4.23 ha which makes up 3.70% of the survey area.

Dominant species were *Eucalyptus lesouefii, Eucalyptus salmonophloia*, *Eremophila interstans* subsp. *virgata, Eremophila scoparia*, *Senna artemisioides* subsp. *filifolia*, *Atriplex vesicaria and Ptilotus obovatus*

Figure 8: *Eucalyptus lesouefii* and *E. salmonophloia* over chenopod shrubland within the survey area

3.2.2.6 *Eucalyptus griffithsii* woodland (F)

This vegetation group consisted of 10 Families, 12 Genera and 16 Species. The vegetation group was approximately 3.15 ha which makes up 2.76% of the survey area.

Dominant species were *Eucalyptus griffithsii, Acacia acuminata, Allocasuarina eriochlamys* subsp*. grossa, Dodonaea microzyga* subsp*. acrolobata, Trymalium myrtillus* subsp*. myrtillus, Mirbelia granitica* and *Alyxia buxifolia.*

Figure 9: *Eucalyptus griffithsii* woodland within the survey area

3.2.2.7 *Eucalyptus lesouefii* over *Melaleuca sheathiana* woodland (G)

This vegetation group consisted of 12 Families, 16 Genera and 21 Species. The vegetation group was approximately 20.54 ha which makes up 17.96% of the survey area.

Dominant species were *Eucalyptus lesouefii, Melaleuca sheathiana, Eremophila caperata, Cratystylis conocephala* and *Acacia erinacea.*

Figure 10: *Eucalyptus lesouefii* over *Melaleuca sheathiana* woodland within the survey area

3.2.2.8 *Eucalyptus oleosa* over *Melaleuca sheathiana* over sclerophyll shrubland (H)

This vegetation group consisted of 11 Families, 13 Genera and 16 Species. The vegetation group was approximately 6.85 ha which makes up 5.99% of the survey area.

Dominant species were *Eucalyptus oleosa* subsp*. oleosa, Melaleuca sheathiana, Alyxia buxifolia, Scaevola spinescens* and *Westringia rigida.*

Figure 11: *Eucalyptus oleosa* over *Melaleuca sheathiana* over sclerophyll shrubland within the survey area

3.2.2.9 *Eucalyptus salubris* over sclerophyll shrubland (I)

This vegetation group consisted of 12 Families, 14 Genera and 17 Species. The vegetation group was approximately 6.51 ha which makes up 5.69% of the survey area.

Dominant species were *Eucalyptus salubris, Melaleuca sheathiana, Eremophila caperata, Alyxia buxifolia, Exocarpos aphyllus, Prostanthera campbellii* and *Grevillea acuaria.*

Figure 12: *Eucalyptus salubris* over sclerophyll shrubland within the survey area

3.2.2.10 Existing Disturbance (J)

This group was completely degraded, and mainly consisted of haul roads and rail corridors. Existing disturbance was approximately 1.06 ha which made up 0.93% of the survey area.

3.2.3 Weeds

Two weed species were recorded within the survey area; *Carrichtera annua* (Ward's Weed) and *Salvia verbenaca* (Wild Sage). *Carrichtera annua* was introduced into Australia from the eastern Mediterranean. First recorded in Port Pirie in South Australia in 1915, *C. annua* is now widespread throughout South Australia, the Interior, and Western Australia (Lamp & Collet, 1999). *Salvia verbenaca* is native to Europe and Asia and is an occasional weed of roadsides and railway tracks, between Kalgoorlie and Esperance (Hussey *et al*, 2007).

None of these species are listed as declared plants by DPIRD (2018).

3.2.4 Vegetation Condition

Evidence of some grazing was observed during the field assessment.

Overall, the condition of the vegetation was determined to be "Very Good" with areas which were affected by historic exploration and grazing in "Good" condition. Degraded areas included haul roads and railway corridors.

4. DISCUSSION

The field assessment established that the condition of the vegetation in the proposed disturbance area is overall “Very Good”, with certain areas affected by exploration in “Good” condition. Degraded areas included haul roads and railway corridors. No areas of vegetation were assessed to be in “Pristine” condition.

No Threatened Flrora, TECs or PECs were recorded in the survey area. Two confirmed Priority Species *Diocirea acutifolia* (P3) and *Allocasuarina eriochlamys* subsp. *grossa* (P3) were recorded within the survey area. *Diocirea acutifolia* (P3) is both widespread and in large numbers across the local area as well as regionally. *Allocasuarina eriochlamys* subsp. *grossa* (P3) is well documented within the broader region, within the closest known location 12.6km northwest of 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, as well as previous flora surveys in the region (NVS, 2017), 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.

Furthermore, four vegetation groups from the Redross-Higginsville Corridor survey area are an extension of, or are the same vegetation groups previously identified within the Two Boys flora survey report (NVS, 2017). These vegetation groups compare similarly to species composition, regarding Families, Genera and Species.

The following recommendations arise from the reconnaissance flora survey:

- Where possible, avoid areas of suspected/confirmed Priority Flora;
- Liaison with DBCA regarding the destruction of Priority Flora be sought; and
- Weed control measures should be implemented during and following earthworks.

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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 (now classed as Threatened 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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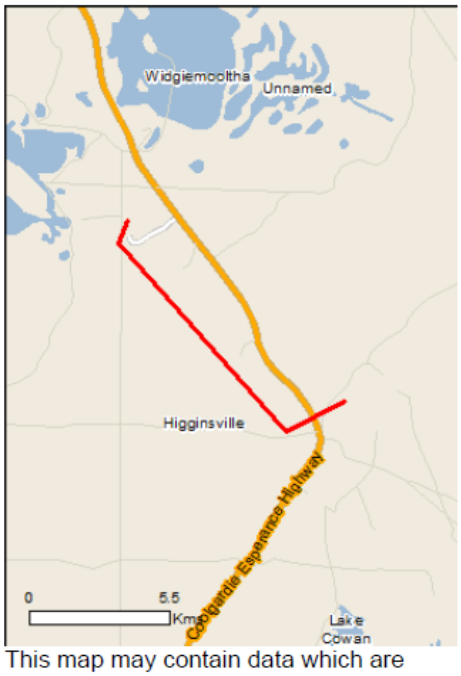

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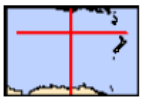


Summary

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:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	4
Listed Migratory Species:	6

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	10
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	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:	8
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		
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

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
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

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
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat 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
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Carrichtera annua Ward's Weed [9511]		Species or species habitat likely to occur within area

Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-31.7357 121.7232,-31.7447 121.7026,-31.6882 121.6431,-31.6814 121.6462

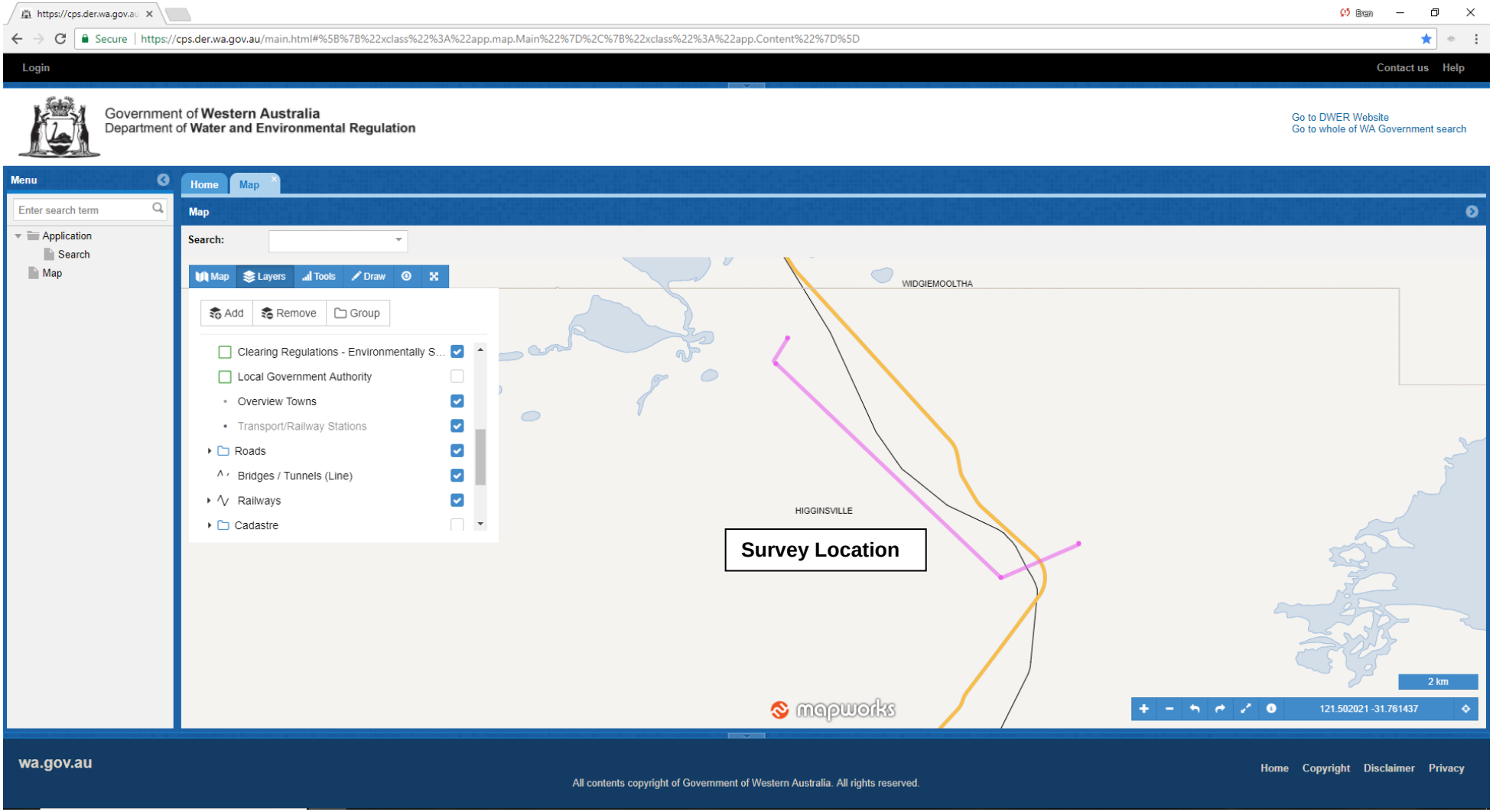
Acknowledgements

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

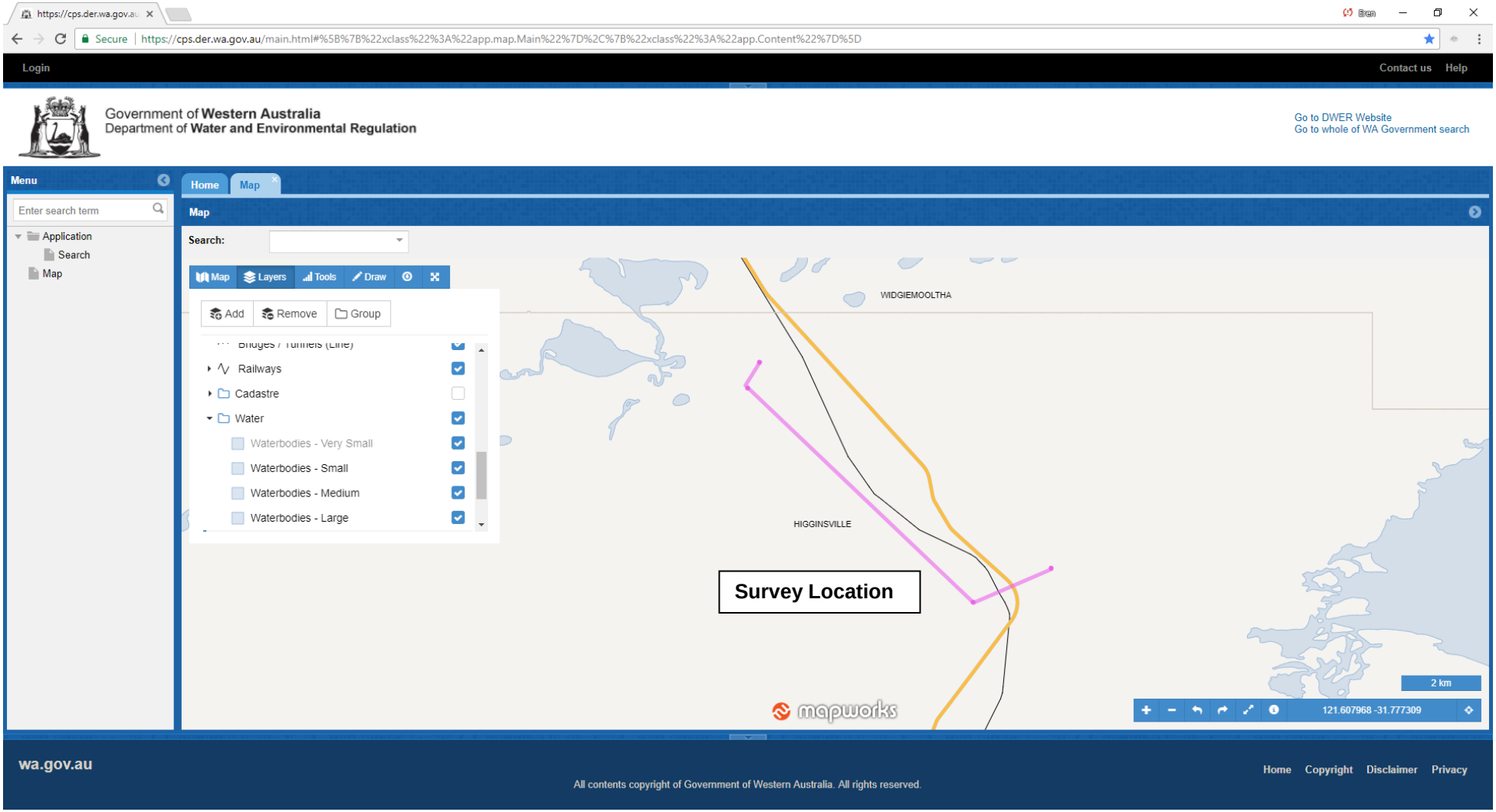
-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management,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

