

Beacon Minerals Ltd

JAURDI HILLS LEVEL 2 FLORA AND VEGETATION SURVEY Part 1- July 2017



Prepared for:

Prepared by: Native Vegetation Solutions PO Box 41 KALGOORLIE WA 6430 Telephone: 08 9021 5818 Mobile: 0407 998 953 E-mail: <u>eren@nativevegsolutions.com.au</u> ABN: 36 150 274 469

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EXECUTIVE SUMMARY

The parent entity, Beacon Minerals Limited (BCN) is a publicly listed company which has a 100% interest in Beacon Mining Pty Ltd (BM). BCM is required to make all the financial and operating policy decisions for this subsidiary. BM has gold interests and is the operator of its Jaurdi Hills Project in the Coolgardie Region of Western Australia. Via exploration drilling within the project area, BM has identified the Lost Dog Deposit within the Mining Lease M16/529. BM provided Native Vegetation Solutions (NVS) with a survey area which encompasses the main mining areas as well as other infrastructure related to mining the mineral resource. The location of this survey area is approximately 32 km northwest of Coolgardie (Figure 1).

This report will support numerous applications including mining proposals, works approvals and clearing permits submitted to relative Government Departments.

The survey area, for the purposes of this report, encompasses an area totalling approximately 589.91 ha, which intersects Mining Tenements M16/34, M16/115, M16/255, M16/529, Prospecting Licenses P16/2925, P16/2926, P16/3031 and Exploration License E16/469. At this stage, the final footprint of mining related disturbances is yet to be finalised, however will be encompassed entirely within the survey area.

The survey area is located in the Coolgardie Botanical District of Beard (1990). The Coolgardie Botanical District is dominated by eucalypt woodlands, eucalypt open woodlands in the east, other shrublands, heath, *Acacia* shrublands, chenopod and samphire shrublands, mallee woodlands and shrublands. There are small areas of *Acacia* forests and woodlands, and hummock grasslands occurring in the north (DOTEE, 2017).

Within the Coolgardie Botanical District, the Eastern Goldfields subregion is comprised 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 granulites of the Fraser Range. The area is rich in endemic *Acacia*'s (CALM, 2002).

The Goldfields Woodlands is a centre of endemism and includes exceptionally high diversity of *Eucalyptus* species with as many as 170 species occurring in the bioregion. The COO3 subregion also has high diversity in *Acacia* species, as well as ephemeral flora communities of tertiary sandplain shrublands and of valley floor woodlands (CALM, 2002).

The search undertaken with the EPBC's Protected Matters Search Tool reported that no TECs were present in the survey area (DOTEE, 2017b). The search also revealed that the survey area may contain habitat for the invasive weed species *Carrichtera annua* (Ward's Weed).

The threatened species, *Gastrolobium graniticum*, was listed as either likely to be in the area or having potential habitat occurring in the area. This species occurs mainly on granite outcrops. No granite outcrops were identified in the survey area.

The DPAW database searches revealed a potential for 2 Threatened and 39 Priority Flora species to occur within a 30km radius of the survey area (DBCA, 2017a). No known locations of these Flora occur within the survey area, while the closest location occurs approximately 7 km east of the survey area.

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

The PEC/TEC search (DBCA, 2017) revealed no TECs or PECs within the survey area.

The survey area does not lie within or contain any ESA's or Conservation Reserves (DWER, 2017).

No water bodies were identified within the survey area via the CPS Map Viewer (DWER, 2017).

The survey area lies south of the 26th parallel, however receives average annual rainfall of approximately 270.3 mm (BOM, 2017), 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 or weed infestations which could pose a risk within the survey area during seasonally favourable conditions.

Nine vegetation groups were identified during this survey, largely following topographical features and dominant species. Mapping of the 9 vegetation groups, as well as the quadrat locations can be seen in Appendix C.

Eighty-six species were recorded within the survey area with 85 species recorded within quadrats. Thirty-nine genera and 24 families were found. These are listed in Appendix E, per Quadrat as well as per vegetation group. Of the native species, Chenopodiaceae had the highest representation, with 19 species from 8 genera, dominated by *Maireana*. Fabaceae and Scrophulariaceae were the next best represented families with 12 species each.

Of the 86 taxa recorded there were two introduced weed species; *Carrichtera annua* (Ward's Weed) and *Cucumis myriocarpus* (Prickly Paddy Melon). These weed species were recorded within 2 of the 29 quadrats. No weed species recorded were considered declared plants by DPIRD (2017).

The most common and widespread species were *Eremophila scoparia, Exocarpos aphyllus and Senna artemisioides* subsp. *filifolia,* which were recorded within 25 quadrats. Its canopy cover was 10-30%. The next most common and widespread species was *Ptilotus obovatus,* recorded in 19 quadrats, with a canopy cover less than 10%.

There were 30 taxa recorded from within a single site, Q23. Of these, none were weed species.

No Threatened species were recorded during the survey.

One Priority species, Eremophila praecox (P1), was identified in the survey area within Q22, which lies within Vegetation Group H. Two plants were recorded here within a 200m radius.

Vegetation condition was generally 'Good' to 'Very Good' (Keighery 1994). Disturbance was present within the survey area mostly attributed to historic mining activities, access tracks, exploration related activities, and also grazing.

The EPA objective for flora and vegetation is to maintain the abundance, species diversity and geographical distribution of flora and vegetation as well as protect Threatened flora consistent with the provisions of the *Biodiversity Conservation Act 2016*.

The proposed clearing of vegetation will result in the loss of some individuals from the local area; however, the impact will not be great enough to remove whole communities or populations. Most of the species and communities recorded during this survey are widespread throughout the Eastern Goldfields subregion and adjoining regions, and therefore the loss of a small proportion from this area will not be significant.

This report summarises the results of the first stage of the Level 2 survey. It is deemed necessary to conduct a second stage follow up survey in Spring 2017, to incorporate any additional taxa that may appear during this seasonal variation.



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1 INTRODUCTION

1.1 BACKGROUND

The parent entity, Beacon Minerals Limited (BCN) is a publicly listed company which has a 100% interest in Beacon Mining Pty Ltd (BM). BCN is required to make all the financial and operating policy decisions for this subsidiary. BM has gold interests and is the operator of its Jaurdi Hills Project in the Coolgardie Region of Western Australia. Via exploration drilling within the project area, BM has identified the Lost Dog Deposit within the Mining Lease M16/529. BM provided Native Vegetation Solutions (NVS) with a survey area which encompasses the main mining areas as well as other infrastructure related to mining the mineral resource. The location of this survey area is approximately 32 km northwest of Coolgardie (Figure 1).

This report will support numerous applications including mining proposals, works approvals and clearing permits submitted to relative Government Departments.

The survey area, for the purposes of this report, encompasses an area totalling approximately 589.91 ha, which intersects Mining Tenements M16/34, M16/115, M16/255, M16/529, Prospecting Licenses P16/2925, P16/2926, P16/3031 and Exploration License E16/469. At this stage, the final footprint of mining related disturbances is yet to be finalised, however will be encompassed entirely within the survey area.





Figure 1: Regional Location of the Jaurdi Hills Survey Area



1.2 PURPOSE AND SCOPE

The objective of this report is to record and analyse the results of the flora and vegetation component of a Level 2 assessment conducted in accordance with the following documents:

- Terrestrial Biological Surveys as an Element of Biodiversity Protection; Position Statement No 3 (EPA, 2002);
- Guidance Statement No. 51- Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (EPA, 2004); and
- Technical Guide- Flora and Vegetation Surveys for Environmental Impact Assessment (EPA and DPAW, 2015).

A Level 2 Flora and Vegetation Survey has two components:

- 1) Level 1 Survey
 - a) Desktop study which includes a literature review and a search of the relevant databases; and
 - b) Reconnaissance survey of the subject area to verify the desktop survey, undertake low impact sampling, define vegetation groups present in the area, search for species of conservation significance and to determine potential sensitivity to impact.
- 2) Detailed Plot Based Survey
 - a) Detailed survey, comprising multiple visits in main flowering seasons or other seasons and replication of plots in vegetation units incorporating greater coverage than a reconnaissance survey; and
 - b) Comprehensive survey when necessary to: enhance the level of knowledge at the locality or sub-regional scale, in order to provide wider context for the local scale.

Therefore, the scope of work for the Level 2 flora and vegetation survey was to:

- Conduct a desktop study that includes a literature review and search of relevant databases;
- Conduct a plot-based survey within the survey area (20m x 20m quadrats);
- Prepare an inventory of species occurring in the study area;
- Conduct PATN analysis of quadrat based presence/absence data;
- Quantify survey intensity via Species Accumulation Curve;
- Describe the vegetation associations in the survey area;
- Identify any vegetation communities or flora species of particular 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, particularly flora of conservation significance, within the study area.



2 EXISTING ENVIRONMENT

2.1 CLIMATE

Typically, the climate is characterised as being arid to semi-arid Mediterranean with mainly winter rainfall as well as summer thunderstorms. The area receives approximately 250-300mm of rainfall per year (Beard, 1990; CALM, 2002). The nearest official meteorological weather station with the most complete and up to date information is Coolgardie, which is located approximately 32 km southeast of the survey area.

2.1.1 Temperature

Mean annual minimum temperature at Coolgardie is 11.2°C and mean annual maximum temperature is 25.0°C (BOM, 2017). The coldest temperatures occur in July (mean minimum temperature 5.2°C), the hottest is January (mean maximum temperature 33.3°C) and diurnal temperature variations are relatively consistent throughout the year (Figure 2).



Figure 2: Mean temperature ranges for Coolgardie weather station (BOM, 2017)

2.1.2 Rainfall

The annual average rainfall at Coolgardie is 270.7mm over an average 34.7 rain days (BOM, 2017). Average rainfall varies across the months, with slightly larger rainfall events falling between January to August (Figure 3), and the least rainfall received in September. Rainfall for 2016 was more than triple the average for January, with June, August and December also receiving above average rainfall levels. All other months in 2016 recorded below average levels. November was the driest month for 2016.



Rainfall for 2017 was not recorded at the Coolgardie weather station (012018) and the nearest rainfall recorded was Credo which is located approximately 27km northwest of the survey area. Rainfall at Credo in 2017 was more than quadruple the average of Coolgardie for January, with February and March also receiving above average rainfall levels (Figure 4). April, May, June and July all received lower than Coolgardie's average in 2017.



Figure 3: Rainfall data for the Coolgardie Meteorological Station (BOM, 2017)





Figure 4: Rainfall data for the Credo Meteorological Station (BOM, 2017)

2.2 INTERIM BIOGEOGRAPHIC REGIONALISATION OF AUSTRALIA (IBRA) REGION

The IBRA recognises 89 bioregions within Australia and 419 subregions (DOTEE, 2017a). The project is located in the Eastern Goldfields IBRA subregion (COO3) which totals over 5.1 million hectares (CALM, 2002). The Eastern Goldfields subregion lies on the '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 over 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 dominant land uses of the COO3 subregion are: UCL and Crown reserves, Grazing-Native pastures-leasehold (37.8%), freehold (7.15%), conservation, mining leases (CALM, 2002).

2.3 LANDFORMS AND SOILS

Native Vegetation

This bioregion consists of granite rocky outcrops, low greenstone hills, laterite uplands and broad plains. There are no major rivers or creeks within the bioregion. Numerous salt lakes of varying size occur across the region (DOTEE, 2017).

Beard (1990) describes the soil types in the COO3 subregion as: principally brown calcareous earths, with sandplains in the western part and some large playa lakes.

2.4 BOTANICAL DISTRICTS AND EXISTING VEGETATION

The survey area is located in the Coolgardie Botanical District of Beard (1990). The Coolgardie Botanical District is dominated by eucalypt woodlands, eucalypt open woodlands in the east, other shrublands, heath, *Acacia* shrublands, chenopod and samphire shrublands, mallee woodlands



and shrublands. There are small areas of *Acacia* forests and woodlands, and hummock grasslands occurring in the north (DOTEE, 2017).

Within the Coolgardie Botanical District, the Eastern Goldfields subregion is comprised 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 granulites of the Fraser Range. The area is rich in endemic *Acacia*'s (CALM, 2002).

The Goldfields Woodlands is a centre of endemism and includes exceptionally high diversity of *Eucalyptus* species with as many as 170 species occurring in the bioregion. The COO3 subregion also has high diversity in *Acacia* species, as well as ephemeral flora communities of tertiary sandplain shrublands and of valley floor woodlands (CALM, 2002).



3 METHODS

3.1 PERSONNEL AND REPORTING

The following personnel were involved in the Level 2 flora and vegetation survey:

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

3.2 PRELIMINARY DESKTOP STUDY

A preliminary assessment of the survey area and its potential constraints was undertaken by reviewing relevant government agency managed databases (Sections 3.2.1 to 3.2.5, and Appendices 1 & 2) and consulting with government agencies where necessary. The following sections provide a summary of desktop searches undertaken for the project.

3.2.1 Environment Protection and Biodiversity Conservation Act Protected Matters

The *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* Protected Matters Search tool was utilised to provide results for matters of National Environmental Significance within the survey area using the coordinates displayed within the search results (Appendix 1) with a 1km buffer (DOTEE, 2017b).

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

3.2.2 Threatened Flora and Communities

The Threatened and Priority Flora Database managed by the Department of Biodiversity, Conservation and Attractions (DBCA) was searched for threatened and priority flora within a 30km radial area of the survey area shapefile (Reference: 04-0717FL).

The Threatened and Priority Ecological Communities (TECs and PECs) database was searched to determine the presence of PECs or TECs (Reference: 11-0717DBCA), with Geographic Information System (GIS) data supplied for assessment, within a 10km radial area of the survey area shapefile.

3.2.3 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 (<u>https://cps.der.wa.gov.au/main.html</u>).

3.2.4 Vegetation Type, Extent and Status

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

DPaW's Statewide Vegetation Statistics (DPAW, 2017) was also referenced for the current extent of Beard's Vegetation Groups.

3.2.5 Wetlands

The potential of wetlands within the project area was determined by examining DWER's Clearing Permit System Map Viewer (DWER, 2017).



3.2.6 Dieback

Dieback is only considered a potential issue for the project if both the mean annual rainfall of the area is >400mm, and if the project area resides south of the 26th parallel. Dieback is not considered an issue for the survey area as although it lies south of the 26th parallel it receives average annual rainfall of 270.3 mm, which is below the 400mm threshold mark. There are no records of *Phytophthora cinnamomi* establishing in natural ecosystems in regions receiving less than 400mm rainfall per annum (CALM, 2003).

3.3 LEVEL OF SURVEY

The survey was conducted in accordance with EPA's Position Statement No. 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA, 2002), Guidance for the Assessment of Environmental Factors No. 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2004) and Technical Guide- Flora and Vegetation Surveys for Environmental Impact Assessment (EPA and DPAW, 2015).

In designing this survey, note was taken of Tables 2 and 3 of EPA Guidance Statement 51 (pp 39-45). Using the Table 3 criterion on 'Size/scale of the proposal/impact' it is determined that the impact of this mining proposal is High, although other criteria (for example 'Degree of degradation or clearing within region' and 'Rarity of vegetation') may mitigate this to Medium impact. This survey, however, is designed to accommodate the High impact and as such, in the Eastern Goldfields subregion, a Level 2 survey is required.

3.4 SITE INVESTIGATION

The first stage of the field survey was conducted by Mr. Eren Reid, Botanist of NVS, on the 6th, 7th, 11th and 13th July 2017.

3.4.1 Field Methods

Prior to the field work, the aerial photography was examined and representative sample sites for quadrats were chosen to provide coverage over all viable vegetation types. Twenty-nine sites were chosen by this method.

In the field, these sites were visited and 20 x 20m quadrats established in appropriate locations, taking into account representativeness of the site to surrounding vegetation and vegetation boundaries.

Each quadrat site was marked in all corners with a 97cm galvanized fence dropper and was defined by tape measures. The location of one corner was captured on a TwoNav Aventura GPS at ±4m accuracy, using Universal Transverse Mercator location on GDA94 datum. Digital photographs were taken of each quadrat site.

Data collected at each quadrat included:

- Species Present;
- Topography;
- Rock Type;
- Soil Colour and Type;
- Aspect;
- % Bare Ground and Litter;
- Disturbance Level; and
- Vegetation Condition.

As well as a complete list of all species encountered, the average height and estimated coverage of the species making up the three stratum levels (Tallest, Mid and Lower).



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 quadrat was assessed using the method developed by Keighery (1994). Definitions of the condition scale are presented in Appendix A.

Vegetation groups were mapped (section 3.4.3 below).

Opportunistic sampling of plant taxa and vegetation group mapping was also utilised in the survey area between quadrat sampling points, via wandering traverses. 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 C.

3.4.2 Post-Field Methods

Unknown specimens collected in the field were identified post field work by Eren Reid with reference to published keys and samples held in the Reference Section of the Western Australian Herbarium (WAHERB).

Species information was transferred into Microsoft Excel[®] worksheets in preparation for PATN analysis (Belbin, 1994), via Bray and Curtis Flexible UPGMA, as well as input into a computer program which generates a species accumulation curve (Seaby & Henderson, 2006).

3.4.3 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 C.

3.5 LICENCE AND PERMITS

Flora was collected for identification under the Scientific Collection License SL011847 held by Mr E. Reid with expiry 09/07/2017.

3.6 NOMENCLATURE AND TAXONOMY

Nomenclature follows that used by the WAHERB.

Recently the WAHERB has updated its sequence and arrangement of collections to conform to the systematic sequence of the Angiosperm Phylogeny Group (APGIII), with the result that many Families and Genera have been moved or renamed. This report attempts to follow those changes in relation to species recorded during this survey. Definitions of Threatened Flora are also included in Section 9 below.



3.7 LIMITATIONS

Table 1 lists potential limitations that may have affected the survey. These are based on the listing given in the *Guidance Statement No. 51 Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004).

Possible Limitation	Constraint	Comment
		Experienced and competent personnel conducted the
Competency/experience of		survey. Eren Reid has over 13 years' experience in
the consultant carrying out		botanical surveys throughout the Goldfields and over a
the survey	No	variety of environments across Western Australia.
· · · · · · · · · · · · · · · · · · ·		The Scope of work was adequately defined. Vascular flora
		species were the focus of the survey and were thoroughly
		sampled Of all the plant taxa identified 17.5 % were
Scope	No	considered annual species
		All taxa not identified in the field were collected and
Proportion of flora identified	No	pressed and later identified by Fren Reid. See also
recorded and/or collected		Species Accumulation Curves in section 4.2.2.2
		Information on flora and vogetation of the region and local
		area was available from publicly available databases
Sources of information	No	alea was available from publicity available databases,
Dreparties of the teaks	INU	
Proportion of the tasks	NIa	
achieved	NO	All tasks completed.
		This survey was undertaken in July 2017. Rainfall
		averages were exceeded in January, February and March
		2017, while rainfall in April, May, June and July 2017 was
		below average. Only 6 specimens were collected during
		field work, which were all identified post field work. Timing
		would have been ideal earlier in April/May, however the
		second part of the field work is expected to account for
Timing/season	Potential	seasonal variation in Spring 2017.
		Disturbance from grazing and exploration was apparent in
		the survey area. However, the structural dominants of the
		vegetation persist and, the vegetation remains in Good to
Disturbance in survey area	No	Very Good condition.
		The survey intensity is considered to have been sufficient
		for a Level 2 survey according to EPA (2004) guidelines.
		Areas most likely to contain threatened and priority
		species were targeted. Vegetation mapping sites were
Intensity of survey effort	No	selected to provide adequate coverage of the survey area.
		Resources, in terms of time, equipment, support and
		personnel were adequate to undertake and complete the
Resources	No	Level 2 survey.
Remoteness and/or access		All the areas in need of survey were easily accessible from
problems	No	existing tracks, or by foot.
		Contextual information regarding vegetation and flora
		around the Eastern Goldfields subregion is readily
		available Adequate information was able to be accessed
Availability of contextual		from available databases (DBCA 2017 and DOTEE
information for the region	No	2017b)
intornation for the region		2017.0/.

Table 1: List of potential survey limitations



4 RESULTS

4.1 PRELIMINARY DESKTOP ASSESSMENT

4.1.1 EPBC Protected Matters Search Tool

The search undertaken with the EPBC's Protected Matters Search Tool reported that no TECs were present in the survey area (DOTEE, 2017b). The search also revealed that the survey area may contain habitat for the invasive weed species *Carrichtera annua* (Ward's Weed).

The threatened species, *Gastrolobium graniticum*, was listed as either likely to be in the area or having potential habitat occurring in the area. This species occurs mainly on granite outcrops. No granite outcrops were identified in the survey area.

Results of the EPBC Protected Matters Search Tool are included in Appendix B.

4.1.2 Threatened Flora and Communities

The DPAW database searches revealed a potential for 2 Threatened and 39 Priority Flora species to occur within a 30km radius of the survey area (DBCA, 2017a). No known locations of these Flora occur within the survey area, while the closest location occurs approximately 7 km east of the survey area.

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

The PEC/TEC search (DBCA, 2017) revealed no TECs or PECs within the survey area.

4.1.3 Environmentally Sensitive Areas and Conservation Reserves

The survey area does not lie within or contain any ESA's or Conservation Reserves (DWER, 2017).

4.1.4 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 and 3 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	8				
Vegetation Association Description*	Medium woodla	Medium woodland; salmon gum & gimlet				
			Scale			
Pre-European Extent (ha)	By Association	By Association	By IBRA Region (Coolgardie- COO)	By IBRA Sub- region (Eastern Goldfields- COO3)	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***	Pasture Grazing, Exploration and Mining					
Weed prevalence***	Low					

* Source: Shepherd et al. (2002)

**Source: DPAW (2017)

***Source: Field Assessment

Table 3: Summary of information regarding Pre-European and current vegetation extent of vegetation association 468 within the survey area

Factor		Value				
Beard Vegetation Association*	468	468				
Vegetation Association Description*	Medium woodla	Medium woodland; salmon gum & goldfields blackbutt				
			Scale			
Pre-European Extent (ha)	By Association	By Association	By IBRA Region (Coolgardie- COO)	By IBRA Sub- region Eastern Goldfields- COO3)	By Shire (Shire of Coolgardie)	
	476,113*	592,022**	583,357**	482,361**	149,487**	
% Pre-European Extent Remaining	100.00%*	98.63%**	98.63%**	98.34%**	99.43%**	
Surrounding Land Use***	Pasture Grazing, Exploration and Mining					
Weed prevalence***	Low					

* Source: Shepherd *et al.* (2002) **Source: DPAW (2017)

***Source: Field Assessment



4.1.5 Wetlands

No water bodies were identified within the survey area via the CPS Map Viewer (DWER, 2017).

4.1.6 Dieback

The survey area lies south of the 26th parallel, however receives average annual rainfall of approximately 270.3 mm (BOM, 2017), 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 or weed infestations which could pose a risk within the survey area during seasonally favourable conditions.

4.2 FIELD ASSESSMENT

4.2.1 Vegetation of the Survey Area

Beard's vegetation associations are very broad and are used over large areas in which there is also a large amount of variation at a more local level. The vegetation groups described below for the survey area fit into the broader Beard descriptions above in section 4.1.4.

The vegetation groups described below were determined visually based on dominant species, to form the descriptions taken at the time of the field survey

Descriptions of all 29 sites/quadrats are presented in Appendix F. For each site the physical features, vegetation description and unit, along with the species lists for the 20 x 20m plots with typical canopy cover and height, are provided.

4.2.1.1 Vegetation Groups

Nine vegetation groups were identified during this survey, largely following topographical features and dominant species. Mapping of the 9 vegetation groups, as well as the quadrat locations can be seen in Appendix C. Photographs of each quadrat and the relevant vegetation group can be seen in Appendix F.

A. Eucalyptus griffithsii and E. campaspe over Acacia acuminata over mixed sclerophyll shrubland

Open Shrub Mallee of *Eucalyptus griffithsii* and *E. campaspe* over *Acacia acuminata* and *Eremophila oldfieldii* subsp. *angustifolia* over *Dodonaea lobulata, Scaevola spinescens, Beyeria sulcata* var. *sulcata* and *Ptilotus obovatus*.

Quadrats: 1 and 2

B. Eucalyptus campaspe and Eucalyptus clelandii woodland

Low Woodland of *Eucalyptus campaspe* and *E. clelandii* over *Eremophila oldfieldii* subsp. angustifolia, *Eremophila interstans* subsp. virgata and Senna artemisioides subsp. filifolia over Atriplex nummularia subsp. spathulata, *Eremophila scoparia*, Acacia erinacea, *Eremophila pustulata*, Olearia muelleri and Ptilotus obovatus.