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

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

Appendix 3

Vegetation Condition Scale (Keighery, 1994)

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

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

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

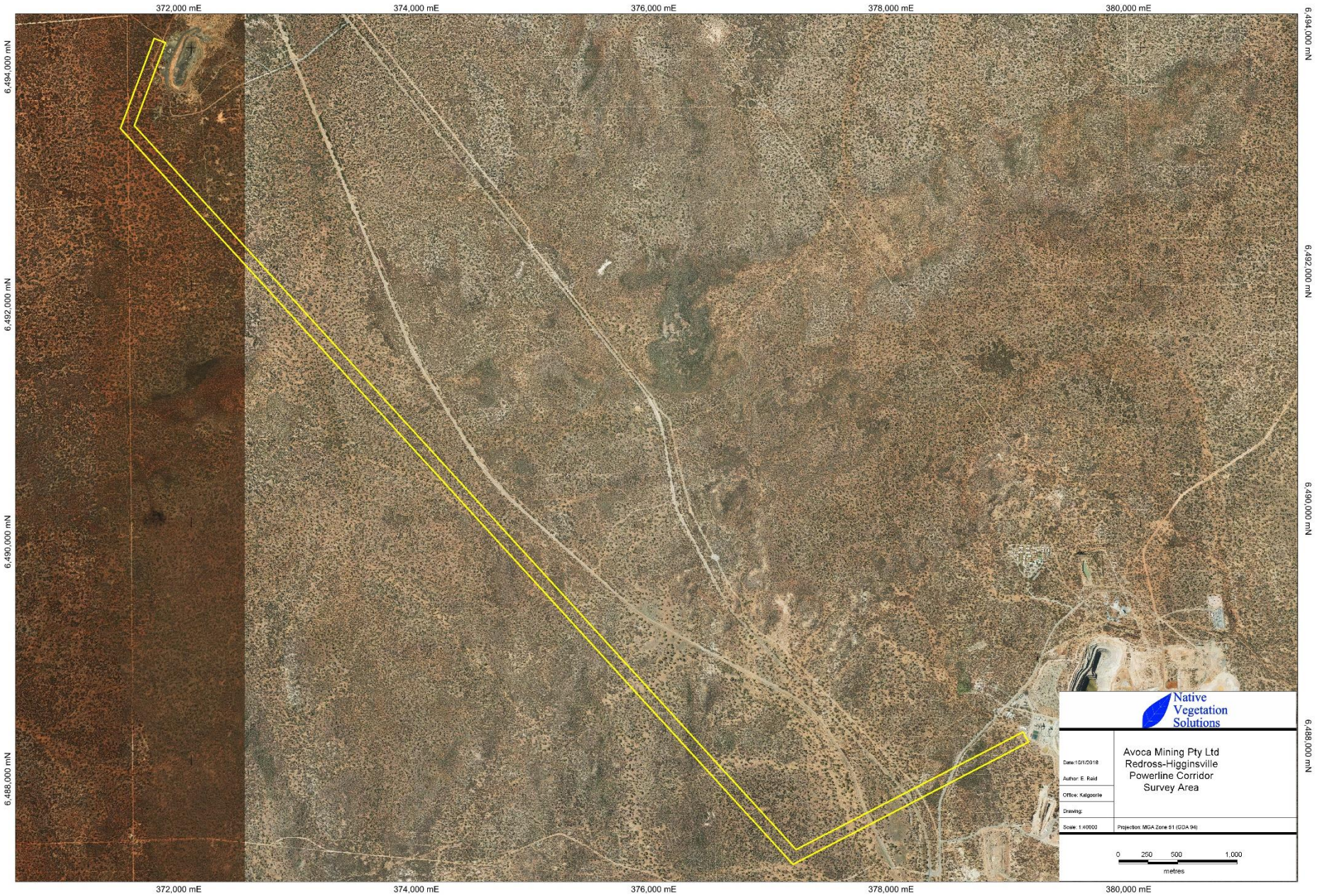
Good (4). Vegetation structure significantly altered by very obvious signs of multiple disturbance.
Retains basic vegetation structure or ability to regenerate it.
For example, disturbance to vegetation structure caused by frequent fires, the presence of some very aggressive weeds at high density, partial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