Quadrats: 3, 4 and 5



C. *Eucalyptus griffithsii* woodland over Chenopod shrublands

Open Tree Mallee of *Eucalyptus griffithsii* over *Eremophila alternifolia* and *Atriplex nummularia* subsp. *spathulata* over *Senna artemisioides* subsp. *filifolia, Atriplex stipitata* and *Ptilotus obovatus*.

Quadrat: 7

D. Open Chenopod shrubland

Tall Open Shrubland of *Eremophila interstans* subsp. *virgata* and *Atriplex nummularia* subsp. *spathulata* over *Eremophila scoparia* and *Senna cardiosperma* over *Atriplex stipitata*.

Quadrat: 6

E. Eucalyptus salmonophloia woodland

Woodland of Eucalyptus salmonophloia with occasional E. transcontinentalis over occasional E. oleosa subsp. oleosa over Eremophila scoparia, Exocarpos aphyllus, Eremophila caperata, Eremophila interstans subsp. virgata and Eremophila ionantha over Olearia muelleri, Senna artemisioides subsp. filifolia, Atriplex vesicaria, Atriplex stipitata, Senna cardiosperma, Acacia hemiteles, Ptilotus obovatus and Scaevola spinescens.

Quadrats: 8,10,11,12,13,14 and 20

F. Mixed *Eucalyptus* woodland over sclerophyll shrubland

Low Woodland of Eucalyptus clelandii, Eucalyptus salubris, Eucalyptus oleosa subsp. oleosa, Eucalyptus griffithsii and occasional Casuarina pauper over Eremophila interstans subsp. virgata, Santalum acuminatum, Eremophila caperata, and Eremophila oldfieldii subsp. angustifolia, over Senna artemisioides subsp. filifolia, Eremophila glabra subsp. glabra, Olearia muelleri, Acacia hemiteles, Eremophila pustulata and Eremophila parvifolia subsp. auricampa.

Quadrats: 9, 15, 18, 19, 21, 24 and 29

G. Eucalyptus thicket in open depressions

Low Open Forrest of *Eucalyptus clelandii*, *E. salubris and E. oleosa* subsp. *oleosa* over Senna artemisioides subsp. filifolia, Acacia merrallii, Exocarpos aphyllus and *Eremophila scoparia* over *Acacia colletioides, Eremophila ionantha* and *Eremophila decipiens* subsp. *decipiens*.

Quadrats: 16 and 17

H. Eucalyptus oleosa subsp. oleosa over Chenopod shrublands

Open Shrub Mallee of *Eucalyptus oleosa subsp. oleosa* with occasional *E. yilgarnensis* over *Eremophila interstans* subsp. *virgata* and *Eremophila scoparia* over *Cratystylis subspinescens, Cratystylis conocephala, Eremophila decipiens* subsp. *decipiens* and *Eremophila parvifolia* subsp. *auricampa*.

Quadrats: 22 and 23



I. Eucalyptus over Melaleuca sheathiana over Cratystylis conocephala on calcrete rises

Low Woodland of *Eucalyptus clelandii* over *Melaleuca sheathiana, Acacia hemiteles* and *Exocarpos aphyllus* over *Cratystylis conocephala, Westringia rigida, Grevillea acuaria, Acacia colletioides* and *Eremophila scoparia.*

Quadrats: 25, 26, 27 and 28

J. Existing Disturbance

This classification was for the purposes of mapping and was completely degraded, including historic open pits, haul roads and waste landforms.

Vegetation Group	Families	Genera	Species	Area (ha)	Percentage of survey area (%)
А	14	16	24	5.051	0.86%
В	12	19	36	42.94	7.28%
С	9	15	26	1.55	0.26%
D	8	13	26	9.58	1.62%
E	14	26	53	164.27	27.85%
F	16	25	53	255.03	43.23%
G	9	11	19	26.90	4.56%
Н	10	17	37	5.04	0.85%
I	14	24	40	55.37	9.39%
J- Existing Disturbance	0	0	0	24.18	4.10%
Total	24*	39*	86*	589.91 [#]	100.00%#

Table 4: Vegetation Group Extent within Survey Area

*Denotes total recorded in the survey area (not sum of column) # Denotes sum of column

4.2.1.2 PATN Analysis of Quadrat Data

PATN Analysis was completed on both the dominant species and all species recorded within each quadrat. The results are supplied below in Figure 5 and Figure 6.

The PATN analysis dendrogram of the dominant species in Figure 5, displays each quadrat with like symbols representing NVS mapped vegetation groups, and coloured lines depicting PATN defined vegetation groups. The dendrogram shows a good association between vegetation groups described in section 4.2.1.1, however there were some outliers (highlighted green).

These outliers are expected to occur for vegetation groups with transitional dominant species. In most cases one or two species will be present within a 20x20 quadrat, but it will not contain all the varieties of dominant species that will occur across that vegetation type, and as such some quadrats of the same vegetation group will be separated as different when assessed by the PATN Analysis.

Quadrat Q19 and Q4 were grouped together via PATN analysis, however were mapped as different vegetation groups because of the overall species composition of surrounding vegetation.



Due to the overlap and variation of lower storey species, these were grouped together via PATN Analysis.

Quadrats 6 and 9, were grouped via PATN analysis with vegetation group B, however were mapped as group D and group F respectively based on other species present and vegetation structure.

Quadrat 12 and 24 were combined as a separate group via PATN Analysis, due to the presence of similar dominant species *Eucalyptus oleosa subsp. oleosa, Eremophila scoparia* and *Daviesia aphylla* however, overall species composition saw these quadrats mapped as groups E and F respectively.

Vegetation groups G and F have been grouped together via PATN analysis based on dominant species. These vegetation groups are varieties of *Eucalyptus* woodland, which demonstrates that although the dominant Eucalypts may differ between vegetation groups, the dominant understorey species may remain similar, providing stronger correlations to some quadrats representing different vegetation groups. The dendrogram also demonstrates stronger correlation within this grouping which favours the vegetation groups mapped by NVS, i.e. Q15, Q21 and Q29 are more similar, representing vegetation group F; Q16 and Q17 are grouped more similarly representing vegetation group G;

Quadrat 18 was combined with Vegetation Group I via PATN analysis based on dominant species, including *Eucalyptus clelandii*, *Exocarpos aphyllus* and *Acacia hemiteles*. This quadrat was mapped as part of group F due to the other non-dominant species present and the vegetation structure, as well as the lack of *Melaleuca sheathiana* and *Cratystylis conocephala*.



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Figure 5: PATN Analysis of Dominant Species into 9 groups



The dendrogram below (Figure 6) of the analysis of all species shows a correlation to pre-grouped quadrats described in section 4.2.1.1. The dendrogram displays each quadrat with like symbols representing NVS mapped vegetation groups, and coloured lines depicting PATN defined vegetation groups. However, there were some outliers and these are highlighted in green (Figure 6).

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•	Q28					
•	Q27					

Figure 6: PATN Analysis of All Species into 9 groups

4.2.1.3 Vegetation Condition

Vegetation in the survey area has been subjected to historic mining, exploration activities and grazing.

According to Keighery (1994), most of the sites/quadrats inspected were in Good to Very Good condition (Appendix F). There were existing vehicle tracks in some areas, due to mine exploration activities. The vegetation more than 0.5m off these tracks was mostly in a Good to Very Good condition (Keighery 1994).

As discussed below in Section 4.2.2.4, there were two species of weeds observed during the survey.



4.2.2 Flora of the Survey Area

4.2.2.1 General

Eighty-six species were recorded within the survey area with 85 species recorded within quadrats. Thirty-nine genera and 24 families were found. These are listed in Appendix E, per Quadrat as well as per vegetation group. Of the native species, Chenopodiaceae had the highest representation, with 19 species from 8 genera, dominated by *Maireana*. Fabaceae and Scrophulariaceae were the next best represented families with 12 species each.

Of the 86 taxa recorded there were two introduced weed species; *Carrichtera annua* (Ward's Weed) and *Cucumis myriocarpus* (Prickly Paddy Melon). These weed species were recorded within 2 of the 29 quadrats. No weed species recorded were considered declared plants by DPIRD (2017).

The most common and widespread species were *Eremophila scoparia, Exocarpos aphyllus and Senna artemisioides* subsp. *filifolia,* which were recorded within 25 quadrats. Its canopy cover was 10-30%. The next most common and widespread species was *Ptilotus obovatus,* recorded in 19 quadrats, with a canopy cover less than 10%.

There were 30 taxa recorded from within a single site, Q23. Of these, none were weed species.

4.2.2.2 Species Accumulation Curves

A Species Accumulation Curve was generated using the computer programme **Species Diversity and Richness Version 4.1.2** (Seaby & Henderson, 2006). This curve was then fitted to a logarithmic curve in **Excel**[®], which is plotted in Figure 7 below. According to the Species Accumulation Curve below, the R² value (0.998) shows an acceptable fit for a logarithmic curve of the total accumulated species per number of quadrats established (Figure 7).

Sufficient sampling was inferred via the effort of intensity (number of quadrats established) versus the return of species collected (total accumulated species). The logarithmic trend line and R² values were generated in **Excel**[®]. From this fitted logarithmic curve formula, the asymptote was calculated where the gain of new species was less than 1% for every new quadrat established. Based on this reasoning, the asymptote was reached at 25 quadrats, at which the extrapolated total accumulated number of species is 83.3. Therefore the 85 species collected within the 29 quadrats represents 102.03% of the projected asymptote.







Figure 7: Species Accumulation Curve for the 29 sampled quadrats

4.2.2.3 Conservation significant species

No Threatened species were recorded during the survey.

One Priority species, *Eremophila praecox* (P1), was identified in the survey area within Q22, which lies within Vegetation Group H. Two plants were recorded here within a 200m radius. There is some suggestion that *Eremophila praecox* (P1) is a hybrid between *Eremophila ionantha* and *Eremophila parvifolia*, which were both abundant in the general area.

4.2.2.4 Introduced species

Two introduced species recorded in the survey area, not considered Declared Plants by the DPIRD (2017) are listed below:

- *Carrichtera annua* (Ward's Weed) is an annual, native to the Mediterranean. This weed is abundant in the Goldfields and Nullarbor shrublands, often dominating mine rehabilitation sites (Hussey *et al*, 2007). This species was recorded in Q5 and Q6.
- *Cucumis myriocarpus* (Prickly Paddy Melon) is a summer growing annual. It is a native southern Africa, and is often found in paddocks, roadsides and disturbed lands throughout the agricultural areas and southern Kimberley (Hussey *et al*, 2007). This species was recorded in Q5.



5 DISCUSSION

The EPA (2002) indicated that an ecological assessment of a site must consider its ecological value at the ecosystem level and its biodiversity value at the genetic, species and ecosystem level.

The survey area is located within the Eastern Goldfields subregion which includes four centres of endemism, all of which occur outside the survey area (CALM, 2002). This survey established that mostly, the flora within the project area is not unique, and is in fact common throughout the Eastern Goldfields subregion and adjoining regions.

Eighty-six species were recorded within the survey area with 85 species recorded within quadrats. Thirty-nine genera and 24 families were recorded. Of the native species, Chenopodiaceae had the highest representation, with 19 species from 8 genera, dominated by *Maireana*. Fabaceae and Scrophulariaceae were the next best represented families with 12 species each.

Of the 86 taxa recorded there were two introduced weed species; *Carrichtera annua* (Ward's Weed) and *Cucumis myriocarpus* (Prickly Paddy Melon) These weed species were recorded within 2 of the 29 quadrats. No weed species recorded were considered declared plants by DPIRD (2017).

No Threatened Flora were recorded in the survey area.

No TECs or PEC's were recorded within the survey area.

One Priority species, Eremophila praecox (P1), was identified in the survey area within Q22, which lies within Vegetation Group H. Two plants were recorded here within a 200m radius

Vegetation condition was generally 'Good' to 'Very Good' (Keighery 1994). Disturbance was present within the survey area mostly attributed to historic mining activities, access tracks, exploration related activities, and also grazing.

It is therefore not expected that the disturbance within the survey area will significantly negatively impact on the vegetation in the area in terms of fragmentation and loss of vegetation associations or species that may be unique. This is partially due to the overall size of the survey area as well as the similar abundant vegetation and habitat outside of the survey area.



6 IMPACT ASSESSMENT

6.1 THREATENING PROCESSES

The major processes likely to impact the Flora within the Survey area, if clearing were to proceed include:

- Vegetation clearing and therefore a reduction in biodiversity;
- Vehicle impacts on uncleared vegetation could increase if tracks are not adhered to;
- An increase in the area of disturbed land could result in an increase in non-native species;
- Dust generated during clearing of native vegetation and associated activities may settle on adjacent native vegetation, causing possible stress and perhaps death, especially during drier months; and
- Accidental fire arising from clearing and associated activities, may affect vegetation in surrounding areas.



7 CONCLUSIONS AND RECOMMENDATIONS

The survey established that the condition of the vegetation in the survey area is overall 'Good' to 'Very Good' condition. No Threatened Flora were recorded in the area. No TECs/PECs were recorded in the survey area.

One Priority Species *Eremophila praecox* (P1) was recorded in Q22. Only two plants were recorded at this location within a 200m radius.

The EPA objective for flora and vegetation is to maintain the abundance, species diversity and geographical distribution of flora and vegetation as well as protect Threatened flora consistent with the provisions of the *Biodiversity Conservation Act 2016*.

The proposed clearing of vegetation will result in the loss of some individuals from the local area; however, the impact will not be great enough to remove whole communities or populations. Most of the species and communities recorded during this survey are widespread throughout the Eastern Goldfields subregion and adjoining regions, and therefore the loss of a small proportion from this area will not be significant.

This report summarises the results of the first stage of the Level 2 survey. It is deemed necessary to conduct a second stage follow up survey in Spring 2017, to incorporate any additional annuals that may appear during this seasonal variation.

The following recommendations arise from the current flora survey:

- Follow-up Stage 2 survey in Spring 2017;
- Any disturbance/clearing be minimised as much as practicable to reduce the loss of individuals and impact on populations;
- Weed control measures should be implemented/followed during and post construction activities;
- Driving restrictions, ensuring that off-road driving is minimised; and
- All staff to be educated on the importance of fire prevention, and equipment provided for use in the event of fire.



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Acronyms:

BOM	Bureau of Meteorology, Australian Government
BSc	Bachelor of Science
CALM	Department of Conservation and Land Management (now DBCA)
COO	Coolgardie Bioregion, IBRA
COO3	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
DRF	Declared Rare Flora
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
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
TEC	Threatened Ecological Community
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 A - 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 B – EPBC and Other 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 <u>Environment Assessments</u> and the EPBC Act including significance guidelines, forms and application process details.

Report created: 10/08/17 16:22:01

Summary <u>Details</u> <u>Matters of NES</u> <u>Other Matters Protected by the EPBC Act</u> <u>Extra Information</u> <u>Caveat</u> <u>Acknowledgements</u>



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

Coordinates	
Buffer: 1.0Km	

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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 <u>permit</u> 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:	9
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:	7
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
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	ne 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 second science of the se	The EPBC Act - Threatened	Species list.
Name	Inreatened	Type of Presence
Dilus Actitia humalauraa		
Common Sandpiper [59309]		Species or species habitat may occur within area
<u>Apus pacificus</u> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<u>Ardea alba</u> Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
<u>Ardea ibis</u> Cattle Egret [59542]		Species or species habitat may occur within area
<u>Calidris acuminata</u> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<u>Calidris ferruginea</u> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<u>Calidris melanotos</u> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<u>Merops ornatus</u> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<u>Motacilla cinerea</u> Grey Wagtail [642]		Species or species habitat may occur within area

Extra Information

Goat [2]

Invasive Species		[Resource Information]
Weeds reported here are the 20 species that are considered by the States and Ter following feral animals are reported: Goat Landscape Health Project, National Land	of national significance (WoNS), a rritories to pose a particularly sigr t, Red Fox, Cat, Rabbit, Pig, Wate and Water Resouces Audit, 200	along with other introduced plants nificant threat to biodiversity. The er Buffalo and Cane Toad. Maps from 1.
Name	Status	Type of Presence
Mammals		
Capra hircus		

Species or species



Name	Status	Type of Presence
		habitat likely to occur within area
Equus caballus		ulou
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
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 gualifications 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

-30.7021 120.9099,-30.708 120.9013,-30.7224 120.9309,-30.7321 120.9298,-30.7328 120.9632,-30.7235 120.9634,-30.7234 120.9387,-30.7021 120.9099



Acknowledgements

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

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

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

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

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DWER CPS Map Viewer - showing no ESA's (dark green shaded areas) within the survey area (pink polygon) (DWER, 2017)





DWER CPS Map Viewer - showing no water bodies within the survey area (pink polygon) (DWER, 2017)



Appendix C - Maps























Appendix D – Threatened Flora Database Search Results



Taxon	Status	Distribution	Flowering Period
		Southern Cross, Carrabin, Bullabulling,	
		Walyahmoning Rock, Chiddarcooping, Sandford	
Acacia crenulata	P3	Rocks N.R., Marvel Loch	Sep-Oct
		Kalgoorlie, Diemals, Goongarri, Boogardie, Mt	
Alyxia tetanifolia	P3	Magnet	May
		Glenorn Stn, Baladjie Lake NR, Quairading, Lake	
Angianthus prostratus	P3	Barlee, Bulga Downs Stn, Kalgoorlie	Jul-Sept
		Kalgoorlie, Ninghan Stn, Wanjarri NR, Mount	
Austroparmelina macrospora	P3	Harry, Kathleen, Bullfinch, Kalbarri	
Baeckea sp. Bulla Bulling (D.J.E. Whibley 4648)	P1	Kalgoorlie, Bulla Bulling	Oct
		Helena & Aurora Range,Credo Stn., Mt Manning	
Calytrix creswellii	P3	Range, Wallaroo Rock	Nov-Dec
Cryptandra crispula	P3	Lake Lefroy, Bullabulling, Karonie, Fraser Range	Jul-Sep
		Bungalbin Hill, Helena & Aurora Ranges, Queen	
Cyathostemon verrucosus	P3	Victoria Rocks, Kalgoorlie, Boorabbin	Sep-Dec,Mar
		Bullabulling, Gibraltar, Maggie Hays Hill, Lake	
Diocirea microphylla	P3	Johnston	Dec
Elachanthus pusillus	P2	Orchid Rock, Cocklebiddy, Kalgoorlie, Jaurdi Stn	Oct
		Five Mile Hill, (Kurrawang), Kalgoorlie, Kanowna	
Eremophila praecox	P1	Belle	Aug-Sep,Dec
		Westonia, Southern Cross, Burracoppin, Ora	
Eucalyptus crucis subsp. crucis	Т	Banda	Dec-Mar
		Norseman, Salmon Gums, Mt Newmont, Bruce	
Eutaxia actinophylla	P3	Rock, Wallaroo Rock, Mt Willgonarinya	Sep-Dec
		Coolgardie, Gnamma Hill, Narembeen,	
Gastrolobium graniticum	Т	Yellowdine, Bullabulling	Aug-Nov
Hakea rigida	P2	Campion, Bullfinch, Wallaroo Rock, Mt Burges	Sep
Hakea sp. Great Victoria Desert (L. Cockram LAC 139) PN	P1	E Kalgoorlie	
Lepidium fasciculatum	P3	Salmon Gums, Kalgoorlie, Esperance, Mingenew	Oct-Feb
		Gibraltar, Boorabbin, Dundas, Ravensthorpe,	
		North Ironcap, Ora Banda, Lake Cowan, Parker	
Notisia intonsa	P3	Range	Sep
Phebalium clavatum	P2	Londonderry	Nov
	1	Jackson Range, Bullfinch, Koolyanobbing,	
Styphelia sp. Bullfinch (M. Hislop 3574)	P3	Bullabulling, Diemals Stn.	Apr-May
Xanthoparmelia dayiana	P3	Kalgoorlie, Northern Territory, Karara	

Additional taxa supplied via database coordinates

	Conservation
Taxon	Code
Acacia coatesii	P1
Acacia epedunculata	P1
Acacia sclerophylla var. teretiuscula	P1
Acacia websteri	P1
Allocasuarina eriochlamys subsp. grossa	P3
Austrostipa blackii	P3
Chrysocephalum apiculatum subsp. norsemanense	P3
Eremophila caerulea subsp. merrallii	P4
Eremophila veronica	P3
Eucalyptus jutsonii subsp. jutsonii	P4
Gompholobium cinereum	Р3
Grevillea georgeana	P3
Lepidium merrallii	P2
Melichrus sp. Coolgardie (K.R. Newbey 8698)	P1
Myriophyllum petraeum	P4
Phebalium appressum	P1
Phlegmatospermum eremaeum	P3
Ptilotus chortophytus	P1
Thryptomene sp. Coolgardie (E. Kelso s.n. 1902)	P1
Thryptomene sp. Londonderry (R.H. Kuchel 1763)	P1



Appendix E - Species Recorded During the July 2017 Survey



Species List per Quadrat

				11	2	3	4	5	5 6	17	8	6	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Family	Conuc	Fracios		0	0	0	0	0	0	0	0	0	ď	ø	ď	ď	ď	a	ø	ď	ð	ď	ď	ď	ď	ď	ď	ď	ď	ď	ď	ď
Amaranthaceae	Btilotus	species	A, P, ININ					*																*		*						
Amaranthaceae	Ptilotus	obovatus	A D	*	*	*		*	*	*	*	*	*	*	*		*	*		*	*	*	*		*	*				<u> </u>		
Anarantilaceae	Marcdonia	obovatus	P D	*						*			*	*								*						*		<u> </u>		
Apocynaceae	Cratyctulic	conoconhala	P D										*					*						*	*	*			*	<u> </u>	*	
Asteraceae	Cratystylis	misrophyllo	P D																						*					<u> </u>	*	
Asteraceae	Cratystylis		P D																							*		*		<u> </u>		
Asteraceae	Cratystylis	subspinescens	P		*	*		*				*	*	*		*		*			*	*	*		*		*	*	*	*	*	*
Asteraceae	Oleania	nimelecides	P		-	-							-			-		-			*	-						-	-	<u> </u>	<u> </u>	-
Asteraceae	Corrichtoro	pinieleoides						*	*																					<u> </u>		
Brassicaceae	Carrichtera	annua	A, ININ					-	-			*							*													
Casuarinaceae	Casuarina	pauper	P			*		*	*	*		*				*	*				*		*	*				*				
Chenopodiaceae	Atriplex	nummularia subsp. spatnulata	P			*		*	*	*	*		*			*	*						*		*	*						
Chenopodiaceae	Atriplex	supitata	P			*		*	*	*			*			*	*				*		*		*	*	*	*	*	*		
chenopodiaceae	Atriplex	Vesicaria	P			-				*	*	*	*		*	-	*						*	*		*	-	*	-	<u> </u>	+	
Chenopodiaceae	Chenopodium	gaudichaudianum	P			*		*	*	*			*	*	*		*						*		*	*				┝──	_	
Chenopodiaceae	Enchylaena	tomentosa var. tomentosa	P			Ŧ		Ŧ	Ŧ	т			т	Ŧ	-		Ŧ						*	*	*	*				—		
Chenopodiaceae	Eriochiton	scierolaenoides	P	*	*	*		*		*	*	*	*				*						*	*	Ŧ	*		*		—		
Chenopodiaceae	Maireana	georgei	P	Ŧ	т	Ŧ		*		т	*	-	т				Ŧ	*					*	Ŧ	*	т	*	т *	*	_		
Chenopodiaceae	Maireana	pentatropis	P					Ŧ	*		-							Ŧ					т		Ŧ	*	Ŧ	т	Ŧ			
Chenopodiaceae	Maireana	pyramidata	P			*			Ŧ							*							*	*		*				—		
Chenopodiaceae	Maireana	sedifolia	P			Ŧ										Ŧ							т	Ŧ		*				—		
Chenopodiaceae	Maireana	thesioides	Р																							* *				<u> </u>	—	
Chenopodiaceae	Maireana	tomentosa	Р			*			*	*	*	*		<u>ب</u> د	*		*				*			*	*	*	*	-1-	*	*	<u> </u>	<u> </u>
Chenopodiaceae	Maireana	trichoptera	Р			*		*	*	*	*		*	*	*						*					*		*		<u> </u>		
Chenopodiaceae	Maireana	triptera	Р		*	*		*	*	*	*			*	*		*															
Chenopodiaceae	Rhagodia	drummondii	Р						*	*	*		*	*	*		*				*			*	*	*		*	*	*	*	
Chenopodiaceae	Salsola	australis	A														*													<u> </u>		
Chenopodiaceae	Sclerolaena	densiflora	Р			*		*	*		*	*	*	*	*	*	*				*		*	*	*	*		*		<u> </u>		
Chenopodiaceae	Sclerolaena	diacantha	Р			*			*	*	*	*	*	*	*						*		*	*		*		*		<u> </u>		
Chenopodiaceae	Sclerolaena	patenticuspis	Р						*								*							*		*				Ļ	<u> </u>	
Cucurbitaceae	Cucumis	myriocarpus	A, NN					*																						\vdash		
Euphorbiaceae	Beyeria	sulcata var. sulcata	Р	*																										\vdash		
Fabaceae	Acacia	acuminata	Р	*	*					*																				\vdash		
Fabaceae	Acacia	colletioides	Р																*	*		*	*	*			*		*	*		*
Fabaceae	Acacia	erinacea	Р		*		*															*								\vdash		
Fabaceae	Acacia	hemiteles	Р									*	*	*		*	*			*	*	*	*						*	*	*	*
Fabaceae	Acacia	ligulata	Р													*												*		<u> </u>		
Fabaceae	Acacia	merrallii	Р															*	*	*				*				*	*	<u> </u>	*	*
Fabaceae	Acacia	prainii	Р											*																		
Fabaceae	Acacia	tetragonophylla	Р	*						*																				*		
Fabaceae	Daviesia	aphylla	Р												*	*											*					
Fabaceae	Senna	artemisioides subsp. artemisioides	Р						*	*						*	*		*	*	*		*									*
Fabaceae	Senna	artemisioides subsp. filifolia	Р					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Fabaceae	Senna	cardiosperma	Р			*	*		*		*		*		*	*		*			*	*	*	*		*						
Frankeniaceae	Frankenia	interioris	Р																					*	*	*						
Goodeniaceae	Scaevola	collaris	Р																											*		*