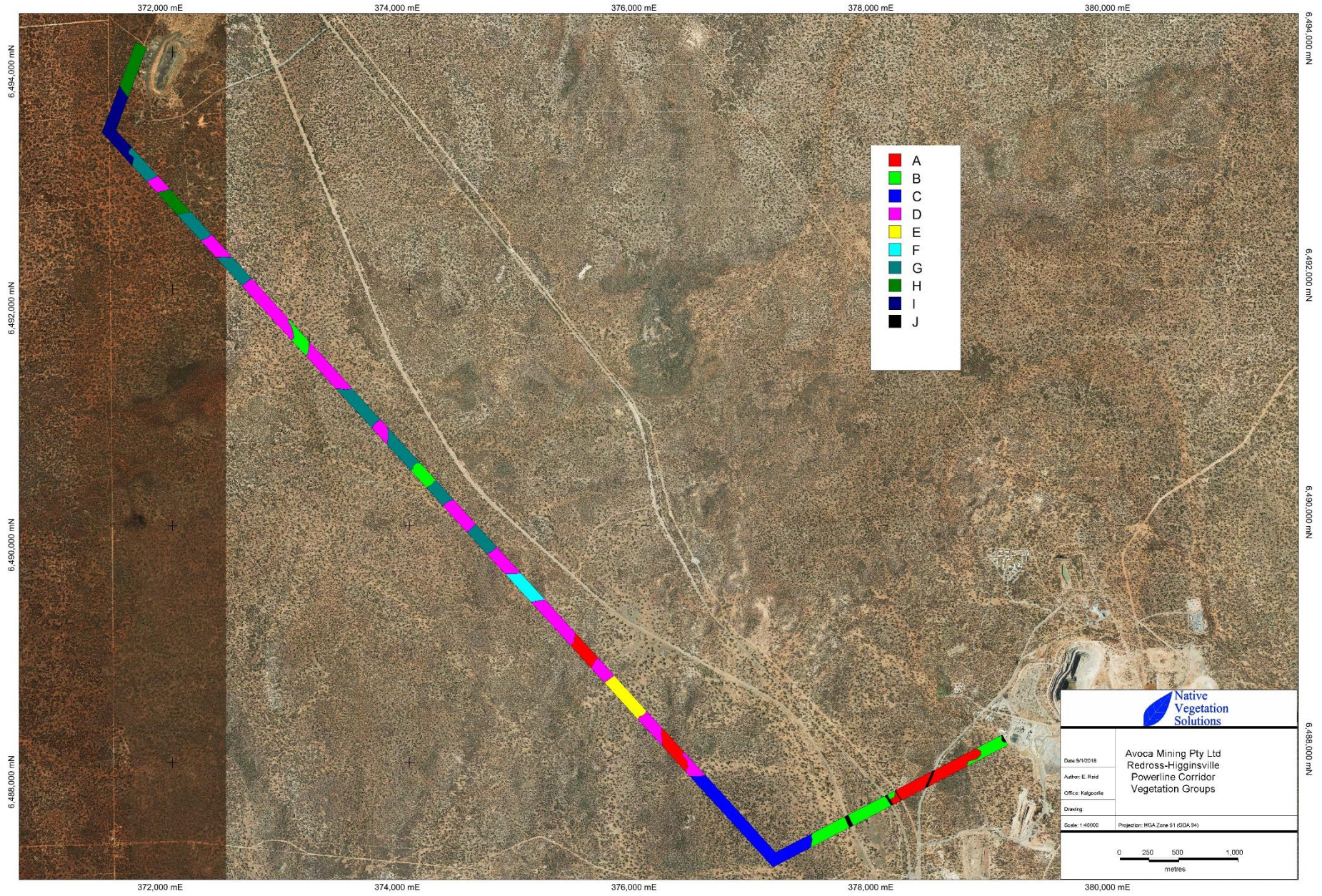
Degraded (5). Basic vegetation structure severely impacted by disturbance.
Scope for regeneration but not to a state approaching good condition without intensive management.
For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial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

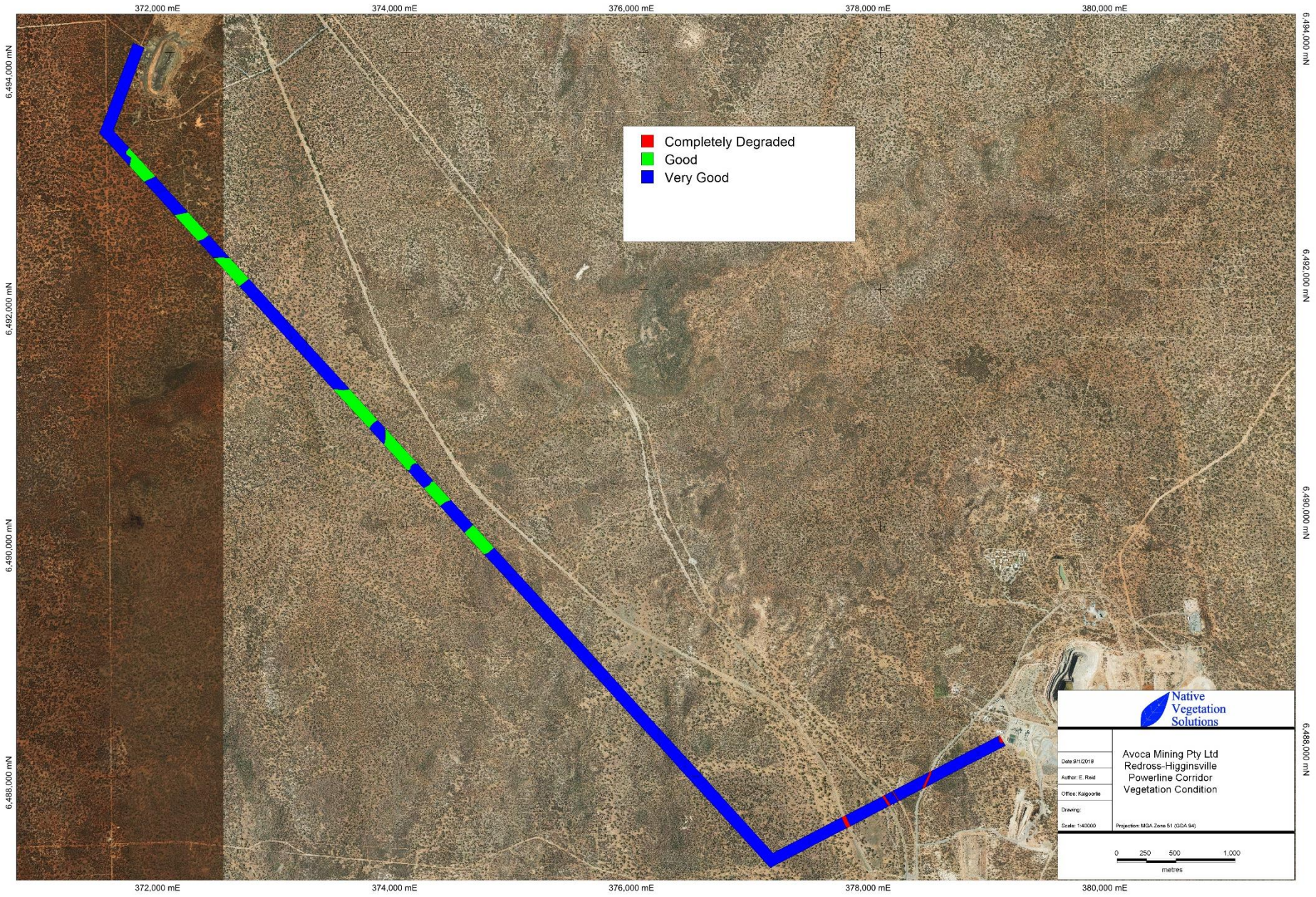
Completely Degraded (6). The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.
These areas are often described as 'parkland cleared' with the flora compromising weed or crop species with isolated trees or shrubs.