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Family	Genus	Species	A, P, NN																											1		i
Goodeniaceae	Scaevola	spinescens	Р	*	*				*	*	*	*	*	*	*	*		*			*	*	*							*		*
Hemerocallidaceae	Dianella	revoluta subsp. divaricata	Р																											*		1
Lamiaceae	Westringia	rigida	Р				*															*						*	*	*	*	*
Loranthaceae	Amyema	preissii	Р										*									*								i T		1
Myrtaceae	Eucalyptus	campaspe	Р	*	*	*	*	*																								-
Myrtaceae	Eucalyptus	clelandii	Р				*	*				*						*	*	*	*	*		*			*	*	*	*	*	*
Myrtaceae	Eucalyptus	griffithsii	Р	*	*					*												*								i T		1
Myrtaceae	Eucalyptus	oleosa subsp. oleosa	Р												*				*	*					*	*	*			i T		1
Myrtaceae	Eucalyptus	salmonophloia	Р								*		*	*	*	*	*						*							i T		1
Myrtaceae	Eucalyptus	salubris	Р															*	*	*												*
Myrtaceae	Eucalyptus	transcontinentalis	Р													*																-
Myrtaceae	Eucalyptus	yilgarnensis	Р																							*				i		ł
Myrtaceae	Melaleuca	sheathiana	Р																									*	*	*	*	i
Pittosporaceae	Pittosporum	angustifolium	Р											*																i		ł
Poaceae	Austrostipa	elegantissima	Р	*	*								*	*			*		*			*		*			*	*	*	i T		*
Poaceae	Triodia	rigidissima	Р																											*		
Proteaceae	Grevillea	acuaria	Р																											*		ł
Santalaceae	Exocarpos	aphyllus	Р	*	*	*			*	*	*	*	*	*	*	*	*			*	*	*	*	*	*	*	*	*	*	*	*	*
Santalaceae	Santalum	acuminatum	Р			*												*		*	*		*							i		ł
Santalaceae	Santalum	spicatum	Р		*								*	*							*		*							i		ł
Sapindaceae	Dodonaea	lobulata	Р	*	*																									i		ł
Sapindaceae	Dodonaea	viscosa subsp. angustissima	Р																									*	*	*		ł
Scrophulariaceae	Eremophila	alternifolia	Р							*				*						*										i		ł
Scrophulariaceae	Eremophila	caperata	Р													*		*						*			*			i		*
Scrophulariaceae	Eremophila	decipiens subsp. decipiens	Р			*				*								*	*	*			*		*	*		*		*		ł
Scrophulariaceae	Eremophila	glabra subsp. glabra	Р		*		*		*	*		*		*	*						*	*	*		*	*				*	*	ł
Scrophulariaceae	Eremophila	interstans subsp. virgata	Р	*		*		*	*			*	*	*							*	*			*	*				i l		i
Scrophulariaceae	Eremophila	ionantha	Р														*	*	*	*			*		*					*		i
Scrophulariaceae	Eremophila	longifolia	Р				*																							i l		1
Scrophulariaceae	Eremophila	oldfieldii subsp. angustifolia	Р	*	*		*		*					*			*				*	*										1
Scrophulariaceae	Eremophila	parvifolia subsp. auricampa	Р																						*		*	*	*	*	*	*
Scrophulariaceae	Eremophila	praecox (P1)	Р																						*							
Scrophulariaceae	Eremophila	pustulata	Р				*	*														*								i		ł
Scrophulariaceae	Eremophila	scoparia	Р		*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*		*	*	*	*
Solanaceae	Duboisia	hopwoodii	Р								*																			i l		1
Solanaceae	Solanum	lasiophyllum	Р	*	*			*	*	*	*		*	*							*											1
Solanaceae	Solanum	nummularium	Р						*	*			*				*	*	*		*		*	*	*			*		*		1
Thymelaeaceae	Pimelea	microcephala subsp. microcephala	Р											*			*	*	*				*		*	*						L
Zygophyllaceae	Zygophyllum	eremaeum	A				*																									1



Species List per Vegetation Group (Quadrat data including opportunistic sampling)

_ • •	U U U U U U U U U U U U U U U U U U U		Vegetation Group Codes									
Family	Genus	Species	A, P, NN	Α	В	С	D	E	F	G	н	I
Amaranthaceae	Ptilotus	aervoides	А		*				*		*	
Amaranthaceae	Ptilotus	obovatus	Р	*	*	*	*	*	*	*	*	
Apocynaceae	Alyxia	buxifolia	Р									*
Apocynaceae	Marsdenia	australis	Р	*		*		*	*			*
Asteraceae	Cratystylis	conocephala	Р					*	*		*	*
Asteraceae	Cratystylis	microphylla	Р								*	*
Asteraceae	Cratystylis	subspinescens	Р								*	*
Asteraceae	Olearia	muelleri	Р	*	*			*	*		*	*
Asteraceae	Olearia	pimeleoides	Р						*			
Brassicaceae	Carrichtera	annua	A, NN		*		*					
Casuarinaceae	Casuarina	pauper	Р	*					*	*		
Chenopodiaceae	Atriplex	nummularia subsp. spathulata	Р	*	*	*	*	*	*			*
Chenopodiaceae	Atriplex	stipitata	Р		*	*	*	*			*	
Chenopodiaceae	Atriplex	vesicaria	Р		*	*	*	*	*		*	*
Chenopodiaceae	Chenopodium	gaudichaudianum	Р		*	*	*	*	*		*	*
Chenopodiaceae	Enchylaena	tomentosa var. tomentosa	Р		*	*	*	*			*	*
Chenopodiaceae	Eriochiton	sclerolaenoides	Р					*	*		*	
Chenopodiaceae	Maireana	georgei	Р	*	*	*		*	*		*	*
Chenopodiaceae	Maireana	pentatropis	Р		*			*	*		*	*
Chenopodiaceae	Maireana	pyramidata	Р				*				*	
Chenopodiaceae	Maireana	sedifolia	Р		*			*	*		*	
Chenopodiaceae	Maireana	thesioides	Р								*	
Chenopodiaceae	Maireana	tomentosa	Р		*	*	*	*	*		*	*
Chenopodiaceae	Maireana	trichoptera	Р		*	*	*	*	*		*	*
Chenopodiaceae	Maireana	triptera	Р	*	*	*	*	*				
Chenopodiaceae	Rhagodia	drummondii	Р		*	*	*	*	*		*	*
Chenopodiaceae	Salsola	australis	А					*				
Chenopodiaceae	Sclerolaena	densiflora	Р		*		*	*	*		*	*
Chenopodiaceae	Sclerolaena	diacantha	Р		*	*	*	*	*		*	*
Chenopodiaceae	Sclerolaena	patenticuspis	Р				*	*	*		*	
Cucurbitaceae	Cucumis	myriocarpus	A, NN		*							
Euphorbiaceae	Beyeria	sulcata var. sulcata	Р	*								
Fabaceae	Acacia	acuminata	Р	*		*						
Fabaceae	Acacia	colletioides	Р					*	*	*		*
Fabaceae	Acacia	erinacea	Р	*	*				*			
Fabaceae	Acacia	hemiteles	Р					*	*	*		*
Fabaceae	Acacia	ligulata	Р					*				*
Fabaceae	Acacia	merrallii	Р						*	*		*
Fabaceae	Acacia	prainii	Р					*				
Fabaceae	Acacia	tetragonophylla	Р	*		*						*
Fabaceae	Daviesia	aphylla	Р					*	*			
Fabaceae	Senna	artemisioides subsp. artemisioides	Р			*	*	*	*	*		
Fabaceae	Senna	artemisioides subsp. filifolia	Р		*	*	*	*	*	*	*	*
Fabaceae	Senna	cardiosperma	Р		*		*	*	*		*	
Frankeniaceae	Frankenia	interioris	Р						*		*	
Goodeniaceae	Scaevola	collaris	Р						*			*
Goodeniaceae	Scaevola	spinescens	Р	*		*	*	*	*			*

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				Vegetation Group Codes								
Family	Genus	Species	A, P, NN	Α	В	С	D	E	F	G	Н	1
Hemerocallidaceae	Dianella	revoluta subsp. divaricata	Р									*
Lamiaceae	Westringia	rigida	Р		*				*			*
Loranthaceae	Amyema	preissii	Р					*	*			
Myrtaceae	Eucalyptus	campaspe	Р	*	*							
Myrtaceae	Eucalyptus	clelandii	Р		*			*	*	*		*
Myrtaceae	Eucalyptus	griffithsii	Р	*		*			*			
Myrtaceae	Eucalyptus	oleosa subsp. oleosa	Р	*				*	*	*	*	
Myrtaceae	Eucalyptus	salmonophloia	Р					*				
Myrtaceae	Eucalyptus	salubris	Р						*	*		
Myrtaceae	Eucalyptus	transcontinentalis	Р					*				
Myrtaceae	Eucalyptus	yilgarnensis	Р					*			*	
Myrtaceae	Melaleuca	sheathiana	Р									*
Pittosporaceae	Pittosporum	angustifolium	Р					*				
Poaceae	Austrostipa	elegantissima	Р	*				*	*	*		*
Poaceae	Triodia	rigidissima	Р									*
Proteaceae	Grevillea	acuaria	Р									*
Santalaceae	Exocarpos	aphyllus	Р	*	*	*	*	*	*	*	*	*
Santalaceae	Santalum	acuminatum	Р		*			*	*	*		
Santalaceae	Santalum	spicatum	Р	*				*	*			
Sapindaceae	Dodonaea	lobulata	Р	*								
Sapindaceae	Dodonaea	viscosa subsp. angustissima	Р									*
Scrophulariaceae	Eremophila	alternifolia	Р			*		*		*		
Scrophulariaceae	Eremophila	caperata	Р					*	*			
Scrophulariaceae	Eremophila	decipiens subsp. decipiens	Р		*	*		*	*	*	*	*
Scrophulariaceae	Eremophila	glabra subsp. glabra	Р	*	*	*	*	*	*		*	*
Scrophulariaceae	Eremophila	interstans subsp. virgata	Р	*	*		*	*	*		*	
Scrophulariaceae	Eremophila	ionantha	Р					*	*	*	*	*
Scrophulariaceae	Eremophila	longifolia	Р		*							
Scrophulariaceae	Eremophila	oldfieldii subsp. angustifolia	Р	*	*		*	*	*			
Scrophulariaceae	Eremophila	parvifolia subsp. auricampa	Р						*		*	*
Scrophulariaceae	Eremophila	praecox (P1)	Р								*	
Scrophulariaceae	Eremophila	pustulata	Р		*				*			
Scrophulariaceae	Eremophila	scoparia	Р	*	*	*	*	*	*	*	*	*
Solanaceae	Duboisia	hopwoodii	Р					*				
Solanaceae	Solanum	lasiophyllum	Р	*	*	*	*	*	*			
Solanaceae	Solanum	nummularium	Р			*	*	*	*	*	*	*
Thymelaeaceae	Pimelea	microcephala subsp. microcephala	Р					*	*	*	*	
Zygophyllaceae	Zygophyllum	eremaeum	А		*							



Appendix F - Site Descriptions



	Project Name: Jaurdi Hills										
Date:	6/07/2017		Botanist:	Eren Reid							
Location:	Jaurdi Hills Mining Proje	ct	Quadrat:	Q1							
Quadrat size:	20x20										
Vegetation	٨										
group:	A										
WP:	1										
Photo number:			22								
Landform:			Lower slope/H	lillslope							
Land surface/distu	rbance:		No effective disturbance								
Coarse fragments of	on the surface (abunda	nce/size/shape):	tabular								
Rock outcrop (abu	ndance/runoff):		Very slightly r	ocky/Moderately rapid							
Soil (profile/field te	xture/soil surface):		Duplex/Sandy	loam/Firm							
% Cover leaf litter:			30								
% Cover bare grou	nd:		40								
				-							
Tallest	t stratum	Mid-stratur	n	Lower strate	um						
	Y Shrub Mallee (<										
Growth form:	8m)	Growth form:	S Shrub	Growth form:	S Shrub						
Height:	6-12m	Height:	1-3m	Height:	0.5-1m						
Crown cover %:	S 10-30	Crown cover %:	S 10-30	Crown cover %:	S 10-30						
Dominant taxa:		Dominant taxa:		Dominant taxa:							
Eucalyptus griffithsii		Acacia acuminata		Beyeria sulcata var. sulo	cata						
		Eremophila oldfieldii sub	sp.								
		angustifolia		Dodonaea lobulata							
				Scaevola spinescens							
		ALL SPECIES	<u>`</u>								
			a willo								
			iyila seima								
		Beveria sulcata var	ulcata								
		Dodonaea lobula	ta								
		Eremonhila interstans sub	sn virgata								
	F	remonhila oldfieldii subsp	angustifolia								
	-	Fucalvotus campa	spe								
		Eucalyptus griffith	sii								
		Exocarpos aphvll	us								
		Maireana george	ei								
		Marsdenia austra	lis								
		Ptilotus obovatu	S								
	Scaevola spinescens										





	Project Name:										
Date:	6/07/2017		Botanist:	Eren Reid							
Location:	Jaurdi Hills Mining Project	t	Quadrat:	Q2							
Quadrat size:	20x20										
Vegetation	٨										
group:	А										
WP:	2										
Photo number:			27								
Landform:			Lower slope/H	lillslope							
Land surface/distur	rbance:		No effective d	isturbance							
Coarse fragments of	on the surface (abunda	nce/size/shape):	Very; abundant/Cobbly; or cobbles/Subangular tabular								
Rock outcrop (abur	ndance/runoff):		Very slightly re	ocky/Slow							
Soil (profile/field te	xture/soil surface):		Duplex/Sandy	loam/Firm							
% Cover leaf litter:			30								
% Cover bare grou	nd:		60								
Tallest	stratum	Mid-stratun	n	Lower stratu	m						
	Y Shrub Mallee (<										
Growth form:	8m)	Growth form:	S Shrub	Growth form:	S Shrub						
Height:	6-12m	Height:	1-3m	Height:	0.5-1m						
Crown cover %:	S 10-30	Crown cover %:	S 10-30	Crown cover %:	S 10-30						
Dominant taxa:		Dominant taxa:		Dominant taxa:							
Eucalyptus griffithsii		Acacia acuminata		Dodonaea lobulata							
		Eremophila oldfieldii subs	sp.	Difference in a second second							
		angustifolia		Ptilotus obovatus							
				Scaevola spinescens							
		ALL OF LOILS	2								
		Acacia erinacea	u								
		Austrostipa elegantis	sima								
		Dodonaea lobulat	a								
		Eremophila glabra subs	o. glabra								
	E	remophila oldfieldii subsp.	angustifolia								
		Eremophila scopa	ria								
		Eucalyptus campas	spe								
		Eucalyptus griffith	sii								
		Exocarpos aphyllu	JS								
		Maireana george	ei								
		Maireana triptera	a								
		Olearia muelleri									
		Ptilotus obovatus	3								
		Santalum spicatu	m								
		Scaevola spinesce	ens								
	Solanum lasiophyllum										

Adjacent Atriplex nummularia subsp. spathulata Casuarina pauper Eucalyptus oleosa subsp. oleosa





Project Name:										
Date:	6/07/2017		Botanist: Eren Reid							
Location:	Jaurdi Hills Mining Proj	ect	Quadrat:	Q3						
Quadrat size:	20x20			·						
Vegetation	D									
group:	D									
WP:	3									
Photo number:			31							
Landform:			Lower slope/For	otslope						
Land surface/distu	urbance:		No effective dist	turbance						
Coarse fragments	on the surface (abund	dance/size/shape):	Slightly; few/Coarse gravelly; large pebbles/Subrounded tabular							
Rock outcrop (abu	undance/runoff):		Very slightly rocky/Slow							
Soil (profile/field to	exture/soil surface):		Duplex/Sandy lo	pam/Firm						
% Cover leaf litter:	:		80							
% Cover bare grou	und:		60							
Talles	t stratum	Mid-str	atum	Lower stratur	n					
	M Tree Mallee (>									
Growth form:	8m)	Growth form:	S Shrub	Growth form: S Shrub						
Height:	6-12m	Height:	1-3m	Height: 0.5-1m						
Crown cover %:	S 10-30	Crown cover %:	V <10	Crown cover %: V <10						
Dominant taxa:		Dominant taxa:		Dominant taxa:						
Eucalyptus campas	spe	Eremophila interstans subsp. virgata		Atriplex nummularia subsp. s	spathulata					
			Eremophila scoparia							
		ALL SF	PECIES							
		Atriplex nummularia	a subsp. spathulat	а						
		Atriplex	stipitata							
		Atriplex v	vesicaria							
		Enchylaena toment	osa var. tomentos	а						
		Eremophila decipier	ns subsp. decipien	IS						
		Eremophila interst	ans subsp. virgata							
		Eremophil	a scoparia							
		Eucalyptus	campaspe							
		Exocarpos	s apnyllus							
		Maireana								
		Maireana t	iomentosa							
		Maireana t	richontera							
<u> </u>		Mairean	a triptera							
		Olearia	muelleri							
		Ptilotus c	obovatus							
		Santalum a	cuminatum							
		Sclerolaena	a densiflora							
		Sclerolaena	a diacantha							
	Scielolaena diacantila Senna cardiosperma									





Derived Names										
		Project Nam	e:	T						
Date:	6/07/2017		Botanist:	Eren Reid						
Location:	Jaurdi Hills Mi	ning Project	Quadrat:	Q4						
Quadrat size:	20x20			•						
Vegetation group:	B									
WD-	4									
Dhata numbar	4		25							
Photo number:			JJ Januar alara / E	a atalan a						
Landform:			Lower slope/Fo	ootsiope						
Land surface/disturbance			No effective di	sturbance						
Coarse fragments on the	surface (abun	dance/size/shape):	Slightly; few/Co	oarse gravelly; large pebbles	Subrounded					
Rock outcrop (abundance	/runoff):		No bedrock ex	posed/Slow						
Soil (profile/field texture/s	oil surface):		Duplex/Sandv	loam/Firm						
% Cover leaf litter			50							
% Cover bare ground:			70							
78 Cover bare ground.			70							
T-U	-	Mid strates			-					
l allest stratun		Mid-stratur	m	Lower stratur	n					
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub					
Height:	6-12m	Height:	1-3m	Height:	0.5-1m					
Crown cover %:	S 10-30	Crown cover %:	V <10	Crown cover %:	V <10					
Dominant taxa	5 10 50	Dominant taxa:	1 10	Dominant taxa	1 10					
Dominant taxa.				Dominant taxa.						
Eucalyptus campaspe		Eremophila oldfieldii subs	sp. angustifolia	Acacia erinacea						
Eucalyptus clelandii				Eremophila pustulata						
			S							
		Access or EOIE								
		Eremophila glabra sul	osp. glabra							
		Eremophila long	gifolia							
		Eremophila oldfieldii subs	sp. angustifolia							
		Eremophila pust	tulata							
		Eucalvotus cam	bashe							
			andii							
		Senna cardiosp	erma							
		Westringia rig	ida							
		Zygophyllum eren	naeum							
					Adiacont					
					Aujacent					
				Eremophila interstans s	ubsp. virgata					
				Ol	earia muelleri					
				Senna artemisioides	subsp. filifolia					
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	Project Name:										
Date:	6/07/2017		Botanist:	Eren Reid							
Location:	Jaurdi Hills Minii	ng Project	Quadrat:	Q5							
Quadrat size:	20x20										
Vegetation group:	В										
WP:	5										
Photo number:	•		38								
Landform:			Flat/Plain								
Land surface/disturbance:			No effective of	listurbance							
Coarse fragments on the s	urface (abunda	nce/size/shape):	No coarse fra	gments							
Rock outcrop (abundance/	/runoff):	• •	No bedrock e	xposed/Slow							
Soil (profile/field texture/so	oil surface):		Duplex/Silty of	lay loam/Firm							
% Cover leaf litter: 80											
% Cover bare ground:			50								
.			•								
Tallest stratu	m	Mid-stratur	n	Lower stratun	n						
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub						
Height:	6-12m	Height:	1-3m	Height:	0.5-1m						
Crown cover %	M 30-70	Crown cover %	V <10	Crown cover %	V <10						
Dominant taxa:		Dominant taxa:	-	Dominant taxa:							
Eucalyptus campaspe		Eremophila interstans su	ibsp. virgata	Atriplex nummularia subst	o, spathulata						
Eucalyptus clelandii		Senna artemisioides sub	sp. filifolia	Olearia muelleri							
				Ptilotus obovatus							
		ALL SPECIES									
		Atriplex nummularia subsp.	spathulata								
		Atriplex stipitata									
		Atriplex vesicaria	3								
		Carrichtera annua	a*								
		Chenopodium gaudicha	udianum								
		Cucumis myriocarp	us*								
	E	Enchvlaena tomentosa var.	tomentosa								
		Eremophila interstans sub	sp. virgata								
		Eremophila pustula	ata								
		Eremophila scopa	ria								
		Eucalyptus campas	spe								
		Eucalyptus clelan	dii								
		Maireana george	ei								
		Maireana pentatro	pis								
		Maireana trichopte	era								
		Maireana triptera	a								
		Olearia muelleri									
Ptilotus aervoides											
		Ptilotus obovatus	S								
		Sclerolaena densifl	ora								
		Senna artemisioides subs	sp. filifolia								
		Solanum lasiophyll	um								
					A						
1					Adjacent						

Maireana sedifolia Rhagodia drummondii





Project Name:									
Date:	6/07/2017		Botanist:	Eren Reid					
Location:	Jaurdi Hills Min	ing Project	Quadrat:	Q6					
Quadrat size:	20x20								
Vegetation group:	D								
WP:	8								
Photo number:			42						
Landform:			Flat/Plain						
Land surface/disturbance:			No effective dis	turbance					
Coarse fragments on the surfa	ce (abundance	/size/shape):	No coarse fragr	nents					
Rock outcrop (abundance/rund	off):		No bedrock exp	oosed/Slow					
Soil (profile/field texture/soil su	urface):		Duplex/Silty cla	y loam/Firm					
% Cover leaf litter:									
% Cover bare ground:			60						
Tallest stratum	i	Mid-stratum	1	Lower stratu	n				
Growth form:	S Shrub	Growth form:	S Shrub	Growth form:	S Shrub				
Height:	3-6m	Height:	1-3m	Height:	0.5-1m				
Crown cover %:	V <10	Crown cover %:	S 10-30	Crown cover %:	S 10-30				
Dominant taxa:		Dominant taxa:		Dominant taxa:					
Atriplex nummularia subsp. spath	nulata	Eremophila scoparia		Atriplex stipitata					
Eremophila interstans subsp. virg	gata	Senna cardiosperma		Senna cardiosperma					
		ALL SPECIES							
		Atriplex nummularia subsp	. spathulata						
		Atriplex stipitata	a						
		Atriplex vesicari	a						
		Carrichtera annu	a*						
		Chenopodium gaudicha	ludianum						
		Enchylaena tomentosa var	tomentosa						
		Eremophila glabra subs	p. glabra						
		Eremophila interstans sub	osp. virgata						
		Eremophila oldfieldii subsp	. angustifolia						
		Eremophila scopa	aria						
		Exocarpos apriyi	US lata						
		Maireana pyramio							
		Maireana trichopt	oro						
		Maireana tripter	51d '9						
		Ptilotus obovatu	а 19						
		Rhagodia drummo	ndii						
		Scaevola spineso	ens						
	Sclarolana densifiora								
		Sclerolaena diacar	ntha						
-		Sclerolaena patentio	cuspis		-				
		Senna artemisioides subsp.	artemisioides						
		Senna artemisioides sub	sp. filifolia						
		Senna cardiosper	ma						
		Solanum lasiophyl	lum						
		Solanum nummula	rium						





	-	Project Name:							
Date:	6/07/2017		Botanist:	Eren Reid					
Location:	Jaurdi Hills Mining Project		Quadrat:	Q7					
Quadrat size:	20x20			•					
Vegetation group:	С								
WP:	9								
Photo number:			45						
Landform:			Flat/Plain						
Land surface/disturbanc	e:		No effective d	listurbance					
Coarse fragments on the	surface (abundance/size/shap	e) [.]	No coarse fra	aments					
Rock outcrop (abundance/runoff): No bedrock exposed/Verv slow									
Soil (nrofile/field texture/soil surface): Dupley/Situ clay ham/Firm									
% Cover leaf litter:			60						
% Cover bare ground:			60						
/ Cover bare ground.			00						
Talle	st stratum	Mid-stratum	n	Lower stratu	ım				
Growth form:	M Tree Mallee (> 8m)	Growth form:	S Shruh	Growth form:	S Shrub				
Hoight:	6-12m	Hoight:	1_2m	Hoight:	0.5-1m				
	6 10 20		1-511		0.3-111 M 20.70				
Crown cover %.	3 10-30	Crown cover %.	V (10	Crown cover %.	IVI 30-70				
Dominant taxa:		Dominant taxa:		Dominant taxa:					
Eucaryptus grimtrisii		Atripley pumpularia auto		Senna anemisioides subs	b. anemisioides				
		Auplex nummulana subs	sp. spathulata	Attiplex stipitata					
				Plilolus obovalus					
		ALL SPECIES							
	A trial	Acacia letragonophylia							
	Attiple	Atriplex atipitate	iulata						
	Oh.	Atripiex vesicaria							
		enopodium gaudichaudianu	um 						
	Encny	laena tomentosa var. tome	ntosa						
	Fromo	Eremophila alternifolia	iniana						
	Eleliio	prilla decipiens subsp. dec	ipiens						
	Ele	Erromanhila giabra subsp. giat	la						
		Eremophila scoparia							
		Exocarpos aprivilus							
		Maireana tementesa							
		Maireana triabantara							
		Maireana trichoptera							
		Maredonio oustrolio							
		Dilatua abayatua							
	Plinous obvertus								
		Secovela eninescena							
		Soloroloono diacontho							
	90000 A	artemisioides subsp. artemi	sioides						
	Serilla	na artomisioidaa aubar fiif	olio						
	Sen	na anemisioides subsp. IIII Solanum lasionbullum	uid						
			1	A ABOVIN					
A CANADA CANADA									





Project Name:										
Date:	6/07/2017		Botanist:	Eren Reid						
Location:	Jaurdi Hills Min	ing Project	Quadrat:	Q8						
Quadrat size:	20x20									
Vegetation group:	E									
WP:	10									
Photo number:			51							
Landform:			Flat/Plain							
Land surface/disturbance:			No effective dis	turbance						
Coarse fragments on the surfa	ce (abundance/	/size/shape):	No coarse frag	ments						
Rock outcrop (abundance/rund	off):		No bedrock exp	bosed/Very slow						
Soil (profile/field texture/soil su	urface):		Duplex/Sandy	clay loam/Firm						
% Cover leaf litter:			70							
% Cover bare ground:			60							
Tallest stratum	I	Mid-stratun	1	Lower st	ratum					
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub					
Height:	12-20m	Height:	1-3m	Height:	0.5-1m					
Crown cover %:	S 10-30	Crown cover %:	S 10-30	Crown cover %:	V <10					
Dominant taxa:		Dominant taxa:		Dominant taxa:						
Eucalyptus salmonophloia		Eremophila scoparia		Atriplex stipitata						
		Exocarpos aphyllus		Scaevola spinescens						
				Senna artemisioides su	ıbsp. filifolia					
		ALL SPECIES								
		Atriplex stipitata								
		Chenopodium gaudichau	Idianum							
		Duboisia hopwood	ii							
		Eremophila scopar	ia							
		Eucalyptus salmonop	hloia							
		Exocarpos aphyllu	S							
		Maireana georgei								
		Maireana pentatrop	ois							
		Maireana tomentos	a							
		Maireana trichopte	ra							
		Maireana triptera								
		Ptilotus obovatus								
		Rhagodia drummon	dii							
		Scaevola spinesce	ns							
		Sclerolaena densific	ora							
		Sclerolaena diacant	ha							
		Senna artemisioides subs	p. filifolia							
		Senna cardiosperm	na							
		Solanum lasiophyllu	ım							
					Adjacent					
					Acacia ligulata					
				Atriplex nummular	ia subsp. spathulata					

Eucalyptus clelandii Eucalyptus transcontinentalis





		Project Name:							
Date:	7/07/2017		Botanist:	Eren Reid					
Location:	Jaurdi Hills Minin	g Project	Quadrat:	Q9					
Quadrat size:	20x20								
Vegetation group:	F								
WP:	14								
Photo number:			63						
Landform:			Flat/Plain						
Land surface/disturbance:			No effective dis	turbance					
Coarse fragments on the surfa	ce (abundance/s	ize/shape):	No coarse fragr	nents					
Rock outcrop (abundance/rund	off):		No bedrock exp	oosed/Very slow					
Soil (profile/field texture/soil surface): Duplex/Sandy clay loam/Firm									
% Cover leaf litter: 80									
% Cover bare ground: 50									
Tallest stratum Mid-stratum Lower strat									
Growth form: T Tree Growth form: S Shrub Growth form					S Shrub				
Height:	6-12m	Height:	1-3m	Height:	0.5-1m				
Crown cover %:	S 10-30	Crown cover %:	V <10	Crown cover %:	V <10				
Dominant taxa:		Dominant taxa:		Dominant taxa:					
Casuarina pauper		Eremophila interstans subsp	. virgata	Eremophila glabra subsp. g	labra				
Eucalyptus clelandii		Eremophila scoparia		Olearia muelleri					
				Senna artemisioides subsp.	. filifolia				
		ALL SPECIES							
		Acacia hemiteles							
		Atriplex nummularia subsp.	spathulata						
		Casuarina pauper	•						
		Chenopodium gaudichau	dianum						
		Eremophila glabra subsp	. glabra						
		Eremophila interstans subs	p. virgata						
		Eremophila scopar	ia						
		Eucalyptus cleland							
		Exocarpos aphyllu	S						
		Maireana georgei							
		Maireana tomentos	a						
		Olearia muelleri							
		Ptilotus obovatus							
		Sclevola spinescei	15						
		Sclerolaena diacont	ha						
		Senna artemisioides subs	n filifolia						
			p. 11110110						
					Adiacent				
				Ac	acia colletioides				
	Maireana pentatropis								





		Project Name:	-			
Date:	7/07/2017		Botanist:	Eren Reid		
Location:	Jaurdi Hills Min	ing Project	Quadrat:	Q10		
Quadrat size:	20x20			- L ·		
Vegetation group:	F					
WP.	16					
Photo number:	10		64-65			
Landform:			04-00 Elet/Disin			
Land surface/disturbance:			No offoctivo di	sturbanco		
Coorce frommente en the ourfe	aa (ahumdanaa		No enective us	Sturbance		
Coarse tragments on the surfa	ce (abundance	/size/snape):	No coarse frag			
Rock outcrop (abundance/run			No bedrock ex	posed/very slow		
Soli (profile/field texture/soli s	urface):		Duplex/Sandy	clay loam/Firm		
% Cover leaf litter:			60			
% Cover bare ground:			50			
Tallest stratum		Mid-stratu	n	Lower stratun	1	
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub	
Height:	6-12m	Height:	1-3m	Height:	0.5-1m	
Crown cover %:	S 10-30	Crown cover %:	V <10	Crown cover %:	V <10	
Dominant taxa:		Dominant taxa:		Dominant taxa:		
Eucalyptus salmonophloia		Eremonbila interstans subs	o virgata	Acacia bemiteles		
		Eremonhila sconaria	5. Virgata	Senna artemisioides subsn. 1	ilifolia	
		Eveneran annulue		Senna artemisioldes subsp. 1	linolia	
				Senna cardiospenna		
		ALL SPECIES	-			
		Acacia nemitele	5			
		Amyema preissi	1			
		Atriplex stipitata				
		Atriplex vesicaria	a			
		Austrostipa elegantis	sima			
		Chenopodium gaudicha	udianum			
		Cratystylis conocep	hala			
		Enchylaena tomentosa var	tomentosa			
		Eremophila interstans sub	sp. virgata			
		Eremophila scopa	ria			
		Eucalyptus salmonor	hloia			
		Exocarpos aphyll	JS			
		Maireana george	ei ei			
initiaaria georgei Maireana trichontera						
		Marsdenia austra	lis			
Marsoenia austraiis						
Ditata muenen						
Phone dia decementation						
Santalum siectum						
Santaum Spicatum						
Scaevola spinescens						
Scierolaena densitiora						
Sclerolaena diacantha						
Senna artemisioides subsp. filifolia						
Senna cardiosperma						
Solanum lasiophyllum						
Solanum nummularium						
Adjacent						
Acacia ligulata						
Atriplex nummularia subsp. spathulata						
Eremophila alternifolia						
Eucalyptus transcontinentalis						





	Project Name:						
Date:	7/07/2017		Botanist:	Eren Reid			
Location:	Jaurdi Hills Mining Project		Quadrat:	Q11			
Quadrat size:	20x20			•			
Vegetation group:	E						
WP:	17						
Photo number:			73				
Landform:			Flat/Plain	Flat/Plain			
Land surface/disturbance:	No effective disturbance						
Coarse fragments on the surface (abundance/size/shape):			No coarse frag	No coarse fragments			
Rock outcrop (abundance/rund	off):		No bedrock exp	posed/Very slow			
Soil (profile/field texture/soil su	urface):		Duplex/Sandy	clay loam/Firm			
% Cover leaf litter:			40	•			
% Cover bare ground:			60				
Tallest stratum		Mid-stratu	m	Lower stra	atum		
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub		
Height:	12-20m	Height:	1-3m	Height:	0.5-1m		
Crown cover %:	S 10-30	Crown cover %:	V <10	Crown cover %:	V <10		
Dominant taxa:		Dominant taxa:		Dominant taxa:			
Eucalvptus salmonophloia		Eremophila interstans subs	p. virgata	Eremophila alternifolia			
		Eremophila scoparia		Ptilotus obovatus			
		Exocarpos aphyllus		Senna artemisioides subsp. filifolia			
		ALL SPECIES					
		Acacia hemitele	s				
		Acacia prainii					
		Austrostipa eleganti	ssima				
		Enchylaena tomentosa vai	. tomentosa				
		Eremophila alterni	folia				
		Eremophila glabra subs	p. glabra				
		Eremophila interstans sub	sp. virgata				
		Eremophila oldfieldii subsp	. angustifolia				
		Eremophila scopa	aria				
		Eucalyptus salmono	phloia				
Exocarpos abhyllus							
Maireana trichoptera							
Maireana triptera							
Marsdenia australis							
Olearia muelleri							
Pimelea microcephala subsp. microcephala							
Pittosporum angustifolium							
Pilotus obovatus							
Rhagodia drummondii							
Santalum spicatum							
Scaevola spinescens							
Sclerolaena densiflora							
Sclerojaena diacantha							
Senna artemisioides subsp. filifolia							





Jaurdi Hills Level 2 Flora and Vegetation Survey Part 1- July 2017

		Pr	oject Name:			
Date:	7/07/2017		Botanist:	Eren Reid		
Location:	Jaurdi Hills Mi	ning Project	Quadrat:	Q12		
Quadrat size:	20x20					
Vegetation group:	E					
WP:	18					
Photo number:			76			
Landform:			Flat/Plain			
Land surface/disturbance):		No effective disturbance			
Coarse fragments on the	surface (abur	dance/size/shape):	No coarse fragments			
Rock outcrop (abundance	e/runoff):		No bedrock exposed/Very slow			
Soil (profile/field texture/s	soil surface):		Duplex/Sandy clay loam/Firm			
% Cover leaf litter:			60			
% Cover bare ground:			60			
Tallest stratur	n	Μ	id-stratum	Lower stratur	n	
Growth form:	T Tree	Growth form:	Y Shrub Mallee (< 8m)	Growth form:	S Shrub	
Height:	12-20m	Height:	3-6m	Height:	0.5-1m	
Crown cover %:	S 10-30	Crown cover %:	V <10	Crown cover %:	V <10	
Dominant taxa:		Dominant taxa:		Dominant taxa:		
Eucalyptus salmonophloia		Eucalyptus oleosa subs	p. oleosa	Daviesia benthamii subsp.	acanthoclona	
				Eremophila scoparia		
				Senna cardiosperma		
		AL	L SPECIES			
		Chenopodi	um gaudichaudianum			
		Dav	viesia aphylla			
		Enchylaena to	mentosa var. tomentosa			
		Eremophila	giabra subsp. glabra			
<u> </u>		Erem				
		Eucalyptus	uieusa suusp. 01605a tus salmonophisis			
<u> </u>		Eucalyp				
<u> </u>		Maire	ana tomentosa			
		Maire	ana trichontera			
		Marc	reana triptera			
		Ptil	otus obovatus			
		Rhage	odia drummondii			
-		Scaev	/ola spinescens			
		Sclero	laena densiflora			
		Sclero	laena diacantha			
		Senna arterr	nisioides subsp. filifolia			
		Senn	a cardiosperma			
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Project Name:						
Date:	7/07/2017		Botanist:	Eren Reid		
Location:	Jaurdi Hills Mining Project		Quadrat:	Q13		
Quadrat size:	20x20		•	•		
Vegetation group:	E					
WP:	19					
Photo number:			80			
Landform:			Flat/Plain			
Land surface/disturbance:			No effective dist	turbance		
Coarse fragments on the surfa	ce (abundance/si	ize/shape):	No coarse frage	nents		
Rock outcrop (abundance/rund	off):		No bedrock exp	No bedrock exposed/Very slow		
Soil (profile/field texture/soil su	urface):		Duplex/Sandy c	lay loam/Firm		
% Cover leaf litter:			80			
% Cover bare ground:			50			
Tallest stratum	-	Mid-stratun	n	Lower stratun	1	
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub	
Height:	12-20m	Height:	1-3m	Height:	0.5-1m	
Crown cover %:	S 10-30	Crown cover %:	S 10-30	Crown cover %:	V <10	
Dominant taxa:		Dominant taxa:		Dominant taxa:		
Eucalyptus salmonophloia		Eremophila caperata		Acacia hemiteles		
Eucalyptus transcontinentalis		Eremophila scoparia		Atriplex vesicaria		
				Senna artemisioides subsp. filifolia		
		ALL SPECIES				
		Acacia hemiteles				
		Acacia ligulata				
		Atriplex nummularia subsp.	spathulata			
Atriplex stipitata						
		Atriplex vesicaria				
Daviesia aphylla						
Eremophila caperata						
Eremophila scoparia						
Eucalyptus salmonophloia						
Eucalyptus transcontinentalis						
Exocarpos aphyllus						
Maireana sedifolia						
Olearia muelleri						
Scaevola spinescens						
Sclerolaena densiflora						
Senna artemisioides subsp. artemisioides						
Senna artemisioides subsp. filifolia						
Senna cardiosperma						
					Adjacent	

Eucalyptus oleosa subsp. oleosa Santalum acuminatum




		Project Name	:		
Date:	7/07/2017		Botanist:	Eren Reid	
Location:	Jaurdi Hills Minir	ig Project	Quadrat:	Q14	
Quadrat size:	20x20				
Vegetation group:	E				
WP:	20				
Photo number:			83		
Landform:			Flat/Plain		
Land surface/disturbance:			No effective dis	sturbance	
Coarse fragments on the surfa	ce (abundance/	size/shape):	No coarse frag	ments	
Rock outcrop (abundance/run	off):		No bedrock exp	oosed/Very slow	
Soil (profile/field texture/soil s	urface):		Duplex/Sandy	clay loam/Firm	
% Cover leaf litter:	•		60	•	
% Cover bare ground:			30		
Tallest stratum		Mid-stratum	1	Lower stratu	um
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub
Height:	12-20m	Height:	1-3m	Height:	0.5-1m
Crown cover %:	S 10-30	Crown cover %:	V <10	Crown cover %:	M 30-70
Dominant taxa:		Dominant taxa:	1	Dominant taxa:	
Eucalvotus salmonophloia		Eremophila scoparia		Eremophila ionantha	
21 1			Eremophila scoparia		
			Senna artemisioides subsp. filifolia		
		ALL SPECIES	i		
		Acacia hemitele	S		
		Atriplex nummularia subsp	. spathulata		
		Atriplex stipitata	a		
		Atriplex vesicari	а		
		Austrostipa eleganti	ssima		
		Chenopodium gaudicha	audianum		
		Enchylaena tomentosa vai	r. tomentosa		
		Eremophila ionan	tha		
		Eremophila oldfieldii subsp	. angustifolia		
		Eremophila scopa	aria		
		Eucalyptus salmono	phloia		
		Exocarpos aphyl	lus		
		Maireana georg	ei		
		Maireana tomento	osa		
		Maireana tripter	a		
		Pimelea microcephala subsp	. microcephala		
		Ptilotus obovatu	IS		
		Rhagodia drummo	ondii		
		Salsola australi	S		
		Sclerolaena densit	lora		
		Sclerolaena patentio	cuspis		
		Senna artemisioides subsp.	artemisioides		
		Senna artemisioides sub	sp. filifolia		
		Solanum nummula	rium		





		Project Name:	-		
Date:	7/07/2017		Botanist:	Eren Reid	
Location:	Jaurdi Hills Mining Project		Quadrat:	Q15	
Vegetation group:	F				
WP:	22				
Photo number:			87		
Landform:		Flat/Plain	l'-4		
Coarse fragments on the	: surface (abundance/size/shane):		No effective o	ansturbance	
Rock outcrop (abundance	/runoff):		No bedrock e	xposed/Very slow	
Soil (profile/field texture/s	oil surface):		Duplex/Sandy	y clay loam/Firm	
% Cover leaf litter:			80		
% Cover bare ground:			50		
Talle	est stratum	Mid-stratum	n	Lower stratu	ım
Growth form:	M Tree Mallee (> 8m)	Growth form:	S Shrub	Growth form:	S Shrub
Height:	6-12m	Height:	1-3m	Height:	0.5-1m
Crown cover %:	M 30-70	Crown cover %:	V <10	Crown cover %:	V <10
Dominant taxa:		Dominant taxa:		Dominant taxa:	
Eucalyptus cieranun Eucalyptus salubris		Santalum acuminatum		Eremophila caperata	
				Eremophila ionantha	
		ALL SPECIES			
	Cr:	Acacia merrallii			
	Cia	remophila caperata			
	Eremophila	a decipiens subsp. decipier	IS		
	E	remophila ionantha			
	E	remophila scoparia			
	E	ucalyptus cleiandii Fucalyptus salubris			
	M	aireana pentatropis			-
		Olearia muelleri			
	Pimelea micr	ocephala subsp. microcepl	nala		
	Sa	Ptilotus obovatus			
	5a	caevola spinescens			
	Senna a	rtemisioides subsp. filifolia			
	S	enna cardiosperma			
			-		64 M



		Project Name:			
Date:	7/07/2017		Botanist:	Eren Reid	
Location:	Jaurdi Hills Mining	Project	Quadrat:	Q16	
Quadrat size:	20x20				
Vegetation group:	G				
WP:	23				-
Photo number:			90 Onen denressia	vala)/Draina za dantagaio	
Landform:			No offoctivo dis	on (vale)/Drainage depressio	n
Coarse fragments on the surf	ace (abundance/si	ze/shane)	No coarse frag	ments	
Rock outcrop (abundance/rur	off):	20/01/00/	No bedrock exp	osed/Verv slow	
Soil (profile/field texture/soil	surface):		Duplex/Sandy of	lay loam/Firm	
% Cover leaf litter:	•		95	•	
% Cover bare ground:			30		
Tallest stratur	n 	Mid-stratum		Lower stra	tum
Growth form:	1 Iree	Growth form:	S Shrub	Growth form:	S Shrub
Height:	3-6m	Height:	1-3m	Height:	0.5-1m
Crown cover %:	IVI 30-70	Crown cover %:	5 10-30	Crown cover %:	IVI 30-70
Eucalvotus clelandii		Acacia merrallii		Acacia colletioides	
Eucalyptus cleasa subsp. oleos	а	Senna artemisioides subsp.	filifolia	Eremophila decipiens sub	sp. decipiens
Eucalyptus salubris				Eremophila ionantha	
		ALL SPECIES		· · ·	
		Acacia colletioide	s		
		Acacia merrallii			
		Austrostipa elegantis	sima		
		Casuarina paupe	r docinicas		
		Eremophila decipiens subsp	b. decipiens		
		Eremophila ionanti Eremophila scopa	ria		
		Eucalyptus cleland	dii		
		Eucalyptus oleosa subsp	o. oleosa		
		Eucalyptus salubr	is		
		Pimelea microcephala subsp.	microcephala		
		Senna artemisioides subsp. a	artemisioides		
		Senna artemisioides subs	sp. filifolia		
		Solanum nummular	ium		12
			N		2 mg
A LAN					
			MC	州人议	
Nº SA					
A CARLON AND A CARLON					



		Project Name:			
Date:	7/07/2017		Botanist:	Eren Reid	
Location:	Jaurdi Hills Mining	Project	Quadrat:	Q17	
Quadrat size:	20x20				
Vegetation group:	G				
WP:	24		04		
Photo number:			94 Open depressio	n (valo)/Drainago doprossion	
Land surface/disturbance:			No effective dist		
Coarse fragments on the surfa	ce (abundance/siz	ze/shape).	No coarse frage	nents	
Rock outcrop (abundance/run	off):		No bedrock exp	osed/Verv slow	
Soil (profile/field texture/soil s	urface):		Duplex/Sandy c	lay loam/Firm	
% Cover leaf litter:			40	•	
% Cover bare ground:			40		
Tallest stratum	1	Mid-stratum		Lower stratu	m
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub
Height:	6-12m	Height:	1-3m	Height:	0.5-1m
Crown cover %:	M 30-70	Crown cover %:	S 10-30	Crown cover %:	S 10-30
Dominant taxa:		Dominant taxa:		Dominant taxa:	
Eucalyptus clelandii		Eremophila scoparia		Acacia colletioides	
Eucalyptus oleosa subsp. oleosa	à	Exocarpos aphyllus	CI:C I:	Senna artemisioides subsp.	filifolia
Eucalyptus salubris		Senna artemisioides subsp.	filifolia	Eremophila ionantha	
		ALL SPECIES			
		Acacia colletioides			
		Acacia nemiteles			
		Acacia merrailii Eromophila alternife	lia		
		Eremonhila deciniens subsn	deciniens		
		Eremonhila ionanth	a		
		Eremophila scopari	a		
		Eucalyptus clelandi	ii		
		Eucalyptus oleosa subsp.	oleosa		
		Eucalyptus salubris	6		
		Exocarpos aphyllus	6		
		Ptilotus obovatus			
		Santalum acuminatu	m		
		Senna artemisioides subsp. ai	rtemisioides		
	I A A		Non C.		