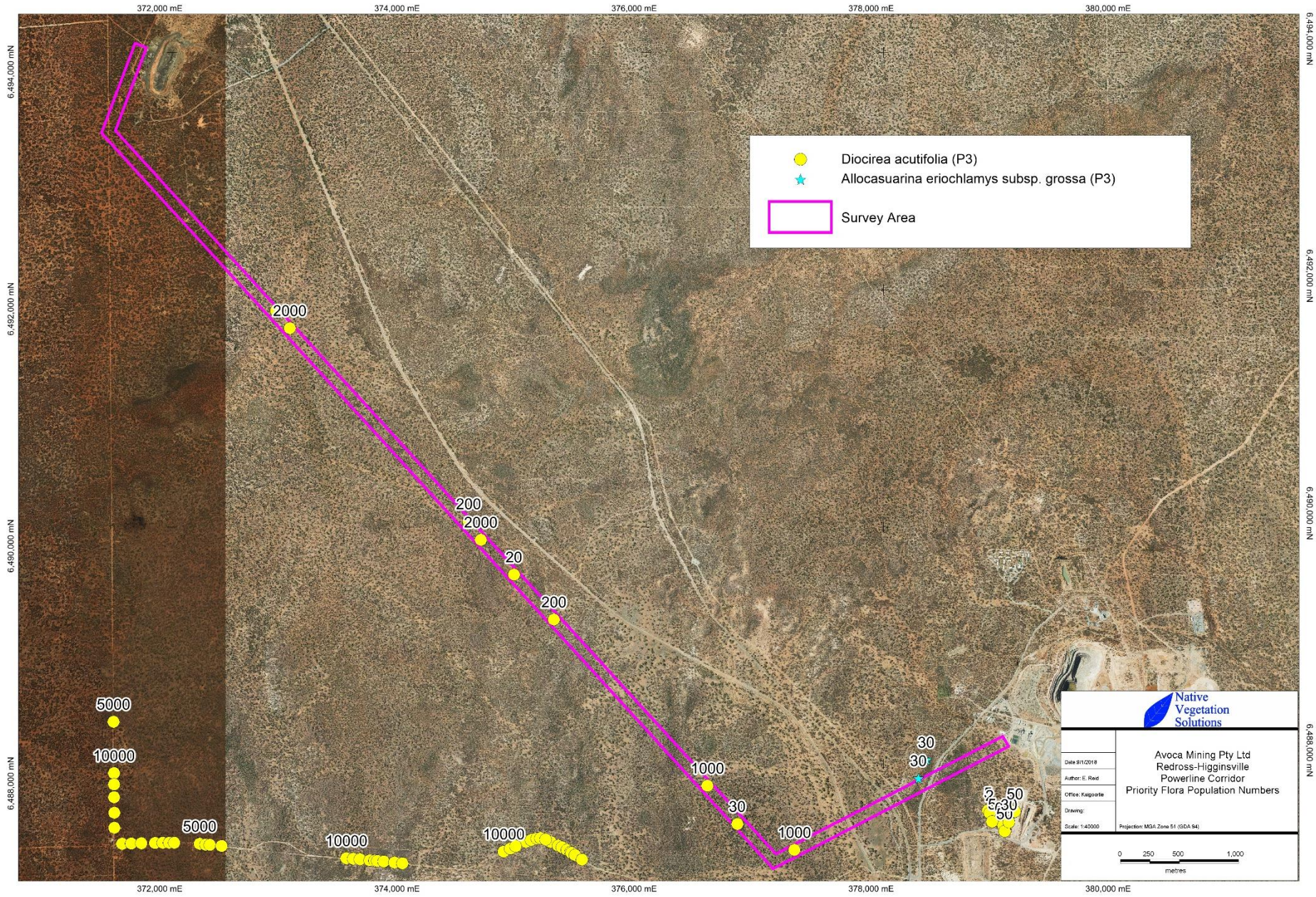
Appendix 4

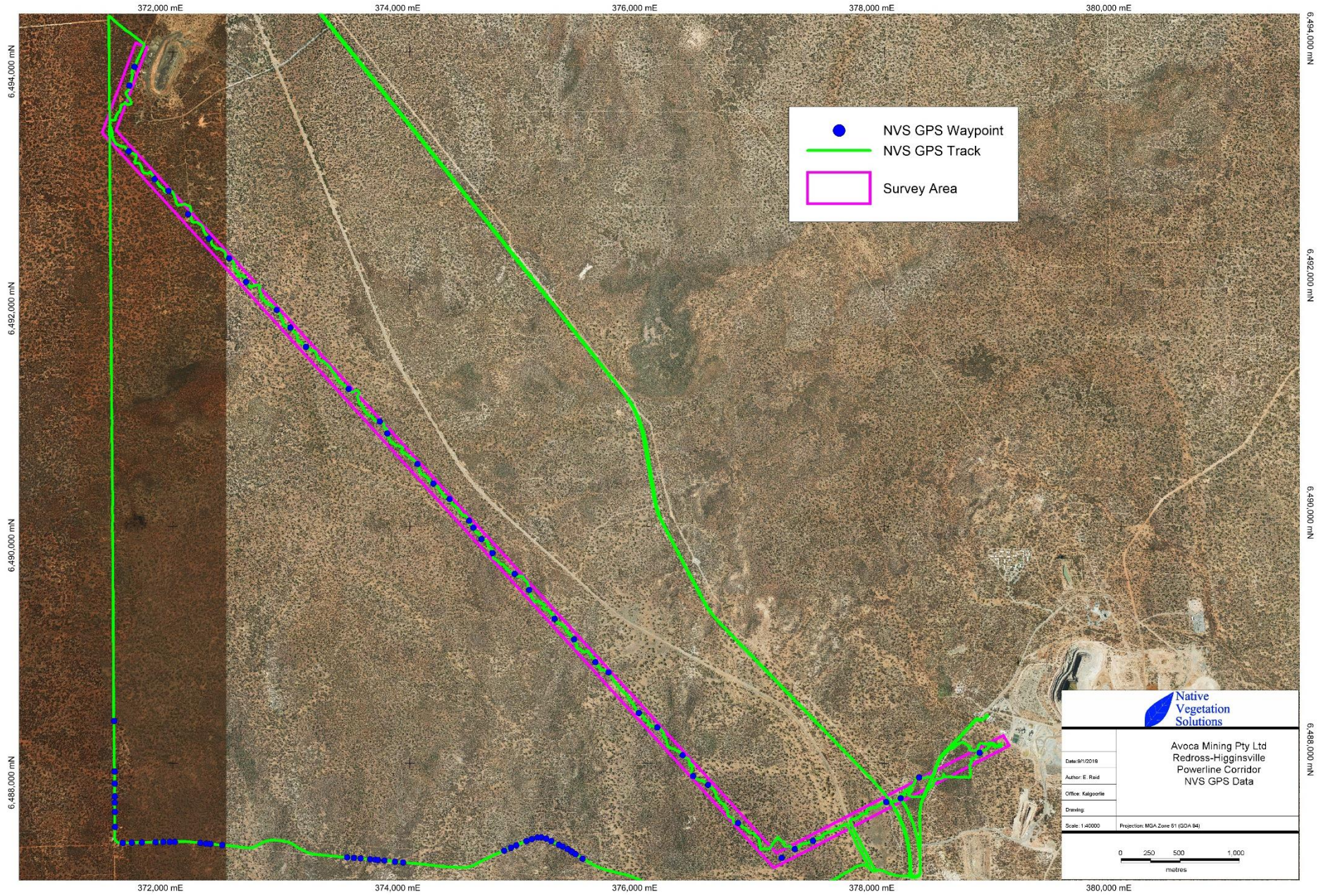
Vegetation Mapping


372,000 mE
374,000 mE
376,000 mE
378,000 mE
380,000 mE
6,494,000 mN
6,492,000 mN
6,490,000 mN
6,488,000 mN
Native Vegetation Solutions
Avoca Mining Pty Ltd
Redross-Higginsville
Powerline Corridor
Survey Area
Date:10/1/2018
Author: E. Reid
Office: Kalgoorlie
Drawing:
Scale: 1:40000
Projection: MGA Zone 51 (GDA 94)
0 250 500 1,000
metres


372,000 mE
374,000 mE
376,000 mE
378,000 mE
380,000 mE
6,494,000 mN
6,492,000 mN
6,490,000 mN
6,488,000 mN
A
B
C
D
E
F
G
H
I
J
Native Vegetation Solutions
Avoca Mining Pty Ltd
Redross-Higginsville
Powerline Corridor
Vegetation Groups
Date:9/1/2018
Author: E. Reid
Office: Kalgoorlie
Drawing:
Scale: 1:40000
Projection: MGA Zone 51 (GDA 94)
0 250 500 1,000
metres


372,000 mE
374,000 mE
376,000 mE
378,000 mE
380,000 mE
6,494,000 mN
6,492,000 mN
6,490,000 mN
6,488,000 mN
Completely Degraded
Good
Very Good
Native Vegetation Solutions
Avoca Mining Pty Ltd
Redross-Higginsville
Powerline Corridor