Project Name:						
Date:	7/07/2017		Botanist:	Eren Reid		
Location:	Jaurdi Hills Minin	g Project	Quadrat:	Q18		
Quadrat size:	20x20					
Vegetation group:	F					
WP:	26					
Photo number:			98			
Landform:			Flat/Plain			
Land surface/disturbance:			No effective distu	urbance		
Coarse fragments on the surfa	ace (abundance/	size/shape):	No coarse fragm	ents		
Rock outcrop (abundance/run	off):		No bedrock expo	sed/Slow		
Soil (profile/field texture/soil s	urface):		Duplex/Sandy cla	ay loam/Firm		
% Cover leaf litter:			40			
% Cover bare ground:			60			
Tallest stratum		Mid-stratu	n	Lower stratu	ım	
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub	
Height:	6-12m	Height:	1-3m	Height:	0.5-1m	
Crown cover %:	S 10-30	Crown cover %:	M 30-70	Crown cover %:	S 10-30	
Dominant taxa:		Dominant taxa:		Dominant taxa:		
Eucalyptus clelandii		Eremophila interstans subsp	o. virgata	Acacia hemiteles		
		Santalum spicatum		Exocarpos aphyllus		
		Senna artemisioides subsp.	filifolia	Senna artemisioides subsp	. filifolia	
		ALL SPECIES	5			
		Acacia hemitele	s			
		Atriplex nummularia subsp	o. spathulata			
		Atriplex vesicar	ia			
		Eremophila glabra subs	sp. glabra			
		Eremophila interstans sul	osp. virgata			
		Eremophila oldfieldii subsp	. angustifolia			
		Eremophila scop	aria			
		Eucalyptus clelar	ndii			
		Exocarpos aphyl	lus			
		Maireana toment	osa			
		Maireana trichopt	era			
		Olearia muelle	ri			
		Olearia pimeleoio	des			
		Ptilotus obovatu	IS			
		Rhagodia drummo	ondii			
		Santalum acumina	atum			
		Santalum spicate	um			
		Scaevola spinesc	ens			
		Sclerolaena densi	flora			
		Sclerolaena diaca	ntha			
		Senna artemisioides subsp.	artemisioides			
		Senna artemisioides sub	osp. filifolia			
		Senna cardiosper	ma			
		Solanum lasiophy	llum			
		Solanum nummula	rium			
			A M			





		Project Name:			
Date:	7/07/2017		Botanist:	Eren Reid	
Location:	Jaurdi Hills Mining Project		Quadrat:	Q19	
Quadrat size:	20x20			•	
Vegetation group:	F				
WP:	27				
Photo number:			101		
Landform:			Hillock/Mound		
Land surface/disturbanc	:e:		No effective di	sturbance	
Coarse fragments on the	e surface (abundance/size/shap	e):	Very; abundar	nt/Fine gravelly; small pebbl	es/Subrounded
Rock outcrop (abundand	ce/runoff):		No bedrock ex	posed/Slow	
Soil (profile/field texture	/soil surface):		Duplex/Sandy	clay loam/Firm	
% Cover leaf litter:			30		
% Cover bare ground:			70		
Z . 0.		Mistoria			
lalle	est stratum	Mid-stratur	n	Lower stratu	um
Growth form:	M Tree Mallee (> 8m)	Growth form:	S Shrub	Growth form:	S Shrub
Height:	6-12m	Height:	1-3m	Height:	0.5-1m
Crown cover %:	\$ 10-30	Crown cover %:	<1	Crown cover %:	5 10-30
Dominant taxa:		Dominant taxa:		Dominant taxa:	
Eucalyptus cleiandii		Eremophila oldfieldil sub	sp. angustifolia	Acacia erinacea	
Eucaryptus grinninsii					
				Scaevola spinescens	
		Acacia colletioides			
		Acacia erinacea			
		Acacia hemiteles			
		Amyema preissii			
		Austrostipa elegantissima			
	Ere	emophila glabra subsp. glat	ora		
	Erem	ophila interstans subsp. vir	gata		
	Eremo	phila oldfieldii subsp. angu	stifolia		
		Eremophila pustulata			
		Eucalyptus clelandii			
		Eucalyptus griffithsii			
		Exocarpos aphyllus			
		Marsdenia australis			
		Olearia muelleri			
		Ptilotus obovatus			
		Scaevola spinescens	- 11 -		
	Sen	na artemisioides subsp. filif	olia		
		Senna cardiosperma			
		westingia nyida			
					Adjacent
				Atriplex nummularia su	hen enathulata
				Autplex numinularia su	sop. spanniala

Atriplex vesicaria Santalum acuminatum antalum spicatum





Project Name:						
Date:	11/07/2017		Botanist:	Eren Reid		
Location:	Jaurdi Hills Minir	ng Project	Quadrat:	Q20		
Quadrat size:	20x20					
Vegetation group:	E					
WP:	30					
Photo number:			105-106			
Landform:			Flat/Plain			
Land surface/disturbance:			No effective dist	urbance		
Coarse fragments on the surfa	ce (abundance/	size/shape):	No coarse fragm	ents		
Rock outcrop (abundance/run	off):		No bedrock expo	osed/Very slow		
Soil (profile/field texture/soil s	urface):		Duplex/Sandy cl	ay loam/Firm		
% Cover leaf litter:			60			
% Cover bare ground:			50			
Tallest stratum		Mid-stratu	m	Lower st	ratum	
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub	
Height:	12-20m	Height:	1-3m	Height:	0.5-1m	
Crown cover %:	S 10-30	Crown cover %:	M 30-70	Crown cover %:	S 10-30	
Dominant taxa:		Dominant taxa:		Dominant taxa:		
Eucalyptus salmonophloia		Eremophila ionantha		Atriplex stipitata		
		Eremophila scoparia		Atriplex vesicaria		
		Senna artemisioides subsp.	filifolia	Olearia muelleri		
		ALL SPECIES	3			
		Acacia colletioid	es			
		Acacia hemitele	es			
		Atriplex nummularia subsp	o. spathulata			
		Atriplex stipitat	а			
		Atriplex vesicar	ia			
		Chenopodium gaudicha	audianum			
		Enchylaena tomentosa va	r. tomentosa			
		Eremophila decipiens sub	sp. decipiens			
		Eremophila glabra sub	sp. glabra			
		Eremophila ionar	ntha			
		Eremophila scop	aria			
		Eucalyptus saimond	luc			
		Mairoana goorg	ius			
		Maireana pentatr	nnis			
		Maireana sedifo	lia			
		Olearia muelle	ri			
		Pimelea microcephala subsp	. microcephala			
		Ptilotus obovatu	JS			
		Santalum acumina	atum			
		Santalum spicat	um			
		Scaevola spinesc	ens			
		Sclerolaena densi	flora			
		Sclerolaena diaca	ntha			
		Senna artemisioides subsp.	artemisioides			
		Senna artemisioides sub	osp. filifolia			
		Senna cardiospe	rma			
		Solanum nummula	arium	2011 - 126 (A		





		Project Name	e:		
Date:	11/07/2017	-	Botanist:	Eren Reid	
Location:	Jaurdi Hills Mi	ning Project	Quadrat:	Q21	
Quadrat size:	20x20	- · ·			
Vegetation group:	tion group: F				
WP:	33				
Photo number:			114		
Landform:			Flat/Plain		
Land surface/disturbance:			No effective dis	turbance	
Coarse fragments on the surface	ce (abundance	e/size/shape):	No coarse fragr	nents	
Rock outcrop (abundance/runo	off):		No bedrock exp	osed/Very slow	
Soil (profile/field texture/soil su	irface):		Duplex/Sandy c	lay loam/Firm	
% Cover leaf litter:			60		
% Cover bare ground:			50		
Tallest stratum		Mid-stratum	ו	Lower stratu	m
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub
Height:	6-12m	Height:	1-3m	Height:	0.5-1m
Crown cover %:	V <10	Crown cover %:	S 10-30	Crown cover %:	S 10-30
Dominant taxa:		Dominant taxa:		Dominant taxa:	
Eucalyptus clelandii		Eremophila caperata		Acacia merrallii	
		Eremophila scoparia		Cratystylis conocephala	
				Eremophila scoparia	
		ALL SPECIE	S		
		Acacia colletioio	des		
		Acacia merral	lii		
		Atriplex nummularia subs	p. spathulata		
		Austrostipa elegant	tissima		
		Chenopodium gaudich	audianum		
		Cratystylis conoce	phala		
		Eremophila cape	erata		
		Eremophila scop	oaria		
		Eriochiton sclerolae	enoides		
		Eucalyptus clela	Indii		
		Exocarpos aphy	llus		
		Frankenia interi	oris		
		Maireana geor	gei		
		Maireana sedife	olia		
		Maireana tomen	tosa		
		Ptilotus aervoid	les		
		Rhagodia drumm	ondii		
		Sclerolaena dens	iflora		
		Sclerolaena diaca	antha		
		Sclerolaena patent	icuspis		
		Senna artemisioides su	bsp. filifolia		
		Senna cardiospe	erma		





	Project Name:						
Date:	11/07/2017		Botanist:	Eren Reid			
Location:	Jaurdi Hills Mining Project		Quadrat:	Q22			
Quadrat size:	20x20			•			
Vegetation group:	F						
WP: 34							
Photo number:		115					
Landform:			Flat/Plain				
Land surface/disturbance			No effective	disturbance			
Coarse fragments on the	surface (abundance/size/shape):		No coarse fra	agments			
Rock outcrop (abundance	/runoff):		No bedrock e	exposed/Very slow			
Soil (profile/field texture/s	oil surface):		Duplex/Sand	ly clay loam/Firm			
% Cover leaf litter:			80				
% Cover bare ground:			50				
Talle	st stratum	Mid-stratur	m	Lower stratu	m		
Growth form:	M Tree Mallee (> 8m)	Growth form:	S Shrub	Growth form:	S Shrub		
Height:	6-12m	Height:	1-3m	Height:	0.5-1m		
Crown cover %:	S 10-30	Crown cover %:	S 10-30	Crown cover %:	S 10-30		
Dominant taxa:		Dominant taxa:		Dominant taxa:			
Eucalyptus oleosa subsp. o	leosa	Eremophila interstans s	ubsp. virgata	Cratystylis conocephala			
		Eremophila scoparia		Eremophila decipiens subsp. decipiens			
				Eremophila parvifolia sub	sp. auricampa		
		ALL SPECIES					
		Atriplex stipitata					
		Atriplex vesicaria					
	Chenc	podium gaudichaudianum	า				
	C	ratystylis conocephala					
	C	Cratystylis microphylla					
	Enchylae	na tomentosa var. toment	osa				
	Eremophi	ila decipiens subsp. decip	iens				
	Eremo	ophila glabra subsp. glabra	a				
	Eremopl	hila interstans subsp. virga	ata				
		Eremophila ionantha					
	Eremophi	la parvifolia subsp. aurica	mpa				
	Eremoj	phila praecox (P1)- 2 plan	ts				
		Eremophila scoparia					
	Ell	ochiton scierolaenoides	_				
	Eucary	pius oleosa subsp. oleosa	a				
		Exocalpos aprivilus					
		Mairoana pontatronia					
		Maireana tomentosa					
	Pimelea mid	crocenhala subsp. microce	nhala				
	i intelea filio	Ptilotus obovatus	spriaia				
	Я	Rhagodia drummondii					
		Sclerolaena densiflora					
	Senna	artemisioides subsp filifol	ia				
	Senina						





		Project Name:			
Date:	11/07/2017		Botanist:	Eren Reid	
Location:	Jaurdi Hills Mining Project		Quadrat:	023	
Quadrat size:	20x20				
Vegetation group:	Н				
WP.	36				
Photo number:			119		
Landform:			Flat/Plain		
Land surface/disturbance			No effective	disturbance	
Coarse fragments on the	surface (abundance/size/shape) [.]		No coarse fra	agments	
Bock outcrop (abundance	/runoff)		No bedrock e	exposed/Very slow	
Soil (profile/field texture/s	oil surface):		Duplex/Sand	v clav loam/Firm	
% Cover leaf litter:			20		
% Cover bare ground:			60		
/ Cover bare ground.			00		
Talle	est stratum	Mid-stratur	n	l ower strat	tum
Growth form:	V Shruh Mallee (< 8m)	Growth form:	S Shrub	Growth form:	S Shrub
Growth form.		Growth form.	3 311100	Growth torn.	3 311 UD
Height:	3-6m	Height:	1-3m	Height:	0.5-1m
Crown cover %:	\$ 10-30	Crown cover %:	V <10	Crown cover %:	5 10-30
Dominant taxa:		Dominant taxa:		Dominant taxa:	
Eucalyptus oleosa subsp. o	leosa	Eremophila interstans su	ubsp. virgata	Cratystylis subspinesce	ens
Eucalyptus yligarnensis				Eremophila scoparia	
				Maireana pyramidata	
		ALL SPECIES			
		Atriplex stipitata			
		Atriplex vesicaria			
	Chenop	odium gaudichaudianum			
	Cra	atystylis conocephala			
	Cra	tystylis subspinescens			
	Enchylaen	a tomentosa var. tomentos	sa		
	Eremophila	a decipiens subsp. decipie	ns		
	Eremor	phila glabra subsp. glabra			
	Eremoph	ila interstans subsp. virgat	а		
	E	remophila scoparia			
	Erio	chiton sclerolaenoides			
	Eucalyr	otus oleosa subsp. oleosa			
	Eu	calyptus yilgarnensis			
		xocarpos aphyllus			
		rankenia interioris			
		Maireana georgei			
	N	laireana pyramidata			
	-	Maireana sedifolia			
	Ν	laireana thesioides			
	N	laireana tomentosa			
	N	laireana trichoptera			
	Pimelea mici	rocephala subsp. microcep	nala		
		Prilotus aervoides			
		Ptilotus obovatus			
	R	nagodia drummondii			
	So	clerolaena densiflora			
	So	clerolaena diacantha			
	Scle	erolaena patenticuspis			
	Senna a	rremisioides subsp. filifolia	l		





		Project Name:			
Date:	11/07/2017		Botanist:	Eren Reid	
Location:	Jaurdi Hills Mining	g Project	Quadrat:	Q24	
Quadrat size:	20x20			1	
Vegetation group:	F				
WP.	11				
Photo number:	- 11		122-123		
Landform:			Flat/Plain		
Land ourfees/disturbances			Ne offective di	aturhanaa	
Land Surface/disturbance.	(No enective un	sturbance	
Coarse fragments on the surfa-	ce (abundance/si	ze/snape):	No coarse frag	Intents	
Rock outcrop (abundance/rund	off):		No bedrock ex	posed/very slow	
Soli (profile/field texture/soll su	irface):		Duplex/Sandy	clay loam/Firm	
% Cover leaf litter:			50		
% Cover bare ground:			60		
Tallest stratum		Mid-stratum		Lower stratu	m
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub
Height:	6-12m	Height:	1-3m	Height:	0.5-1m
Crown cover %:	S 10-30	Crown cover %:	V <10	Crown cover %:	V <10
Dominant taxa:		Dominant taxa:		Dominant taxa:	
Eucalvotus oleosa subsp. oleosa		Eremophila caperata		Daviesia aphylla	
Eucalyptus clelandii		Eremophila scoparia		Eremophila scoparia	
		Senna artemisioides subsp. f	ilifolia	Olearia muelleri	
				ologing indeligi	
		Acacia colletioides	:		
		Atriplex vesicaria			
			ima		
			inta		
			0		
		Eremophila caperat	a		
		Eremophila parvitolia subsp.	auricampa		
		Eremophila scopari	а		
		Eucalyptus cleland			
		Eucalyptus oleosa subsp.	oleosa		
		Exocarpos aphyllus	8		
		Maireana pentatrop	is		
		Maireana tomentos	а		
		Olearia muelleri			
		Senna artemisioides subs	o. filifolia		
					Adjacent
					A a a a la ma a malli
					Acacia merralili
				Euc	alyptus salubris
				Euc Santal	alyptus salubris um acuminatum
				Euc Santal	alyptus salubris um acuminatum
	M			Euc Santal	alyptus salubris um acuminatum
	WE			Euc Santal	Acacla merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	alyptus salubris um acuminatum
				Euc Santal	Acada meranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada meranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
				Euc Santal	Acada merranin calyptus salubris um acuminatum
					Acada merranin calyptus salubris um acuminatum



		Project Name:			
Date:	11/07/2017		Botanist:	Eren Reid	
Location:	Jaurdi Hills Mir	ning Project	Quadrat:	Q25	
Quadrat size:	20x20				
Vegetation group:	1				
WP:	43		407		-
Photo number:			127 Hillook/Mound		
Land surface/disturbance:			Limited clearing		
Coarse fragments on the surface	e (abundance)	(size/shane)	Verv: abundant/	Cobbly: or cobbles/Rounded	
Rock outcrop (abundance/runo	ff):	5126/5110/07.	Slightly rocky/Sl		
Soil (profile/field texture/soil su	rface):		Duplex/Sandy cl	lay loam/Firm	
% Cover leaf litter:	,		15		
% Cover bare ground:			70		
				-	
Tallest stratum		Mid-stratum		Lower stratum	
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub
Height:	6-12m	Height:	1-3m	Height:	0.5-1m
Crown cover %:	V <10	Crown cover %:	S 10-30	Crown cover %:	V <10
Dominant taxa:		Dominant taxa:		Dominant taxa:	
Eucalyptus cleiandii		Exocarpos apnyllus Molalouca shoathiana		Acacia merrailii	
		Senna artemisioides subsp. fil	ifolia	Westringia rigida	
		ALL SPECIES	liolia	Westningla figlida	
		Acacia ligulata			
		Acacia merrallii			
		Atriplex nummularia subsp.	spathulata		
		Atriplex vesicaria	à		
		Austrostipa elegantis	sima		
		Chenopodium gaudichau	udianum		
		Cratystylis subspines	cens		
		Dodonaea viscosa subsp. a	ngustissima		
		Eremophila decipiens subsp	b. decipiens		
		Eremophila parvifolia subsp	. auricampa		
		Maireana deorde	us ni		
		Maireana pentatro	pis		
		Maireana trichopte	era		
		Marsdenia austral	lis		
		Melaleuca sheathia	ana		
		Olearia muelleri			
		Rhagodia drummor	ndii		
		Sclerolaena densifi	ora		-
		Scierolaena diacan	tha m filifalia		
		Solanum nummular	ium		
		Solanum nummular Westringia rigida	ium 3		
	A the second			AN CAN	



Project Name:							
Date:	11/07/2017		Botanist:	Eren Reid			
Location:	Jaurdi Hills Mining	g Project	Quadrat: Q26				
Quadrat size:	20x20						
Vegetation group: 1							
WP:	44						
Photo number: 130							
Landform: Hillock/Mound							
Land surface/disturbance: Limited clearing							
Coarse fragments on the surface (abundance/size/shape): Very; abundant/Coarse gravelly; large pebbles/Rounded							
Rock outcrop (abundance/rund	off):		Slightly rocky/SI	ow			
Soil (profile/field texture/soil su	urface):		Duplex/Sandy c	lay loam/Firm			
% Cover leaf litter:			40				
% Cover bare ground:			60				
Tallest stratum		Mid-stratum		m			
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub		
Height:	6-12m	Height:	1-3m	Height:	0.5-1m		
Crown cover %:	S 10-30	Crown cover %:	V <10	Crown cover %:	S 10-30		
Dominant taxa:		Dominant taxa:		Dominant taxa:			
Eucalyptus clelandii		Acacia hemiteles		Acacia colletioides	-		
Eucalyptuc oforarian		Exocarpos aphyllus		Cratystylis conocephala	-		
		Melaleuca sheathiana		Eremonhila sconaria			
		Acacia colletioide	2				
			5				
		Autropiex vesicaria					
		Austrostipa elegantis	sima				
		Cratystylis conocepr					
		Dodonaea viscosa subsp. ar	igustissima				
		Eremophila parvitolia subsp.	auricampa				
		Eremophila scopar					
		Eucalyptus cleiand	111				
		Exocarpos aphyllu	S				
		Maireana pentatrop	DIS				
		Maireana tomentos	sa				
		Melaleuca sheathia	na				
		Olearia muelleri					
		Rhagodia drummor	idii				
Senna artemisioides subsp. filifolia							
	Westringia rigida						



Project Name:							
Date:	11/07/2017	Botanist:	Eren Reid				
Location:	Jaurdi Hills Mining Project		Quadrat:	Q27			
Quadrat size:	20x20						
Vegetation group:	1						
WP:	46						
Photo number:			134				
Landform:			Hillock/Moun	d			
Land surface/disturbance	:		Limited clear	ing w/Oakklas/D			
Coarse tragments on the s	surface (abundance/size/snape):		Very; abunda	ant/Cobbly; or cobbles/R	ounded		
Soil (profile/field texture/s	oil surfaco):		Duploy/Sand	//SIOW			
% Cover leaf litter:	on surface).		Duplex/Saliu	y ciay ioani/Finn			
% Cover bare ground:			50				
78 COver bare ground.			50				
Talle	est stratum	Mid-stratur	n	Lower stra	atum		
Growth form:	M Tree Mallee (> 8m)	Growth form:	S Shrub	Growth form:	S Shrub		
Height:	6-12m	Height:	1-3m	Height:	0.5-1m		
Crown cover %:	V <10	Crown cover %:	V <10	Crown cover %:	S 10-30		
Dominant taxa:	•	Dominant taxa:	•	Dominant taxa:	.		
Eucalyptus clelandii		Acacia hemiteles		Acacia colletioides			
		Melaleuca sheathiana		Grevillea acuaria			
				Westringia rigida			
		ALL SPECIES		<u> </u>			
		Acacia colletioides					
		Acacia hemiteles					
	A	cacia tetragonophylla					
		Atriplex vesicaria					
	Dianella	a revoluta subsp. divaricata	1				
	Dodonaea	viscosa subsp. angustissi	ma				
	Eremophi	la decipiens subsp. decipie	ens				
	Eremo	phila glabra subsp. glabra					
	E	Fremophila ionantha					
	Eremophil	a parvifolia subsp. auricam	ipa				
	E	Eremophila scoparia					
		Eucalyptus clelandii					
	Exocarpos aphyllus						
		Grevillea acuaria					
Maireana pentatropis							
	Ν	Maireana tomentosa					
	N	lelaleuca sheathiana					
	_	Olearia muelleri					
	R	hagodia drummondii					
		Scaevola collaris					
	5	Scaevola spinescens					
	Senna	artemisioides subsp. filifolia	a				
Solanum nummularium							
Triodia rigidissima							
vvestringia rigida							
Adjacent							
					<u>Alyxia buxifolia</u>		





		Project Name:			
Date:	11/07/2017		Botanist:	Eren Reid	
Location:	Jaurdi Hills Minin	g Project	Quadrat: 028		
Quadrat size:	20x20				
Vegetation group:	1				
WP.	50				
Photo number: 142					
Landform: 142					
Land orm. Initiative disturbance					
Coarso fragmonts on the surfa	oco (abundanco/s	izo/shana):	No qualifier: cor	mon/Coorso grovelly: lorgo n	obbloc/Poundod
Book outgrop (obundance/run	off)	ize/shape).	No qualifier, cor	and/Slow	epples/Rounded
Soil (profile/field texture/coil o	urfooo):		Dupley/Sendy a	lov loom/Firm	
Soli (prome/neid texture/soli s	unace).				
% Cover lear litter.			50		
% Cover bare ground:			50		
Tallast stratum		Mint a traction			
Tallest stratum	I	Mid-stratum		Lower stratu	m
Growth form:	I Iree	Growth form:	S Shrub	Growth form:	S Shrub
Height:	6-12m	Height:	1-3m	Height:	0.5-1m
Crown cover %:	S 10-30	Crown cover %:	S 10-30	Crown cover %:	S 10-30
Dominant taxa:		Dominant taxa:		Dominant taxa:	
Eucalyptus clelandii		Melaleuca sheathiana		Cratystylis conocephala	
				Eremophila scoparia	
				Westringia rigida	
		ALL SPECIES			
		Acacia hemiteles	;		
		Acacia merrallii			
		Cratystylis conocept	nala		
		Cratystylis microph	vlla		
		Enchylaena tomentosa var	tomentosa		
		Eromonhila dahra subsr			
		Eremonhile panyifelia subsp	o. glabia		
			. auncampa		
		Eremophila scopal	1d 		
		Eucalyptus cleiand	ווג		
		Exocarpos aphyliu	IS		
		Maireana pentatrop	DIS		
		Melaleuca sheathia	ina		
		Olearia muelleri			
		Rhagodia drummor	ndii		
		Senna artemisioides subs	sp. filifolia		
				All S	
					186



Project Name:						
Date:	11/07/2017		Botanist:	Eren Reid		
Location:	Jaurdi Hills Mining	Project	Quadrat: Q29			
Quadrat size:	20x20					
Vegetation group:	F					
WP: 52						
Photo number: 148						
Landform: Flat/Terrace plain						
Land surface/disturbance: No effective disturbance						
Coarse fragments on the surfa	ice (abundance/si	ze/shape):	No coarse frage	nents		
Rock outcrop (abundance/run	off):		No bedrock exp	osed/Very slow		
Soil (profile/field texture/soil s	urface):		Duplex/Sandy c	lay loam/Firm		
% Cover leaf litter:			70			
% Cover bare ground:			40			
Tallest stratum	1	Mid-stratum		Lower stratum		
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub	
Height:	6-12m	Height:	1-3m	Height:	0.5-1m	
Crown cover %:	M 30-70	Crown cover %:	S 10-30	Crown cover %:	S 10-30	
Dominant taxa:		Dominant taxa:		Dominant taxa:	•	
Eucalyptus clelandii		Acacia hemiteles		Acacia merrallii		
Eucalyptus salubris		Eremophila caperata		Olearia muelleri		
		Eremophila scoparia		Westringia rigida		
		ALL SPECIES				
		Acacia colletioides				
		Acacia hemiteles				
		Acacia merrallii				
		Austrostipa elegantiss	ima			
		Eremophila caperat	a			
		Eremophila parvifolia subsp.	auricampa			
		Eremophila scopari	a			
		Eucalyptus clelandi	I			
		Eucalyptus salubris	6			
		Exocarpos aphyllus	6			
		Olearia muelleri				
		Scaevola collaris				
		Scaevola spinescen	IS			
		Senna artemisioides subsp. ar	rtemisioides			
		Senna artemisioides subsp	o. filifolia			



Beacon Minerals Ltd

JAURDI HILLS LEVEL 2 FLORA AND VEGETATION SURVEY Part 2- September 2017



Prepared for:

Prepared by: Native Vegetation Solutions PO Box 41 KALGOORLIE WA 6430 Telephone: 08 9021 5818 Mobile: 0407 998 953 E-mail: <u>eren@nativevegsolutions.com.au</u> ABN: 36 150 274 469

> FINAL V2.0 September 2017



EXECUTIVE SUMMARY

The parent entity, Beacon Minerals Limited (BCN) is a publicly listed company which has a 100% interest in Beacon Mining Pty Ltd (BM). BCM is required to make all the financial and operating policy decisions for this subsidiary. BM has gold interests and is the operator of its Jaurdi Hills Project in the Coolgardie Region of Western Australia. Via exploration drilling within the project area, BM has identified the Lost Dog Deposit within the Mining Lease M16/529. BM provided Native Vegetation Solutions (NVS) with a survey area which encompasses the main mining areas as well as other infrastructure related to mining the mineral resource. The location of this survey area is approximately 32 km northwest of Coolgardie (Figure 1).

This report will support numerous applications including mining proposals, works approvals and clearing permits submitted to relative Government Departments.

The survey area, for the purposes of this report, encompasses an area totalling approximately 589.91 ha, which intersects Mining Tenements M16/34, M16/115, M16/255, M16/529, Prospecting Licenses P16/2925, P16/2926, P16/3031 and Exploration License E16/469. At this stage, the final footprint of mining related disturbances is yet to be finalised, however will be encompassed entirely within the survey area.

The survey area is located in the Coolgardie Botanical District of Beard (1990). The Coolgardie Botanical District is dominated by eucalypt woodlands, eucalypt open woodlands in the east, other shrublands, heath, *Acacia* shrublands, chenopod and samphire shrublands, mallee woodlands and shrublands. There are small areas of *Acacia* forests and woodlands, and hummock grasslands occurring in the north (DOTEE, 2017).

Within the Coolgardie Botanical District, the Eastern Goldfields subregion is comprised 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 granulites of the Fraser Range. The area is rich in endemic *Acacia*'s (CALM, 2002).

The Goldfields Woodlands is a centre of endemism and includes exceptionally high diversity of *Eucalyptus* species with as many as 170 species occurring in the bioregion. The COO3 subregion also has high diversity in *Acacia* species, as well as ephemeral flora communities of tertiary sandplain shrublands and of valley floor woodlands (CALM, 2002).

The search undertaken with the EPBC's Protected Matters Search Tool reported that no TECs were present in the survey area (DOTEE, 2017b). The search also revealed that the survey area may contain habitat for the invasive weed species *Carrichtera annua* (Ward's Weed).

The threatened species, *Gastrolobium graniticum*, was listed as either likely to be in the area or having potential habitat occurring in the area. This species occurs mainly on granite outcrops. No granite outcrops were identified in the survey area.

The DPAW database searches revealed a potential for 2 Threatened and 39 Priority Flora species to occur within a 30km radius of the survey area (DBCA, 2017a). No known locations of these Flora occur within the survey area, while the closest location occurs approximately 7 km east of the survey area.

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

The PEC/TEC search (DBCA, 2017) revealed no TECs or PECs within the survey area.

The survey area does not lie within or contain any ESA's or Conservation Reserves (DWER, 2017).

No water bodies were identified within the survey area via the CPS Map Viewer (DWER, 2017).

The survey area lies south of the 26th parallel, however receives average annual rainfall of approximately 270.3 mm (BOM, 2017), 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 or weed infestations which could pose a risk within the survey area during seasonally favourable conditions.

Nine vegetation groups were identified during this survey, largely following topographical features and dominant species. Mapping of the 9 vegetation groups, as well as the quadrat locations can be seen in Appendix C.

Eighty-five species were recorded within the survey area with 84 species recorded within quadrats. Thirty-nine genera and 24 families were found. These are listed in Appendix E, per Quadrat as well as per vegetation group. Of the native species, Chenopodiaceae had the highest representation, with 19 species from 8 genera, dominated by *Maireana*. Fabaceae and Scrophulariaceae were the next best represented families with 12 species each.

Of the 85 taxa recorded there were two introduced weed species; *Carrichtera annua* (Ward's Weed) and *Cucumis myriocarpus* (Prickly Paddy Melon). These weed species were recorded within 2 of the 29 quadrats. No weed species recorded were considered declared plants by DPIRD (2017).

The most common and widespread species were *Eremophila scoparia, Exocarpos aphyllus and Senna artemisioides* subsp. *filifolia,* which were recorded within 25 quadrats. Its canopy cover was 10-30%. The next most common and widespread species was *Ptilotus obovatus,* recorded in 19 quadrats, with a canopy cover less than 10%.

There were 30 taxa recorded from within a single site, Q23. Of these, none were weed species.

No Threatened species were recorded during the survey.

One Priority species, Eremophila praecox (P1), was identified in the survey area within Q22, which lies within Vegetation Group H. Two plants were recorded here within a 200m radius.

Vegetation condition was generally 'Good' to 'Very Good' (Keighery 1994). Disturbance was present within the survey area mostly attributed to historic mining activities, access tracks, exploration related activities, and also grazing.

The EPA objective for flora and vegetation is to maintain the abundance, species diversity and geographical distribution of flora and vegetation as well as protect Threatened flora consistent with the provisions of the *Biodiversity Conservation Act 2016*.

The proposed clearing of vegetation will result in the loss of some individuals from the local area; however, the impact will not be great enough to remove whole communities or populations. Most of the species and communities recorded during this survey are widespread throughout the Eastern Goldfields subregion and adjoining regions, and therefore the loss of a small proportion from this area will not be significant.

This report summarises the results of the second stage of the Level 2 survey, incorporation Winter and Spring surveys of 2017.



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1 INTRODUCTION

1.1 BACKGROUND

The parent entity, Beacon Minerals Limited (BCN) is a publicly listed company which has a 100% interest in Beacon Mining Pty Ltd (BM). BCN is required to make all the financial and operating policy decisions for this subsidiary. BM has gold interests and is the operator of its Jaurdi Hills Project in the Coolgardie Region of Western Australia. Via exploration drilling within the project area, BM has identified the Lost Dog Deposit within the Mining Lease M16/529. BM provided Native Vegetation Solutions (NVS) with a survey area which encompasses the main mining areas as well as other infrastructure related to mining the mineral resource. The location of this survey area is approximately 32 km northwest of Coolgardie (Figure 1).

This report will support numerous applications including mining proposals, works approvals and clearing permits submitted to relative Government Departments.

The survey area, for the purposes of this report, encompasses an area totalling approximately 589.91 ha, which intersects Mining Tenements M16/34, M16/115, M16/255, M16/529, Prospecting Licenses P16/2925, P16/2926, P16/3031 and Exploration License E16/469. At this stage, the final footprint of mining related disturbances is yet to be finalised, however will be encompassed entirely within the survey area.





Figure 1: Regional Location of the Jaurdi Hills Survey Area



1.2 PURPOSE AND SCOPE

The objective of this report is to record and analyse the results of the flora and vegetation component of a Level 2 assessment conducted in accordance with the following documents:

- Terrestrial Biological Surveys as an Element of Biodiversity Protection; Position Statement No 3 (EPA, 2002);
- Guidance Statement No. 51- Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (EPA, 2004); and
- Technical Guide- Flora and Vegetation Surveys for Environmental Impact Assessment (EPA and DPAW, 2015).

A Level 2 Flora and Vegetation Survey has two components:

- 1) Level 1 Survey
 - a) Desktop study which includes a literature review and a search of the relevant databases; and
 - b) Reconnaissance survey of the subject area to verify the desktop survey, undertake low impact sampling, define vegetation groups present in the area, search for species of conservation significance and to determine potential sensitivity to impact.
- 2) Detailed Plot Based Survey
 - a) Detailed survey, comprising multiple visits in main flowering seasons or other seasons and replication of plots in vegetation units incorporating greater coverage than a reconnaissance survey; and
 - b) Comprehensive survey when necessary to: enhance the level of knowledge at the locality or sub-regional scale, in order to provide wider context for the local scale.

Therefore, the scope of work for the Level 2 flora and vegetation survey was to:

- Conduct a desktop study that includes a literature review and search of relevant databases;
- Conduct a plot-based survey within the survey area (20m x 20m quadrats);
- Prepare an inventory of species occurring in the study area;
- Conduct PATN analysis of quadrat based presence/absence data;
- Quantify survey intensity via Species Accumulation Curve;
- Describe the vegetation associations in the survey area;
- Identify any vegetation communities or flora species of particular 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, particularly flora of conservation significance, within the study area.



2 EXISTING ENVIRONMENT

2.1 CLIMATE

Typically, the climate is characterised as being arid to semi-arid Mediterranean with mainly winter rainfall as well as summer thunderstorms. The area receives approximately 250-300mm of rainfall per year (Beard, 1990; CALM, 2002). The nearest official meteorological weather station with the most complete and up to date information is Coolgardie, which is located approximately 32 km southeast of the survey area.

2.1.1 Temperature

Mean annual minimum temperature at Coolgardie is 11.2°C and mean annual maximum temperature is 25.0°C (BOM, 2017). The coldest temperatures occur in July (mean minimum temperature 5.2°C), the hottest is January (mean maximum temperature 33.3°C) and diurnal temperature variations are relatively consistent throughout the year (Figure 2).



Figure 2: Mean temperature ranges for Coolgardie weather station (BOM, 2017)

2.1.2 Rainfall

The annual average rainfall at Coolgardie is 270.7mm over an average 34.7 rain days (BOM, 2017). Average rainfall varies across the months, with slightly larger rainfall events falling between January to August (Figure 3), and the least rainfall received in September. Rainfall for 2016 was more than triple the average for January, with June, August and December also receiving above average rainfall levels. All other months in 2016 recorded below average levels. November was the driest month for 2016.





Figure 3: Rainfall data for the Coolgardie Meteorological Station (BOM, 2017)

Rainfall for 2017 was not recorded at the Coolgardie weather station (012018) and the nearest rainfall recorded was Credo which is located approximately 27km northwest of the survey area. Rainfall at Credo (012259) in 2017 was more than quadruple the average of Coolgardie for January, with February and March also receiving above average rainfall levels (Figure 4). April, May, June, July and August all received lower than Coolgardie's average in 2017.





Figure 4: Rainfall data for the Credo Meteorological Station (BOM, 2017)

2.2 INTERIM BIOGEOGRAPHIC REGIONALISATION OF AUSTRALIA (IBRA) REGION

The IBRA recognises 89 bioregions within Australia and 419 subregions (DOTEE, 2017a). The project is located in the Eastern Goldfields IBRA subregion (COO3) which totals over 5.1 million hectares (CALM, 2002). The Eastern Goldfields subregion lies on the '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 over 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 dominant land uses of the COO3 subregion are: UCL and Crown reserves, Grazing-Native pastures-leasehold (37.8%), freehold (7.15%), conservation, mining leases (CALM, 2002).

2.3 LANDFORMS AND SOILS

This bioregion consists of granite rocky outcrops, low greenstone hills, laterite uplands and broad plains. There are no major rivers or creeks within the bioregion. Numerous salt lakes of varying size occur across the region (DOTEE, 2017).

Beard (1990) describes the soil types in the COO3 subregion as: principally brown calcareous earths, with sandplains in the western part and some large playa lakes.

2.4 BOTANICAL DISTRICTS AND EXISTING VEGETATION

The survey area is located in the Coolgardie Botanical District of Beard (1990). The Coolgardie Botanical District is dominated by eucalypt woodlands, eucalypt open woodlands in the east, other shrublands, heath, *Acacia* shrublands, chenopod and samphire shrublands, mallee woodlands



and shrublands. There are small areas of *Acacia* forests and woodlands, and hummock grasslands occurring in the north (DOTEE, 2017).

Within the Coolgardie Botanical District, the Eastern Goldfields subregion is comprised 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 granulites of the Fraser Range. The area is rich in endemic *Acacia*'s (CALM, 2002).

The Goldfields Woodlands is a centre of endemism and includes exceptionally high diversity of *Eucalyptus* species with as many as 170 species occurring in the bioregion. The COO3 subregion also has high diversity in *Acacia* species, as well as ephemeral flora communities of tertiary sandplain shrublands and of valley floor woodlands (CALM, 2002).



3 METHODS

3.1 PERSONNEL AND REPORTING

The following personnel were involved in the Level 2 flora and vegetation survey:

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

3.2 PRELIMINARY DESKTOP STUDY

A preliminary assessment of the survey area and its potential constraints was undertaken by reviewing relevant government agency managed databases (Sections 3.2.1 to 3.2.5, and Appendices 1 & 2) and consulting with government agencies where necessary. The following sections provide a summary of desktop searches undertaken for the project.

3.2.1 Environment Protection and Biodiversity Conservation Act Protected Matters

The *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* Protected Matters Search tool was utilised to provide results for matters of National Environmental Significance within the survey area using the coordinates displayed within the search results (Appendix 1) with a 1km buffer (DOTEE, 2017b).

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

3.2.2 Threatened Flora and Communities

The Threatened and Priority Flora Database managed by the Department of Biodiversity, Conservation and Attractions (DBCA) was searched for threatened and priority flora within a 30km radial area of the survey area shapefile (Reference: 04-0717FL).

The Threatened and Priority Ecological Communities (TECs and PECs) database was searched to determine the presence of PECs or TECs (Reference: 11-0717DBCA), with Geographic Information System (GIS) data supplied for assessment, within a 10km radial area of the survey area shapefile.

3.2.3 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 (<u>https://cps.der.wa.gov.au/main.html</u>).

3.2.4 Vegetation Type, Extent and Status

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

DPaW's Statewide Vegetation Statistics (DPAW, 2017) was also referenced for the current extent of Beard's Vegetation Groups.

3.2.5 Wetlands

The potential of wetlands within the project area was determined by examining DWER's Clearing Permit System Map Viewer (DWER, 2017).



3.2.6 Dieback

Dieback is only considered a potential issue for the project if both the mean annual rainfall of the area is >400mm, and if the project area resides south of the 26th parallel. Dieback is not considered an issue for the survey area as although it lies south of the 26th parallel it receives average annual rainfall of 270.3 mm, which is below the 400mm threshold mark. There are no records of *Phytophthora cinnamomi* establishing in natural ecosystems in regions receiving less than 400mm rainfall per annum (CALM, 2003).

3.3 LEVEL OF SURVEY

The survey was conducted in accordance with EPA's Position Statement No. 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA, 2002), Guidance for the Assessment of Environmental Factors No. 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2004) and Technical Guide- Flora and Vegetation Surveys for Environmental Impact Assessment (EPA and DPAW, 2015).

In designing this survey, note was taken of Tables 2 and 3 of EPA Guidance Statement 51 (pp 39-45). Using the Table 3 criterion on 'Size/scale of the proposal/impact' it is determined that the impact of this mining proposal is High, although other criteria (for example 'Degree of degradation or clearing within region' and 'Rarity of vegetation') may mitigate this to Medium impact. This survey, however, is designed to accommodate the High impact and as such, in the Eastern Goldfields subregion, a Level 2 survey is required.

3.4 SITE INVESTIGATION

The first stage of the field survey was conducted by Mr. Eren Reid, Botanist of NVS, on the 6th, 7th, 11th and 13th July 2017. The second follow up survey was conducted by Mr. Eren Reid on 13th and 14th September 2017.

3.4.1 Field Methods

Prior to the field work, the aerial photography was examined and representative sample sites for quadrats were chosen to provide coverage over all viable vegetation types. Twenty-nine sites were chosen by this method.

In the field, these sites were visited and 20 x 20m quadrats established in appropriate locations, taking into account representativeness of the site to surrounding vegetation and vegetation boundaries.

Each quadrat site was marked in all corners with a 97cm galvanized fence dropper and was defined by tape measures. The location of one corner was captured on a TwoNav Aventura GPS at ±4m accuracy, using Universal Transverse Mercator location on GDA94 datum. Digital photographs were taken of each quadrat site.

Data collected at each quadrat included:

- Species Present;
- Topography;
- Rock Type;
- Soil Colour and Type;
- Aspect;
- % Bare Ground and Litter;
- Disturbance Level; and
- Vegetation Condition.

As well as a complete list of all species encountered, the average height and estimated coverage of the species making up the three stratum levels (Tallest, Mid and Lower).



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 quadrat was assessed using the method developed by Keighery (1994). Definitions of the condition scale are presented in Appendix A.

Vegetation groups were mapped (section 3.4.3 below).

Opportunistic sampling of plant taxa and vegetation group mapping was also utilised in the survey area between quadrat sampling points, via wandering traverses. 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 C.

3.4.2 Post-Field Methods

Unknown specimens collected in the field were identified post field work by Eren Reid with reference to published keys and samples held in the Reference Section of the Western Australian Herbarium (WAHERB).

Species information was transferred into Microsoft Excel[®] worksheets in preparation for PATN analysis (Belbin, 1994), via Bray and Curtis Flexible UPGMA, as well as input into a computer program which generates a species accumulation curve (Seaby & Henderson, 2006).

3.4.3 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 C.

3.5 LICENCE AND PERMITS

Flora was collected for identification under the Scientific Collection License SL011847 held by Mr E. Reid with expiry 09/07/2017.

3.6 NOMENCLATURE AND TAXONOMY

Nomenclature follows that used by the WAHERB.

Recently the WAHERB has updated its sequence and arrangement of collections to conform to the systematic sequence of the Angiosperm Phylogeny Group (APGIII), with the result that many Families and Genera have been moved or renamed. This report attempts to follow those changes in relation to species recorded during this survey. Definitions of Threatened Flora are also included in Section 9 below.



3.7 LIMITATIONS

Table 1 lists potential limitations that may have affected the survey. These are based on the listing given in the *Guidance Statement No. 51 Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004).

Possible Limitation	Constraint	Comment
		Experienced and competent personnel conducted the
Competency/experience of		survey. Eren Reid has over 13 years' experience in
the consultant carrying out		botanical surveys throughout the Goldfields and over a
the survey	No	variety of environments across Western Australia.
		The Scope of work was adequately defined. Vascular flora
		species were the focus of the survey and were thoroughly
		sampled. Of all the plant taxa identified, 5.8% were
Scope	No	considered annual species.
•	NL	All taxa not identified in the field were collected and
Proportion of flora identified.	NO	pressed, and later identified by Eren Reid. See also
recorded and/or collected		Species Accumulation Curves in section 4.2.2.2.
		Information on flora and vegetation of the region and local
		area was available from publicly available databases
Sources of information	No	hooks and reports
Proportion of the tasks	110	
achieved	No	All tasks completed
	110	This survey was undertaken in July and Sentember 2017
		Rainfall averages were exceeded in January February
		and March 2017 while rainfall in April May June July
		and August 2017, while rainal in April, May, Suile, Suy
		were collected during field work, which were all identified
		post field work. Timing would have been ideal earlier in
		April/May for the first part of the survey. September was
Timing/season	Potential	ideal for the second part of the survey
Timing/season	TOteritia	Disturbance from grazing and exploration was apparent in
		the survey area. However, the structural dominants of the
		vogetation persist and the vegetation remains in Good to
Disturbanco in survov area	No	Very Good condition
Disturbance in survey area	INO	The survey intensity is considered to have been sufficient.
		for a Level 2 survey according to EDA (2004) guidelines
		Tor a Lever 2 survey according to EPA (2004) guidennes.
		Areas most likely to contain threatened and phonty
later site of summer offerst	NIa	species were targeted. Vegetation mapping sites were
Intensity of survey effort	NO	selected to provide adequate coverage of the survey area.
		Resources, in terms of time, equipment, support and
		personnel were adequate to undertake and complete the
Resources	No	Level 2 survey.
Remoteness and/or access		All the areas in need of survey were easily accessible from
problems	No	existing tracks, or by foot.
		Contextual information regarding vegetation and flora
		around the Eastern Goldfields subregion is readily
		available. Adequate information was able to be accessed
Availability of contextual		from available databases (DBCA 2017 and DOTEE
information for the region`	No	2017b).

Table 1: List of potential survey limitations



4 RESULTS

4.1 PRELIMINARY DESKTOP ASSESSMENT

4.1.1 EPBC Protected Matters Search Tool

The search undertaken with the EPBC's Protected Matters Search Tool reported that no TECs were present in the survey area (DOTEE, 2017b). The search also revealed that the survey area may contain habitat for the invasive weed species *Carrichtera annua* (Ward's Weed).

The threatened species, *Gastrolobium graniticum*, was listed as either likely to be in the area or having potential habitat occurring in the area. This species occurs mainly on granite outcrops. No granite outcrops were identified in the survey area.

Results of the EPBC Protected Matters Search Tool are included in Appendix B.

4.1.2 Threatened Flora and Communities

The DPAW database searches revealed a potential for 2 Threatened and 39 Priority Flora species to occur within a 30km radius of the survey area (DBCA, 2017a). No known locations of these Flora occur within the survey area, while the closest location occurs approximately 7 km east of the survey area.

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

The PEC/TEC search (DBCA, 2017) revealed no TECs or PECs within the survey area.

4.1.3 Environmentally Sensitive Areas and Conservation Reserves

The survey area does not lie within or contain any ESA's or Conservation Reserves (DWER, 2017).

4.1.4 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 and 3 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 woodla	Medium woodland; salmon gum & gimlet					
			Scale				
Pre-European Extent (ha)	By Association	By Association	By IBRA Region (Coolgardie- COO)	By IBRA Sub- region (Eastern Goldfields- COO3)	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***	Pasture Grazing, Exploration and Mining						
Weed prevalence***	Low						

* Source: Shepherd et al. (2002)

**Source: DPAW (2017)

***Source: Field Assessment

Table 3: Summary of information regarding Pre-European and current vegetation extent of vegetation association 468 within the survey area

Factor		Value					
Beard Vegetation Association*	468						
Vegetation Association Description*	Medium woodla	Medium woodland; salmon gum & goldfields blackbutt					
			Scale				
Pre-European Extent (ha)	By Association	By Association	By IBRA Region (Coolgardie- COO)	By IBRA Sub- region Eastern Goldfields- COO3)	By Shire (Shire of Coolgardie)		
	476,113*	592,022**	583,357**	482,361**	149,487**		
% Pre-European Extent Remaining	100.00%*	98.63%**	98.63%**	98.34%**	99.43%**		
Surrounding Land Use***	Pasture Grazin	g, Exploration an	d Mining				
Weed prevalence***	Low						

* Source: Shepherd *et al.* (2002) **Source: DPAW (2017)

***Source: Field Assessment



4.1.5 Wetlands

No water bodies were identified within the survey area via the CPS Map Viewer (DWER, 2017).