Vegetation Condition
Date 9/1/2019
Author: E. Reid
Office: Kalgoorlie
Drawing:
Scale: 1:40000
Projection: MGA Zone 51 (GDA 94)
0 250 500 1,000
metres


372,000 mE
374,000 mE
376,000 mE
378,000 mE
380,000 mE
6,494,000 mN
6,492,000 mN
6,490,000 mN
6,488,000 mN
Diocirea acutifolia (P3)
Allocasuarina eriochlamys subsp. grossa (P3)
Survey Area
2000
200
2000
20
200
1000
30
1000
30
30
2
50
5
30
50
5000
10000
5000
10000
10000
Native Vegetation Solutions
Avoca Mining Pty Ltd
Redross-Higginsville
Powerline Corridor
Priority Flora Population Numbers
Date: 8/1/2018
Author: E. Reid
Office: Kalgoorlie
Drawing:
Scale: 1:40000
Projection: MGA Zone 51 (GDA 94)
0
250
500
1,000
metres


372,000 mE
374,000 mE
376,000 mE
378,000 mE
380,000 mE
6,494,000 mN
6,492,000 mN
6,490,000 mN
6,488,000 mN
NVS GPS Waypoint
NVS GPS Track
Survey Area
Native Vegetation Solutions
Avoca Mining Pty Ltd
Redross-Higginsville
Powerline Corridor
NVS GPS Data
Date:9/1/2018
Author: E. Reid
Office: Kalgoorlie
Drawing:
Scale: 1:40000
Projection: MGA Zone 51 (GDA 94)
0 250 500 1,000
metres