4.1.6 Dieback

The survey area lies south of the 26th parallel, however receives average annual rainfall of approximately 270.3 mm (BOM, 2017), 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 or weed infestations which could pose a risk within the survey area during seasonally favourable conditions.

4.2 FIELD ASSESSMENT

4.2.1 Vegetation of the Survey Area

Beard's vegetation associations are very broad and are used over large areas in which there is also a large amount of variation at a more local level. The vegetation groups described below for the survey area fit into the broader Beard descriptions above in section 4.1.4.

The vegetation groups described below were determined visually based on dominant species, to form the descriptions taken at the time of the field survey

Descriptions of all 29 sites/quadrats are presented in Appendix F. For each site the physical features, vegetation description and unit, along with the species lists for the 20 x 20m plots with typical canopy cover and height, are provided.

4.2.1.1 Vegetation Groups

Nine vegetation groups were identified during this survey, largely following topographical features and dominant species. Mapping of the 9 vegetation groups, as well as the quadrat locations can be seen in Appendix C. Photographs of each quadrat and the relevant vegetation group can be seen in Appendix F.

A. Eucalyptus griffithsii and E. campaspe over Acacia acuminata over mixed sclerophyll shrubland

Open Shrub Mallee of *Eucalyptus griffithsii* and *E. campaspe* over *Acacia acuminata* and *Eremophila oldfieldii* subsp. *angustifolia* over *Dodonaea lobulata, Scaevola spinescens, Beyeria sulcata* var. *sulcata* and *Ptilotus obovatus*.

Quadrats: 1 and 2

B. Eucalyptus campaspe and Eucalyptus clelandii woodland

Low Woodland of *Eucalyptus campaspe* and *E. clelandii* over *Eremophila oldfieldii* subsp. angustifolia, Eremophila interstans subsp. virgata and Senna artemisioides subsp. filifolia over Atriplex nummularia subsp. spathulata, Eremophila scoparia, Acacia erinacea, Eremophila pustulata, Olearia muelleri and Ptilotus obovatus.

Quadrats: 3, 4 and 5



C. *Eucalyptus griffithsii* woodland over Chenopod shrublands

Open Tree Mallee of *Eucalyptus griffithsii* over *Eremophila alternifolia* and *Atriplex nummularia* subsp. *spathulata* over *Senna artemisioides* subsp. *filifolia, Atriplex stipitata* and *Ptilotus obovatus*.

Quadrat: 7

D. Open Chenopod shrubland

Tall Open Shrubland of *Eremophila interstans* subsp. *virgata* and *Atriplex nummularia* subsp. *spathulata* over *Eremophila scoparia* and *Senna cardiosperma* over *Atriplex stipitata*.

Quadrat: 6

E. Eucalyptus salmonophloia woodland

Woodland of *Eucalyptus salmonophloia* with occasional *E. transcontinentalis* over occasional *E. oleosa* subsp. oleosa over *Eremophila scoparia, Exocarpos aphyllus, Eremophila caperata, Eremophila interstans* subsp. virgata and *Eremophila ionantha* over *Olearia muelleri, Senna artemisioides* subsp. filifolia, *Atriplex vesicaria, Atriplex stipitata, Senna cardiosperma, Acacia hemiteles, Ptilotus obovatus* and *Scaevola spinescens*.

Quadrats: 8,10,11,12,13,14 and 20

F. Mixed *Eucalyptus* woodland over sclerophyll shrubland

Low Woodland of *Eucalyptus clelandii, Eucalyptus salubris, Eucalyptus oleosa* subsp. *oleosa, Eucalyptus griffithsii* and occasional *Casuarina pauper* over *Eremophila interstans* subsp. *virgata, Santalum acuminatum, Eremophila caperata, and Eremophila oldfieldii* subsp. *angustifolia,* over *Senna artemisioides* subsp. *filifolia, Eremophila glabra* subsp. *glabra, Olearia muelleri, Acacia hemiteles, Eremophila pustulata* and *Eremophila parvifolia* subsp. *auricampa.*

Quadrats: 9, 15, 18, 19, 21, 24 and 29

G. Eucalyptus thicket in open depressions

Low Open Forrest of *Eucalyptus clelandii*, *E. salubris and E. oleosa* subsp. *oleosa* over Senna artemisioides subsp. filifolia, Acacia merrallii, Exocarpos aphyllus and *Eremophila scoparia* over *Acacia colletioides, Eremophila ionantha* and *Eremophila decipiens* subsp. *decipiens*.

Quadrats: 16 and 17

H. Eucalyptus oleosa subsp. oleosa over Chenopod shrublands

Open Shrub Mallee of *Eucalyptus oleosa subsp. oleosa* with occasional *E. yilgarnensis* over *Eremophila interstans* subsp. *virgata* and *Eremophila scoparia* over *Cratystylis subspinescens, Cratystylis conocephala, Eremophila decipiens* subsp. *decipiens* and *Eremophila parvifolia* subsp. *auricampa*.

Quadrats: 22 and 23


I. Eucalyptus over Melaleuca sheathiana over Cratystylis conocephala on calcrete rises

Low Woodland of *Eucalyptus clelandii* over *Melaleuca sheathiana, Acacia hemiteles* and *Exocarpos aphyllus* over *Cratystylis conocephala, Westringia rigida, Grevillea acuaria, Acacia colletioides* and *Eremophila scoparia.*

Quadrats: 25, 26, 27 and 28

J. Existing Disturbance

This classification was for the purposes of mapping and was completely degraded, including historic open pits, haul roads and waste landforms.

Vegetation Group	Families	Genera	Species	Area (ha)	Percentage of survey area (%)
А	14	16	26	5.051	0.86%
В	12	19	36	42.94	7.28%
С	9	15	27	1.55	0.26%
D	8	13	26	9.58	1.62%
E	14	26	53	164.27	27.85%
F	16	25	57	255.03	43.23%
G	9	11	19	26.90	4.56%
Н	10	17	37	5.04	0.85%
I	14	24	40	55.37	9.39%
J- Existing Disturbance	0	0	0	24.18	4.10%
Total	24*	39*	85*	589.91 [#]	100.00%#

Table 4: Vegetation Group Extent within Survey Area

*Denotes total recorded in the survey area (not sum of column) # Denotes sum of column

4.2.1.2 PATN Analysis of Quadrat Data

PATN Analysis was completed on both the dominant species and all species recorded within each quadrat. The results are supplied below in Figure 5 and Figure 6.

The PATN analysis dendrogram of the dominant species in Figure 5, displays each quadrat with like symbols representing NVS mapped vegetation groups, and coloured lines depicting PATN defined vegetation groups. The dendrogram shows a good association between vegetation groups described in section 4.2.1.1, however there were some outliers (highlighted green).

These outliers are expected to occur for vegetation groups with transitional dominant species. In most cases one or two species will be present within a 20x20 quadrat, but it will not contain all the varieties of dominant species that will occur across that vegetation type, and as such some quadrats of the same vegetation group will be separated as different when assessed by the PATN Analysis.

Quadrat Q19 and Q4 were grouped together via PATN analysis, however were mapped as different vegetation groups because of the overall species composition of surrounding vegetation.



Due to the overlap and variation of lower storey species, these were grouped together via PATN Analysis.

Quadrats 6 and 9, were grouped via PATN analysis with vegetation group B, however were mapped as group D and group F respectively based on other species present and vegetation structure.

Quadrat 12 and 24 were combined as a separate group via PATN Analysis, due to the presence of similar dominant species *Eucalyptus oleosa subsp. oleosa, Eremophila scoparia* and *Daviesia aphylla* however, overall species composition saw these quadrats mapped as groups E and F respectively.

Vegetation groups G and F have been grouped together via PATN analysis based on dominant species. These vegetation groups are varieties of *Eucalyptus* woodland, which demonstrates that although the dominant Eucalypts may differ between vegetation groups, the dominant understorey species may remain similar, providing stronger correlations to some quadrats representing different vegetation groups. The dendrogram also demonstrates stronger correlation within this grouping which favours the vegetation groups mapped by NVS, i.e. Q15, Q21 and Q29 are more similar, representing vegetation group F; Q16 and Q17 are grouped more similarly representing vegetation group G;

Quadrat 18 was combined with Vegetation Group I via PATN analysis based on dominant species, including *Eucalyptus clelandii*, *Exocarpos aphyllus* and *Acacia hemiteles*. This quadrat was mapped as part of group F due to the other non-dominant species present and the vegetation structure, as well as the lack of *Melaleuca sheathiana* and *Cratystylis conocephala*.



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Figure 5: PATN Analysis of Dominant Species into 9 groups



The dendrogram below (Figure 6) of the analysis of all species shows a correlation to pre-grouped quadrats described in section 4.2.1.1. The dendrogram displays each quadrat with like symbols representing NVS mapped vegetation groups, and coloured lines depicting PATN defined vegetation groups. However, there were some outliers and these are highlighted in green (Figure 6).





4.2.1.3 Vegetation Condition

Vegetation in the survey area has been subjected to historic mining, exploration activities and grazing.

According to Keighery (1994), most of the sites/quadrats inspected were in Good to Very Good condition (Appendix F). There were existing vehicle tracks in some areas, due to mine exploration activities. The vegetation more than 0.5m off these tracks was mostly in a Good to Very Good condition (Keighery 1994).

As discussed below in Section 4.2.2.4, there were two species of weeds observed during the survey.



4.2.2 Flora of the Survey Area

4.2.2.1 General

Eighty-five species were recorded within the survey area with 84 species recorded within quadrats. Thirty-nine genera and 24 families were found. These are listed in Appendix E, per Quadrat as well as per vegetation group. Of the native species, Chenopodiaceae had the highest representation, with 19 species from 8 genera, dominated by *Maireana*. Fabaceae and Scrophulariaceae were the next best represented families with 12 species each.

Of the 85 taxa recorded there were two introduced weed species; *Carrichtera annua* (Ward's Weed) and *Cucumis myriocarpus* (Prickly Paddy Melon). These weed species were recorded within 2 of the 29 quadrats. No weed species recorded were considered declared plants by DPIRD (2017).

The most common and widespread species were *Eremophila scoparia, Exocarpos aphyllus and Senna artemisioides* subsp. *filifolia,* which were recorded within 25 quadrats. Its canopy cover was 10-30%. The next most common and widespread species was *Ptilotus obovatus,* recorded in 19 quadrats, with a canopy cover less than 10%.

There were 30 taxa recorded from within a single site, Q23. Of these, none were weed species.

4.2.2.2 Species Accumulation Curves

A Species Accumulation Curve was generated using the computer programme **Species Diversity and Richness Version 4.1.2** (Seaby & Henderson, 2006). This curve was then fitted to a logarithmic curve in **Excel**[®], which is plotted in Figure 7 below. According to the Species Accumulation Curve below, the R^2 value (0.991) shows an acceptable fit for a logarithmic curve of the total accumulated species per number of quadrats established (Figure 7).

Sufficient sampling was inferred via the effort of intensity (number of quadrats established) versus the return of species collected (total accumulated species). The logarithmic trend line and R² values were generated in **Excel**[®]. From this fitted logarithmic curve formula, the asymptote was calculated where the gain of new species was less than 1% for every new quadrat established. Based on this reasoning, the asymptote was reached at 24 quadrats, at which the extrapolated total accumulated number of species is 80.6. Therefore the 84 species collected within the 29 quadrats represents 104.21% of the projected asymptote.





Figure 7: Species Accumulation Curve for the 29 sampled quadrats

4.2.2.3 Conservation significant species

No Threatened species were recorded during the survey.

One Priority species, *Eremophila praecox* (P1), was identified in the survey area within Q22, which lies within Vegetation Group H. Two plants were recorded here within a 200m radius. There is some suggestion that *Eremophila praecox* (P1) is a hybrid between *Eremophila ionantha* and *Eremophila parvifolia*, which were both abundant in the general area.

4.2.2.4 Introduced species

Two introduced species recorded in the survey area, not considered Declared Plants by the DPIRD (2017) are listed below:

- *Carrichtera annua* (Ward's Weed) is an annual, native to the Mediterranean. This weed is abundant in the Goldfields and Nullarbor shrublands, often dominating mine rehabilitation sites (Hussey *et al*, 2007). This species was recorded in Q5 and Q6.
- *Cucumis myriocarpus* (Prickly Paddy Melon) is a summer growing annual. It is a native southern Africa, and is often found in paddocks, roadsides and disturbed lands throughout the agricultural areas and southern Kimberley (Hussey *et al*, 2007). This species was recorded in Q5.



5 DISCUSSION

The EPA (2002) indicated that an ecological assessment of a site must consider its ecological value at the ecosystem level and its biodiversity value at the genetic, species and ecosystem level.

The survey area is located within the Eastern Goldfields subregion which includes four centres of endemism, all of which occur outside the survey area (CALM, 2002). This survey established that mostly, the flora within the project area is not unique, and is in fact common throughout the Eastern Goldfields subregion and adjoining regions.

Eighty-five species were recorded within the survey area with 84 species recorded within quadrats. Thirty-nine genera and 24 families were recorded. Of the native species, Chenopodiaceae had the highest representation, with 19 species from 8 genera, dominated by *Maireana.* Fabaceae and Scrophulariaceae were the next best represented families with 12 species each.

Of the 85 taxa recorded there were two introduced weed species; *Carrichtera annua* (Ward's Weed) and *Cucumis myriocarpus* (Prickly Paddy Melon) These weed species were recorded within 2 of the 29 quadrats. No weed species recorded were considered declared plants by DPIRD (2017).

No Threatened Flora were recorded in the survey area.

No TECs or PEC's were recorded within the survey area.

One Priority species, Eremophila praecox (P1), was identified in the survey area within Q22, which lies within Vegetation Group H. Two plants were recorded here within a 200m radius

Vegetation condition was generally 'Good' to 'Very Good' (Keighery 1994). Disturbance was present within the survey area mostly attributed to historic mining activities, access tracks, exploration related activities, and also grazing.

It is therefore not expected that the disturbance within the survey area will significantly negatively impact on the vegetation in the area in terms of fragmentation and loss of vegetation associations or species that may be unique. This is partially due to the overall size of the survey area as well as the similar abundant vegetation and habitat outside of the survey area.



6 IMPACT ASSESSMENT

6.1 THREATENING PROCESSES

The major processes likely to impact the Flora within the Survey area, if clearing were to proceed include:

- Vegetation clearing and therefore a reduction in biodiversity;
- Vehicle impacts on uncleared vegetation could increase if tracks are not adhered to;
- An increase in the area of disturbed land could result in an increase in non-native species;
- Dust generated during clearing of native vegetation and associated activities may settle on adjacent native vegetation, causing possible stress and perhaps death, especially during drier months; and
- Accidental fire arising from clearing and associated activities, may affect vegetation in surrounding areas.



7 CONCLUSIONS AND RECOMMENDATIONS

The survey established that the condition of the vegetation in the survey area is overall 'Good' to 'Very Good' condition. No Threatened Flora were recorded in the area. No TECs/PECs were recorded in the survey area.

One Priority Species *Eremophila praecox* (P1) was recorded in Q22. Only two plants were recorded at this location within a 200m radius.

The EPA objective for flora and vegetation is to maintain the abundance, species diversity and geographical distribution of flora and vegetation as well as protect Threatened flora consistent with the provisions of the *Biodiversity Conservation Act 2016*.

The proposed clearing of vegetation will result in the loss of some individuals from the local area; however, the impact will not be great enough to remove whole communities or populations. Most of the species and communities recorded during this survey are widespread throughout the Eastern Goldfields subregion and adjoining regions, and therefore the loss of a small proportion from this area will not be significant.

This report summarises the results of the first and second stages of the Level 2 survey.

The following recommendations arise from the current flora survey:

- Any disturbance/clearing be minimised as much as practicable to reduce the loss of individuals and impact on populations;
- Weed control measures should be implemented/followed during and post construction activities;
- Driving restrictions, ensuring that off-road driving is minimised; and
- All staff to be educated on the importance of fire prevention, and equipment provided for use in the event of fire.



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Acronyms:

BOM	Bureau of Meteorology, Australian Government
BSc	Bachelor of Science
CALM	Department of Conservation and Land Management (now DBCA)
COO	Coolgardie Bioregion, IBRA
COO3	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
DRF	Declared Rare Flora
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
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
TEC	Inreatened Ecological Community
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 A - 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 B – EPBC and Other 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 <u>Environment Assessments</u> and the EPBC Act including significance guidelines, forms and application process details.

Report created: 10/08/17 16:22:01

Summary Details Matters of NES Other Matters Protected by the EPBC Act Extra Information Caveat Acknowledgements



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



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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 <u>permit</u> 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:	9
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:	7
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
Mammals		
Dasyurus geoffroii		
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area
Plants		
<u>Gastrolobium graniticum</u> 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	ne 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 second s	ne EPBC Act - Threatened	Species list.
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
<u>Apus pacificus</u> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<u>Ardea alba</u> Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
<u>Ardea ibis</u> Cattle Egret [59542]		Species or species habitat may occur within area
<u>Calidris acuminata</u> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<u>Calidris ferruginea</u> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<u>Calidris melanotos</u> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<u>Merops ornatus</u> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<u>Motacilla cinerea</u> Grey Wagtail [642]		Species or species habitat may occur within area

Extra Information

Goat [2]

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		
Mammals				
Capra hircus				

Species or species



Solutions		
Name	Status	Type of Presence
		habitat likely to occur within
Equus caballus		alea
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
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 gualifications 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

-30.7021 120.9099,-30.708 120.9013,-30.7224 120.9309,-30.7321 120.9298,-30.7328 120.9632,-30.7235 120.9634,-30.7234 120.9387,-30.7021 120.9099



Acknowledgements

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

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

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

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

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DWER CPS Map Viewer - showing no ESA's (dark green shaded areas) within the survey area (pink polygon) (DWER, 2017)





DWER CPS Map Viewer - showing no water bodies within the survey area (pink polygon) (DWER, 2017)



Appendix C - Maps























Appendix D – Threatened Flora Database Search Results



Taxon	Status	Distribution	Flowering Period
		Southern Cross, Carrabin, Bullabulling,	
		Walyahmoning Rock, Chiddarcooping, Sandford	
Acacia crenulata	P3	Rocks N.R., Marvel Loch	Sep-Oct
		Kalgoorlie, Diemals, Goongarri, Boogardie, Mt	
Alyxia tetanifolia	P3	Magnet	May
		Glenorn Stn, Baladjie Lake NR, Quairading, Lake	
Angianthus prostratus	P3	Barlee, Bulga Downs Stn, Kalgoorlie	Jul-Sept
		Kalgoorlie, Ninghan Stn, Wanjarri NR, Mount	
Austroparmelina macrospora	P3	Harry, Kathleen, Bullfinch, Kalbarri	
Baeckea sp. Bulla Bulling (D.J.E. Whibley 4648)	P1	Kalgoorlie, Bulla Bulling	Oct
		Helena & Aurora Range, Credo Stn., Mt Manning	
Calytrix creswellii	P3	Range, Wallaroo Rock	Nov-Dec
Cryptandra crispula	P3	Lake Lefroy, Bullabulling, Karonie, Fraser Range	Jul-Sep
		Bungalbin Hill, Helena & Aurora Ranges, Queen	
Cyathostemon verrucosus	P3	Victoria Rocks, Kalgoorlie, Boorabbin	Sep-Dec,Mar
		Bullabulling, Gibraltar, Maggie Hays Hill, Lake	
Diocirea microphylla	P3	Johnston	Dec
Elachanthus pusillus	P2	Orchid Rock, Cocklebiddy, Kalgoorlie, Jaurdi Stn	Oct
		Five Mile Hill, (Kurrawang), Kalgoorlie, Kanowna	
Eremophila praecox	P1	Belle	Aug-Sep,Dec
		Westonia, Southern Cross, Burracoppin, Ora	
Eucalyptus crucis subsp. crucis	Т	Banda	Dec-Mar
		Norseman, Salmon Gums, Mt Newmont, Bruce	
Eutaxia actinophylla	P3	Rock, Wallaroo Rock, Mt Willgonarinya	Sep-Dec
		Coolgardie, Gnamma Hill, Narembeen,	
Gastrolobium graniticum	Т	Yellowdine, Bullabulling	Aug-Nov
Hakea rigida	P2	Campion, Bullfinch, Wallaroo Rock, Mt Burges	Sep
Hakea sp. Great Victoria Desert (L. Cockram LAC 139) PN	P1	E Kalgoorlie	
Lepidium fasciculatum	P3	Salmon Gums, Kalgoorlie, Esperance, Mingenew	Oct-Feb
		Gibraltar, Boorabbin, Dundas, Ravensthorpe,	
		North Ironcap, Ora Banda, Lake Cowan, Parker	
Notisia intonsa	P3	Range	Sep
Phebalium clavatum	P2	Londonderry	Nov
	1	Jackson Range, Bullfinch, Koolyanobbing,	
Styphelia sp. Bullfinch (M. Hislop 3574)	P3	Bullabulling, Diemals Stn.	Apr-May
Xanthoparmelia dayiana	P3	Kalgoorlie, Northern Territory, Karara	

Additional taxa supplied via database coordinates

	Conservation
Taxon	Code
Acacia coatesii	P1
Acacia epedunculata	P1
Acacia sclerophylla var. teretiuscula	P1
Acacia websteri	P1
Allocasuarina eriochlamys subsp. grossa	P3
Austrostipa blackii	Р3
Chrysocephalum apiculatum subsp. norsemanense	P3
Eremophila caerulea subsp. merrallii	P4
Eremophila veronica	P3
Eucalyptus jutsonii subsp. jutsonii	P4
Gompholobium cinereum	Р3
Grevillea georgeana	P3
Lepidium merrallii	P2
Melichrus sp. Coolgardie (K.R. Newbey 8698)	P1
Myriophyllum petraeum	P4
Phebalium appressum	P1
Phlegmatospermum eremaeum	P3
Ptilotus chortophytus	P1
Thryptomene sp. Coolgardie (E. Kelso s.n. 1902)	P1
Thryptomene sp. Londonderry (R.H. Kuchel 1763)	P1