Appendix 5

Species List

Family	Genus	Species	Perennial (P) Annual (A) Non-Native (NN)	A	B	C	D	E	F	G	H	I	J
Amaranthaceae	*Ptilotus*	*nobilis*	A				*						
Amaranthaceae	*Ptilotus*	*obovatus*	P	*	*		*	*					
Apocynaceae	*Alyxia*	*buxifolia*	P	*		*	*		*	*	*	*	
Apocynaceae	*Marsdenia*	*australis*	P	*			*						
Asteraceae	*Cratystylis*	*conocephala*	P		*	*	*	*		*	*		
Asteraceae	*Cratystylis*	*subspinescens*	P				*						
Asteraceae	*Olearia*	*muelleri*	P	*	*		*	*	*			*	
Asteraceae	*Olearia*	*pimelioides*	P							*			
Asteraceae	*Olearia*	*subspicata*	P	*									
Asteraceae	*Rhodanthe*	*charsleyae*	A				*	*					
Asteraceae	*Rhodanthe*	*floribunda*	A				*			*	*		
Boraginaceae	*Halgania*	*andromedifolia*	P				*			*	*	*	
Brassicaceae	*Carrichtera*	*annua*	A, NN				*						
Casuarinaceae	*Allocasuarina*	*eriochlamys* subsp. *grossa* (P3)	P	*									
Casuarinaceae	*Allocasuarina*	*helmsii*	P	*									
Chenopodiaceae	*Atriplex*	*bunburyana*	P				*	*					
Chenopodiaceae	*Atriplex*	*nummularia* subsp. *spathulata*	P	*	*	*	*	*					
Chenopodiaceae	*Atriplex*	*stipitata*	P	*	*	*	*	*					
Chenopodiaceae	*Atriplex*	*vesicaria*	P	*	*	*	*	*					
Chenopodiaceae	*Chenopodium*	*gaudichaudianum*	P	*			*	*					
Chenopodiaceae	*Enchylaena*	*tomentosa* var. *tomentosa*	P	*		*	*						
Chenopodiaceae	*Eriochiton*	*sclerolaenoides*	P	*			*						
Chenopodiaceae	*Maireana*	*georgei*	P	*			*						
Chenopodiaceae	*Maireana*	*pentatropis*	P				*	*					
Chenopodiaceae	*Maireana*	*platycarpa*	P		*								
Chenopodiaceae	*Maireana*	*pyramidata*	P		*								
Chenopodiaceae	*Maireana*	*sedifolia*	P		*	*	*						
Chenopodiaceae	*Maireana*	*tomentosa*	P	*			*	*					
Chenopodiaceae	*Maireana*	*triptera*	P		*		*	*					
Chenopodiaceae	*Rhagodia*	*drummondii*	P	*		*	*	*		*	*		
Chenopodiaceae	*Salsola*	*australis*	A		*								
Chenopodiaceae	*Sclerolaena*	*cuneata*	P	*				*					
Chenopodiaceae	*Sclerolaena*	*densiflora*	P	*			*	*					
Chenopodiaceae	*Sclerolaena*	*diacantha*	P	*	*		*	*					
Chenopodiaceae	*Sclerolaena*	*eriacantha*	P				*						
Chenopodiaceae	*Sclerolaena*	*eurotioides*	P				*	*					
Chenopodiaceae	*Sclerolaena*	*patenticuspis*	P				*	*					
Chenopodiaceae	*Tecticornia*	*disarticulata*	P			*	*	*					
Fabaceae	*Acacia*	acuminata	P						*				
Fabaceae	*Acacia*	*colletioides*	P	*	*		*		*	*	*	*	
Fabaceae	*Acacia*	*erinacea*	P	*			*		*	*	*		
Fabaceae	*Acacia*	*hemiteles*	P									*	

Family	Genus	Species	Perennial (P) Annual (A) Non-Native (NN)	A	B	C	D	E	F	G	H	I	J
Fabaceae	*Acacia*	*kalgoorliensis*	P		*								
Fabaceae	*Acacia*	*ligulata*	P		*		*		*				
Fabaceae	*Acacia*	*quadrimarginea*	P	*									
Fabaceae	*Acacia*	*tetragonophylla*	P	*			*						
Fabaceae	*Daviesia*	*aphylla*	P						*				
Fabaceae	*Mirbelia*	*graniticola*	P	*									
Fabaceae	*Senna*	*artemisioides* subsp. *filifolia*	P	*	*		*	*	*				
Frankeniaceae	*Frankenia*	*interioris*	P				*						
Frankeniaceae	*Frankenia*	*pauciflora*	P				*						
Goodeniaceae	*Scaevola*	*spinescens*	P	*	*	*	*		*	*	*	*	
Lamiaceae	*Prostanthera*	*campbellii*	P									*	
Lamiaceae	*Prostanthera*	*grylloana*	P	*			*						
Lamiaceae	*Salvia*	*verbenaca*	A, NN				*						
Lamiaceae	*Westringia*	*rigida*	P	*	*				*	*	*	*	
Malvaceae	*Radyera*	*farragei*	P		*								
Myrtaceae	*Eucalyptus*	*calycogona*	P		*								
Myrtaceae	*Eucalyptus*	*campaspe*	P				*						
Myrtaceae	*Eucalyptus*	*celastroides*	P				*						
Myrtaceae	*Eucalyptus*	*cylindriflora*	P		*								
Myrtaceae	*Eucalyptus*	*dundasii*	P		*								
Myrtaceae	*Eucalyptus*	*flocktoniae* subsp. *hebes*	P		*		*						
Myrtaceae	*Eucalyptus*	*griffithsii*	P						*				
Myrtaceae	*Eucalyptus*	*lesouefii*	P	*	*		*	*		*		*	
Myrtaceae	*Eucalyptus*	*melanoxylon*	P		*								
Myrtaceae	*Eucalyptus*	*oleosa* subsp. *oleosa*	P	*	*	*	*	*			*		
Myrtaceae	*Eucalyptus*	*ravida*	P				*						
Myrtaceae	*Eucalyptus*	*salmonophloia*	P		*	*	*	*					
Myrtaceae	*Eucalyptus*	*salubris*	P		*		*	*				*	
Myrtaceae	*Eucalyptus*	*torquata*	P	*						*	*		
Myrtaceae	*Eucalyptus*	*transcontinentalis*	P		*	*	*			*			
Myrtaceae	*Eucalyptus*	*yilgarnensis*	P			*	*						
Myrtaceae	*Melaleuca*	*sheathiana*	P	*	*	*	*			*	*	*	
Poaceae	*Aristida*	*contorta*	P							*		*	
Poaceae	*Austrostipa*	*elegantissima*	P	*	*		*		*				
Poaceae	*Austrostipa*	*nitida*	P	*	*		*	*					
Poaceae	*Cymbopogon*	*obtectus*	P				*						
Poaceae	*Monachather*	*paradoxus*	P				*	*					
Portulacaceae	*Calandrinia*	*eremaea*	A									*	
Proteaceae	*Grevillea*	*acuaria*	P						*			*	
Rhamnaceae	*Cryptandra*	*graniticola*	P	*									
Rhamnaceae	*Trymalium*	*myrtillus* subsp. *myrtillus*	P	*						*	*		
Santalaceae	*Exocarpos*	*aphyllus*	P	*	*	*	*		*			*	
Santalaceae	*Santalum*	*acuminatum*	P	*	*	*	*	*		*	*		
Santalaceae	*Santalum*	*spicatum*	P	*									

Family	Genus	Species	Perennial (P) Annual (A) Non-Native (NN)	A	B	C	D	E	F	G	H	I	J
Sapindaceae	*Dodonaea*	*lobulata*	P	*			*						
Sapindaceae	*Dodonaea*	*microzyga* var. *acrolobata*	P	*									
Sapindaceae	*Dodonaea*	*stenozyga*	P				*						
Scrophulariaceae	*Diocirea*	*acutifolia* (P3)	P			*	*			*			
Scrophulariaceae	*Eremophila*	*alternifolia*	P	*			*						
Scrophulariaceae	*Eremophila*	*caperata*	P							*	*	*	
Scrophulariaceae	*Eremophila*	*clavata*	P	*	*	*	*			*			
Scrophulariaceae	*Eremophila*	*decipiens* subsp. *decipiens*	P		*		*						
Scrophulariaceae	*Eremophila*	*georgei*	P	*									
Scrophulariaceae	*Eremophila*	*glabra subsp. glabra*	P	*	*		*					*	
Scrophulariaceae	*Eremophila*	*interstans* subsp. *interstans*	P				*						
Scrophulariaceae	*Eremophila*	*interstans* subsp. *virgata*	P	*	*	*	*	*	*				
Scrophulariaceae	*Eremophila*	*ionantha*	P		*		*		*				
Scrophulariaceae	*Eremophila*	*longifolia*	P		*		*						
Scrophulariaceae	*Eremophila*	*maculata* subsp. *brevifolia*	P		*		*						
Scrophulariaceae	*Eremophila*	*psilocalyx*	P	*						*	*		
Scrophulariaceae	*Eremophila*	*scoparia*	P	*	*	*	*	*					
Scrophulariaceae	*Myoporum*	*platycarpum* subsp. *platycarpum*	P				*						
Solanaceae	*Duboisia*	*hopwoodii*	P				*						
Solanaceae	*Lycium*	*australe*	P				*						
Solanaceae	*Solanum*	*nummularium*	P	*	*		*	*					
Solanaceae	*Solanum*	*orbiculatum*	P	*									
Thymelaeaceae	*Pimelea*	*microcephala* subsp. *microcephala*	P	*				*					
Zygophyllaceae	*Zygophyllum*	*aurantiacum*	P		*								
Zygophyllaceae	*Zygophyllum*	*eremaeum*	A		*		*	*					

Appendix 6

Priority Flora Recorded During the Survey

Species	Conservation Code	Zone	Easting (m)	Northing (m)	Recorded Number of Plants	Inside Survey Area	Outside Survey Area
Allocasuarina eriochlamys subsp. *grossa*	P3	51 J	378295	6487880	30	*	
Diocirea acutifolia	P3	51 J	377249	6487275	1000	*	
Diocirea acutifolia	P3	51 J	376767	6487496	30	*	
Diocirea acutifolia	P3	51 J	376515	6487817	1000	*	
Diocirea acutifolia	P3	51 J	375221	6489219	200	*	
Diocirea acutifolia	P3	51 J	374883	6489599	20	*	
Diocirea acutifolia	P3	51 J	374603	6489892	2000	*	
Diocirea acutifolia	P3	51 J	374500	6490047	200	*	
Diocirea acutifolia	P3	51 J	372993	6491676	2000	*	
Diocirea acutifolia	P3	51 J	372878	6491826		*	
Diocirea acutifolia	P3	51 J	378882	6487611	5		*
Diocirea acutifolia	P3	51 J	378896	6487588	2		*
Diocirea acutifolia	P3	51 J	378916	6487516	5		*
Diocirea acutifolia	P3	51 J	379011	6487484	60		*
Diocirea acutifolia	P3	51 J	379022	6487434	50		*
Diocirea acutifolia	P3	51 J	379059	6487511	30		*
Diocirea acutifolia	P3	51 J	379109	6487601	50		*
Diocirea acutifolia	P3	51 J	377955	6485571	15		*
Diocirea acutifolia	P3	51 J	377953	6485498	10		*
Diocirea acutifolia	P3	51 J	377940	6485470	60		*
Diocirea acutifolia	P3	51 J	377977	6485371	100		*
Diocirea acutifolia	P3	51 J	377952	6485285	60		*
Diocirea acutifolia	P3	51 J	377941	6485047	4		*
Allocasuarina eriochlamys subsp. *grossa*	P3	51 J	378361	6488036	30		*
Diocirea acutifolia	P3	51 J	371505	6488358	5000		*
Diocirea acutifolia	P3	51 J	371510	6487923	10000		*
Diocirea acutifolia	P3	51 J	371510	6487829			*
Diocirea acutifolia	P3	51 J	371511	6487720			*
Diocirea acutifolia	P3	51 J	371512	6487590			*
Diocirea acutifolia	P3	51 J	371513	6487464			*
Diocirea acutifolia	P3	51 J	371577	6487328			*
Diocirea acutifolia	P3	51 J	371655	6487330			*
Diocirea acutifolia	P3	51 J	371740	6487332			*
Diocirea acutifolia	P3	51 J	371856	6487335			*
Diocirea acutifolia	P3	51 J	371922	6487337			*
Diocirea acutifolia	P3	51 J	371975	6487337			*
Diocirea acutifolia	P3	51 J	372018	6487338			*
Diocirea acutifolia	P3	51 J	372233	6487328	5000		*
Diocirea acutifolia	P3	51 J	372283	6487323			*
Diocirea acutifolia	P3	51 J	372318	6487319			*
Diocirea acutifolia	P3	51 J	372417	6487309			*
Diocirea acutifolia	P3	51 J	373470	6487206	10000		*
Diocirea acutifolia	P3	51 J	373527	6487201			*
Diocirea acutifolia	P3	51 J	373584	6487197			*
Diocirea acutifolia	P3	51 J	373668	6487189			*
Diocirea acutifolia	P3	51 J	373709	6487186			*
Diocirea acutifolia	P3	51 J	373731	6487184			*
Diocirea acutifolia	P3	51 J	373786	6487179			*
Diocirea acutifolia	P3	51 J	373874	6487170			*
Diocirea acutifolia	P3	51 J	373943	6487164			*
Diocirea acutifolia	P3	51 J	374797	6487263	10000		*
Diocirea acutifolia	P3	51 J	374851	6487288			*
Diocirea acutifolia	P3	51 J	374897	6487308			*
Diocirea acutifolia	P3	51 J	374983	6487344			*
Diocirea acutifolia	P3	51 J	375028	6487360			*
Diocirea acutifolia	P3	51 J	375076	6487374			*
Diocirea acutifolia	P3	51 J	375108	6487376			*
Diocirea acutifolia	P3	51 J	375151	6487365			*
Diocirea acutifolia	P3	51 J	375194	6487344			*
Diocirea acutifolia	P3	51 J	375257	6487313			*
Diocirea acutifolia	P3	51 J	375288	6487298			*
Diocirea acutifolia	P3	51 J	375330	6487277			*
Diocirea acutifolia	P3	51 J	375360	6487258			*
Diocirea acutifolia	P3	51 J	375370	6487252			*
Diocirea acutifolia	P3	51 J	375398	6487233			*
Diocirea acutifolia	P3	51 J	375456	6487196			*