Appendix E - Species Recorded During the July 2017 Survey



Species List per Quadrat

			A=Annual P= Perennial NN=Non-Native	Q1	Q2	Q3	Q4	q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29
Family	Genus	Species																														
Amaranthaceae	Ptilotus	aervoides	A					*																*		*						
Amaranthaceae	Ptilotus	obovatus	Р	*	*	*		*	*	*	*	*	*	*	*		*	*		*	*	*	*		*	*						
Apocynaceae	Marsdenia	australis	Р	*						*			*	*								*						*				
Asteraceae	Cratystylis	conocephala	Р										*					*						*	*	*			*		*	
Asteraceae	Cratystylis	microphylla	Р																						*						*	
Asteraceae	Cratystylis	subspinescens	Р																							*		*				
Asteraceae	Olearia	muelleri	Р	*	*	*		*				*	*	*		*		*			*	*	*		*		*	*	*	*	*	*
Asteraceae	Olearia	pimeleoides	Р																		*											
Brassicaceae	Carrichtera	annua	A, NN					*	*																							
Casuarinaceae	Casuarina	pauper	Р									*							*													
Chenopodiaceae	Atriplex	nummularia subsp. spathulata	Р			*		*	*	*		*				*	*				*		*	*				*				
Chenopodiaceae	Atriplex	stipitata	Р			*		*	*	*	*		*			*	*						*		*	*						
Chenopodiaceae	Atriplex	vesicaria	Р			*		*	*	*			*			*	*				*		*		*	*	*	*	*	*		
Chenopodiaceae	Chenopodium	gaudichaudianum	Р					*	*	*	*	*	*		*		*						*	*	*	*		*				
Chenopodiaceae	Enchylaena	tomentosa var. tomentosa	Р			*		*	*	*	*	*	*	*	*		*						*		*	*					*	
Chenopodiaceae	Eriochiton	sclerolaenoides	Р																				*	*	*	*						
Chenopodiaceae	Maireana	georgei	Р	*	*	*		*		*	*	*	*				*						*	*		*		*				
Chenopodiaceae	Maireana	pentatropis	Р					*			*							*					*		*		*	*	*	*	*	
Chenopodiaceae	Maireana	pyramidata	Р						*																	*						
Chenopodiaceae	Maireana	sedifolia	Р			*										*							*	*		*						
Chenopodiaceae	Maireana	thesioides	Р																							*						
Chenopodiaceae	Maireana	tomentosa	Р			*			*	*	*	*			*		*				*			*	*	*	*		*	*		
Chenopodiaceae	Maireana	trichoptera	Р			*		*	*	*	*		*	*	*						*			*	*	*		*				
Chenopodiaceae	Maireana	triptera	Р		*	*		*	*	*	*			*	*		*															
Chenopodiaceae	Rhagodia	drummondii	Р						*	*	*		*	*	*		*				*			*	*	*		*	*	*	*	
Chenopodiaceae	Salsola	australis	А														*															
Chenopodiaceae	Sclerolaena	densiflora	Р			*		*	*		*	*	*	*	*	*	*				*		*	*	*	*		*				
Chenopodiaceae	Sclerolaena	diacantha	Р			*			*	*	*	*	*	*	*						*		*	*		*		*				
Chenopodiaceae	Sclerolaena	patenticuspis	Р						*								*							*		*						
Cucurbitaceae	Cucumis	myriocarpus	A, NN					*																								
Euphorbiaceae	Beyeria	sulcata var. sulcata	Р	*																												
Fabaceae	Acacia	acuminata	Р	*	*					*		*																		1		
Fabaceae	Acacia	colletioides	Р																*	*		*	*	*			*		*	*		*
Fabaceae	Acacia	erinacea	Р		*		*															*										
Fabaceae	Acacia	hemiteles	Р									*	*	*		*	*			*	*	*	*						*	*	*	*
Fabaceae	Acacia	ligulata	Р													*												*				
Fabaceae	Acacia	merrallii	Р															*	*	*				*				*	*		*	*
Fabaceae	Acacia	prainii	Р											*																		
Fabaceae	Acacia	tetragonophylla	Р	*						*																				*		
Fabaceae	Daviesia	aphylla	Р												*	*											*					
Fabaceae	Senna	artemisioides subsp. artemisioides	Р						*	*						*	*		*	*	*		*									*
Fabaceae	Senna	artemisioides subsp. filifolia	Р		*			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

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Jaurdi Hills Level 2 Flora and Vegetation Survey Part 2- September 2017

			vnnual erennial on-Native	Q1	02	Q3	Q4	Q5	Q6	Q7	Q8	60	210	211	212	Q13	Q14	215	216 2	217	218	219 219	220	221	22 2	23	224	225	226	227	228	229
			A=A = Pe = No						_				0	0	Ŭ	0	0	0	0	0	0	0	0	U	0	0	0	0	0	0	Ĩ	0
Family.	C	Constant	^d ^Z																												ł	
Family	Genus	Species	D			*	*		*		*		*		*	*		*			*	*	*	*		*					<u> </u>	
Fabaceae	Senna	cardiosperma	P				*		*		*		*		*	*		*			*	*	*	*	*	*					<u> </u>	-
Frankeniaceae	Frankenia	Interioris	P																					*	*	*				*	<u> </u>	*
Goodeniaceae	Scaevola	collaris	P	*	*				*	*	*	*	*	*	*	*		*			*	*	*							*	<u> </u>	*
Goodeniaceae	Scaevola	spinescens	P	*	*				*	*	*		*	*	*	*		*			*	*	*							*	<u> </u>	-
Hemerocalildaceae	Dianella	revoluta subsp. divaricata	P				*															*						*	*	*	*	*
Lamiaceae	westringia	rigida	P										*									*						*	*	*	<u> </u>	
Lorantnaceae	Amyema	preissi	P	*	*	*	*	*														*									<u> </u>	
Nyrtaceae	Eucalyptus	campaspe	P	*			*	*				*						*	*	*	*	*		*			*	*	*	*		*
Myrtaceae	Eucalyptus	clelandii	P	*	*		Ŧ	Ŧ		*		Ŧ						Ŧ	Ŧ	Ŧ	т	*		Ŧ			т	Ŧ	Ŧ	Ŧ	<u> </u>	-
Myrtaceae	Eucalyptus		P	т	Ŧ					Ŧ					*				*	*		т			*	*	*				┢────	
Myrtaceae	Eucalyptus	oleosa subsp. oleosa	P								*		*	*	*	*	*		Ŧ	Ŧ			*		т	Ŧ	т				<u> </u>	
Myrtaceae	Eucalyptus	salmonophiola	P								Ŧ		Ŧ	т	Ŧ	Ŧ	Ŧ	*	*	*			Ŧ								┢────	*
Myrtaceae	Eucalyptus	salupris	P									*				*		*	*	*											<u> </u>	*
Myrtaceae	Eucalyptus	transcontinentalis	P													*										*					<u> </u>	
Myrtaceae	Eucalyptus	yligarnensis	P																							*		*	*	*	*	
Nyrtaceae	Ivielaleuca	sneathlana	P										-	*													-	*	*	*	<u> </u>	
Pittosporaceae	Pittosporum	angustifolium	P	*	*								*	*			*		*			*		*			*	*	*		<u> </u>	*
Poaceae	Austrostipa	elegantissima	P	т	Ŧ								Ŧ	т			т		Ŧ			т		Ŧ			т	т	Ŧ	*	<u> </u>	-
Poaceae	Triodia	rigidissima	P										-														-			*	<u> </u>	
Proteaceae	Grevillea	acuaria	P	*	*	*			*	*	*	*	*	*	*	*	*			*	*	*	*	*	*	*	*	*	*	*		*
Santalaceae	Exocarpos	apnyllus	P	т	Ŧ	*			т	Ŧ	*	Ŧ	Ŧ	т	Ŧ	т	Ŧ	*		*	*	т	*	Ŧ	т	Ŧ	т	Ŧ	Ŧ	Ŧ	<u> </u>	- T
Santalaceae	Santalum		P		*						*		*	*				*			*		*								<u> </u>	
Santalaceae	Santalum	spicatum	P	*	*								Ŧ	т							Ŧ		Ŧ								┢────	
Sapindaceae	Dodonaea	lobulata	P	*	*																							*	*	*	┝───	
Sapindaceae	Dodonaea	viscosa subsp. angustissima	P							*				*						*								Ŧ	Ŧ	Ŧ	<u> </u>	
Scrophulariaceae	Eremophila	alternifolia	P							Ŧ				т		*		*		Ŧ				*			*				<u> </u>	*
Scrophulariaceae	Eremophila	caperata	P			*				*			-			т		*	*	*			*	Ŧ	*	*	т	*		*	<u> </u>	-
Scrophulariaceae	Eremophila	decipiens subsp. decipiens	P		*	Ŧ	*		*	*		*	-	*	*			Ŧ	Ŧ	Ŧ	*	*	*		*	*	-	Ŧ		*		
Scrophulariaceae	Eremophila	glabra subsp. glabra	P	-	Ŧ		Ŧ		т 	Ŧ		- -		т -	Ŧ						-	т 	т		т -	T				Ŧ	<u> </u>	
Scrophulariaceae	Eremophila	interstans subsp. virgata	Р	*		*		*	*			*	*	*			*	*	*	*	*	*	*		*	*				*	┢────	
Scrophulariaceae	Eremophila	ionantha	Р		*		*										*	*	*	*			*		*					*	┢────	
Scrophulariaceae	Eremophila	longifolia	Р	-	*		*		-L-	-L				ale.			-				44										⊢	
Scrophulariaceae	Eremophila	oldfieldii subsp. angustifolia	Р	Ŷ	*		*		^	*				*			^				*	*			ale.		علد	-	-			
Scrophulariaceae	Eremophila	parvifolia subsp. auricampa	Р																						*		*	^	*	*	<u> </u>	Ŷ
Scrophulariaceae	Eremophila	praecox (P1)	Р																						*						⊢	
Scrophulariaceae	Eremophila	pustulata	P	<u> </u>	*	*	*	*	*	*	*		*	*	*	*	*		*	*	*	*	*	*	*	*	*		*	*	_	+
Scrophulariaceae	Eremophila	scoparia	P	<u> </u>	^	^		*	*	*	<u> </u>	*	*	*	*	*	^	*	*	*	*		*	*	*	*	*		*	Ŷ	Ļ	<u> </u>
Solanaceae	Duboisia	hopwoodii	P			<u> </u>				۰.	*		~																		<u> </u>	\vdash
Solanaceae	Solanum	lasiophyllum	P	*	*	<u> </u>		*	*	*	*		*	*							*										<u> </u>	\vdash
Solanaceae	Solanum	nummularium	Р						*	*			*				*	*	*		*		*	*	*			*		*	⊢	──
Thymelaeaceae	Pimelea	microcephala subsp. microcephala	P				-u-							*			*	*	*				*		*	*					<u> </u>	──
Zygophyllaceae	Zygophyllum	eremaeum	A				*																								L	


Species List pe	Species List per Vegetation Group (Quadrat data including opportunistic sampling)											
Family	Genus	Species	A, P, NN	Α	в	С	D	E	F	G	н	I
Amaranthaceae	Ptilotus	aervoides	A		*				*		*	
Amaranthaceae	Ptilotus	obovatus	Р	*	*	*	*	*	*	*	*	
Apocynaceae	Alyxia	buxifolia	Р									*
Apocynaceae	Marsdenia	australis	Р	*		*		*	*			*
Asteraceae	Cratystylis	conocephala	Р					*	*		*	*
Asteraceae	Cratystylis	microphylla	Р								*	*
Asteraceae	Cratystylis	subspinescens	Р								*	*
Asteraceae	Olearia	muelleri	Р	*	*			*	*		*	*
Asteraceae	Olearia	pimeleoides	Р						*			
Brassicaceae	Carrichtera	annua	A, NN		*		*					
Casuarinaceae	Casuarina	pauper	Р	*					*	*		
Chenopodiaceae	Atriplex	nummularia subsp. spathulata	Р	*	*	*	*	*	*			*
Chenopodiaceae	Atriplex	stipitata	Р		*	*	*	*			*	
Chenopodiaceae	Atriplex	vesicaria	Р		*	*	*	*	*		*	*
Chenopodiaceae	Chenopodium	gaudichaudianum	Р		*	*	*	*	*		*	*
Chenopodiaceae	Enchylaena	tomentosa var. tomentosa	Р		*	*	*	*	*		*	*
Chenopodiaceae	Eriochiton	sclerolaenoides	Р					*	*		*	
Chenopodiaceae	Maireana	georgei	Р	*	*	*		*	*		*	*
Chenopodiaceae	Maireana	pentatropis	Р		*			*	*		*	*
Chenopodiaceae	Maireana	pyramidata	Р				*				*	
Chenopodiaceae	Maireana	sedifolia	Р		*			*	*		*	
Chenopodiaceae	Maireana	thesioides	Р								*	
Chenopodiaceae	Maireana	tomentosa	Р		*	*	*	*	*		*	*
Chenopodiaceae	Maireana	trichoptera	Р		*	*	*	*	*		*	*
Chenopodiaceae	Maireana	triptera	Р	*	*	*	*	*				
Chenopodiaceae	Rhagodia	drummondii	Р		*	*	*	*	*		*	*
Chenopodiaceae	Salsola	australis	А					*				
Chenopodiaceae	Sclerolaena	densiflora	Р		*		*	*	*		*	*
Chenopodiaceae	Sclerolaena	diacantha	Р		*	*	*	*	*		*	*
Chenopodiaceae	Sclerolaena	patenticuspis	Р				*	*	*		*	
Cucurbitaceae	Cucumis	myriocarpus	A, NN		*							
Euphorbiaceae	Beyeria	sulcata var. sulcata	Р	*								
Fabaceae	Acacia	acuminata	Р	*		*			*			
Fabaceae	Acacia	colletioides	Р					*	*	*		*
Fabaceae	Acacia	erinacea	Р	*	*				*			
Fabaceae	Acacia	hemiteles	Р					*	*	*		*
Fabaceae	Acacia	ligulata	Р					*				*
Fabaceae	Acacia	merrallii	Р						*	*		*
Fabaceae	Acacia	prainii	Р					*				
Fabaceae	Acacia	tetragonophylla	Р	*		*						*
Fabaceae	Daviesia	aphylla	Р					*	*			
Fabaceae	Senna	artemisioides subsp. artemisioides	Р			*	*	*	*	*		
Fabaceae	Senna	artemisioides subsp. filifolia	Р	*	*	*	*	*	*	*	*	*
Fabaceae	Senna	cardiosperma	Р		*		*	*	*		*	
Frankeniaceae	Frankenia	interioris	Р						*		*	
Goodeniaceae	Scaevola	collaris	Р						*			*
Goodeniaceae	Scaevola	spinescens	Р	*		*	*	*	*			*
Hemerocallidaceae	Dianella	revoluta subsp. divaricata	Р								1	*



Family	Genus	Species	A, P, NN	Α	В	С	D	E	F	G	Н	I
Lamiaceae	Westringia	rigida	Р		*				*			*
Loranthaceae	Amyema	preissii	Р					*	*			
Myrtaceae	Eucalyptus	campaspe	Р	*	*							
Myrtaceae	Eucalyptus	clelandii	Р		*			*	*	*		*
Myrtaceae	Eucalyptus	griffithsii	Р	*		*			*			
Myrtaceae	Eucalyptus	oleosa subsp. oleosa	Р	*				*	*	*	*	
Myrtaceae	Eucalyptus	salmonophloia	Р					*				
Myrtaceae	Eucalyptus	salubris	Р						*	*		
Myrtaceae	Eucalyptus	transcontinentalis	Р					*	*			
Myrtaceae	Eucalyptus	yilgarnensis	Р					*			*	
Myrtaceae	Melaleuca	sheathiana	Р									*
Pittosporaceae	Pittosporum	angustifolium	Р					*				
Poaceae	Austrostipa	elegantissima	Р	*				*	*	*		*
Poaceae	Triodia	rigidissima	Р									*
Proteaceae	Grevillea	acuaria	Р									*
Santalaceae	Exocarpos	aphyllus	Р	*	*	*	*	*	*	*	*	*
Santalaceae	Santalum	acuminatum	Р		*			*	*	*		
Santalaceae	Santalum	spicatum	Р	*				*	*			
Sapindaceae	Dodonaea	lobulata	Р	*								
Sapindaceae	Dodonaea	viscosa subsp. angustissima	Р						*			*
Scrophulariaceae	Eremophila	alternifolia	Р			*		*		*		
Scrophulariaceae	Eremophila	caperata	Р					*	*			
Scrophulariaceae	Eremophila	decipiens subsp. decipiens	Р		*	*		*	*	*	*	*
Scrophulariaceae	Eremophila	glabra subsp. glabra	Р	*	*	*	*	*	*		*	*
Scrophulariaceae	Eremophila	interstans subsp. virgata	Р	*	*		*	*	*		*	
Scrophulariaceae	Eremophila	ionantha	Р					*	*	*	*	*
Scrophulariaceae	Eremophila	longifolia	Р	*	*							
Scrophulariaceae	Eremophila	oldfieldii subsp. angustifolia	Р	*	*	*	*	*	*			
Scrophulariaceae	Eremophila	parvifolia subsp. auricampa	Р						*		*	*
Scrophulariaceae	Eremophila	praecox (P1)	Р								*	
Scrophulariaceae	Eremophila	pustulata	Р		*				*			
Scrophulariaceae	Eremophila	scoparia	Р	*	*	*	*	*	*	*	*	*
Solanaceae	Duboisia	hopwoodii	Р					*				
Solanaceae	Solanum	lasiophyllum	Р	*	*	*	*	*	*			
Solanaceae	Solanum	nummularium	Р			*	*	*	*	*	*	*
Thymelaeaceae	Pimelea	microcephala subsp. microcephala	Р					*	*	*	*	
Zygophyllaceae	Zygophyllum	eremaeum	A		*							



Appendix F - Site Descriptions



	Р	roject Name: Jaurdi Hills	Jaurdi Hills			
Date:	6/07/2017		Botanist:	Eren Reid		
Location:	Jaurdi Hills Mining Proje	ct	Quadrat:	Q1		
Quadrat size:	20x20		•	•		
Vegetation						
group:	A					
WP:	1					
Photo number:			22			
Landform: Lower slope/Hillslope						
Land surface/disturbance:			No effective d	listurbance		
Coarse fragments on the surface (abundance/size/shape):			Very; abunda tabular	nt/Cobbly; or cobbles/Suba	angular	
Rock outcrop (abu	ndance/runoff):		Very slightly r	ocky/Moderately rapid		
Soil (profile/field te	xture/soil surface):		Duplex/Sandy	/ loam/Firm		
% Cover leaf litter:			30			
% Cover bare ground: 40						
Tallest	t stratum	Mid-stratur	n	Lower stratu	Im	
	Y Shrub Mallee (<					
Growth form:	8m)	Growth form:	S Shrub	Growth form:	S Shrub	
Height:	6-12m	Height:	1-3m	Height:	0.5-1m	
Crown cover %:	S 10-30	Crown cover %:	S 10-30	Crown cover %: S 10-30		
Dominant taxa:		Dominant taxa:		Dominant taxa:		
Eucalyptus griffithsii		Acacia acuminata		Beyeria sulcata var. sulc	ata	
		Eremophila oldfieldii sub	sp.			
		angustifolia	Dodonaea lobulata			
			Scaevola spinescens			
		ALL SPECIES				
		Acacia acuminat	a			
-		Acacia tetragonopr	nylla			
		Austrostipa elegantis	sima			
		Dedenace lebule				
		Eromonhilo interatono qui	la von virgoto			
			opquetifolio			
	L	Eucalyptus campa	angustitulia			
		Eucalyptus campa	spe Ieli			
		Execution Execut				
		Maireana george	ai			
		Marsdenia austra	lis			
	Ptilotus obovatus					
		Olearia mueller	i			
Scaevola spinescens						
		Solanum lasiophyll	lum			

Adjacent: Acacia erinacea





		Project Name: Jaurd	li Hills						
Date:	6/07/2017 & 13/09/201	7	Botanist:	Eren Reid					
Location:	Jaurdi Hills Mining Proje	ct	Quadrat:	Q2					
Quadrat size:	20x20			·					
Vegetation	A								
WP·	2								
Photo number:	2		27						
Landform:			27 Lower slope/Hillslope						
Land surface/distu	rhance.		No effective d	isturbance					
Coarse fragments on the surface (abundance/size/shape):			Very; abundar	nt/Cobbly; or cobbles/Suba	ingular				
Rock outcrop (abu	ndance/runoff)	Very slightly r	ocky/Slow						
Soil (profile/field te	xture/soil surface)	Dupley/Sandy	/loam/Firm						
% Cover leaf litter:			30						
% Cover hare group	nd:		60						
Tallest	stratum	Mid-stratur	n	Lower stratu	m				
	Y Shrub Mallee (<								
Growth form:	8m)	Growth form:	S Shrub	Growth form:	S Shrub				
Height:	6-12m	Height:	1-3m	Height:	0.5-1m				
Crown cover %:	S 10-30	Crown cover %:	S 10-30	Crown cover %:	S 10-30				
Dominant taxa:		Dominant taxa:		Dominant taxa:					
Eucalyptus griffithsii		Acacia acuminata		Dodonaea lobulata					
		Eremophila oldfieldii sub	SD.						
		angustifolia	Ptilotus obovatus						
-			Scaevola spinescens						
		ALL SPECIES							
		Acacia acuminat	а						
		Acacia erinacea	1						
		Austrostipa elegantis	ssima						
		Dodonaea lobula	ta						
		Eremophila glabra subs	p. glabra						
		Eremophila longifo	olia						
	E	Eremophila oldfieldii subsp.	angustifolia						
		Eremophila scopa	ria						
		Eucalyptus campa	spe						
		Eucalyptus griffith	isii						
		Exocarpos aphyll	us						
		Maireana george	ei						
		Maireana triptera	a						
		Olearia mueller	i						
	Ptilotus obovatus								
		Santalum spicatu	m						
		Scaevola spinesce	ens						
		Senna artemisioides sub	sp. filifolia						
		Solanum lasiophyll	lum						

Adjacent Atriplex nummularia subsp. spathulata Casuarina pauper Eucalyptus oleosa subsp. oleosa





	Project Name: Jaurdi Hills									
Date:	6/07/2017 & 13/09/20	17	Botanist:	Eren Reid						
Location:	Jaurdi Hills Mining Proj	ect	Quadrat:	Q3						
Quadrat size:	20x20			·						
Vegetation	D									
group:	D									
WP:	3									
Photo number:			31							
Landform: Lower slope/Footslope										
Land surface/disturbance: No effective disturbance										
Coarse fragments on the surface (abundance/size/shape):			Slightly; few/Coa tabular	arse gravelly; large pebbles/Su	brounded					
Rock outcrop (abu	indance/runoff):		Very slightly roc	ky/Slow						
Soil (profile/field te	exture/soil surface):		Duplex/Sandy lo	pam/Firm						
% Cover leaf litter:			80							
% Cover bare grou	ınd:		60							
Tallest	stratum	Mid-stra	atum	Lower stratun	า					
	M Tree Mallee (>									
Growth form:	8m)	Growth form:	S Shrub	Growth form:	S Shrub					
Height:	6-12m	Height:	1-3m	Height:	0.5-1m					
Crown cover %:	S 10-30	Crown cover %:	V <10	Crown cover %:	V <10					
Dominant taxa:		Dominant taxa:		Dominant taxa:						
		Eremophila intersta	ns subsp.							
Eucalyptus campas	ре	virgata		Atriplex nummularia subsp. s	pathulata					
			Eremophila scoparia							
		ALL SP	ECIES	-						
		Atriplex nummularia	a subsp. spainulaia	a						
		Auplex								
		Auripiex v	residana	2						
		Eremonhila interet	ane suben virgata	5						
		Eremonhile	ans subsp. virgata a scoparia							
		Fucalvotus	campasne							
		Eucarpos	aphyllus							
		Maireana	aeoraei							
		Maireana	sedifolia							
		Maireana t	omentosa							
		Maireana t	richoptera							
		Maireana	a triptera							
		Olearia I	muelleri							
		Ptilotus o	bovatus							
		Santalum a	cuminatum							
	Sclerolaena densiflora									
		Sclerolaena	diacantha							
		Senna caro	diosperma							





	Project Name: Jaurdi Hills								
Date:	6/07/2017 & 1	3/09/2017	Botanist:	Eren Reid					
Location:	Jaurdi Hills Mi	ning Project	Quadrat:	Q4					
Quadrat size:	20x20								
Vegetation group:	В								
Photo number:	4		35						
Landform:			Lower slope/Footslope						
Land surface/disturbance	:		No effective di	sturbance					
Coarse fragments on the	surface (abun	dance/size/shape):	Slightly; few/C	oarse gravelly; large pebble	s/Subrounded				
Rock outcrop (abundance	/runoff):		No bedrock ex	posed/Slow					
Soil (profile/field texture/s	oil surface):		Duplex/Sandy	loam/Firm					
% Cover leaf litter:			50						
% Cover bare ground:			70						
Tallest stratun	n	Mid-stratur	n	Lower stratu	m				
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub				
Height:	6-12m	Height:	1-3m	Height:	0.5-1m				
Crown cover %:	S 10-30	Crown cover %:	V <10	Crown cover %:	V <10				
Dominant taxa:		Dominant taxa:	•	Dominant taxa:	·				
Eucalyptus campaspe		Eremophila oldfieldii subs	sp. angustifolia	Acacia erinacea					
Eucalyptus clelandii				Eremophila pustulata					
			0						
			.5						
		Fremonhila diabra sul	ea osp. glabra						
<u> </u>		Eremonhila long	lifolia						
		Eremophila oldfieldii subs	p. angustifolia						
		Eremophila pust	tulata						
		Eucalyptus camp	baspe						
		Eucalyptus cleia	andii						
	Senna cardiosperma								
		Westringia rig	Ida						
		∠ygophyllum eren	naeum						
Adiacont									
	Fremophila interstans subsp. virgata								
				Exoca	arpos aphyllus				
				0	learia muelleri				
	and all all a star			Senna artemisioides	subsp. filifolia				



	Project Name: Jaurdi Hills								
Date:	6/07/2017 & 13	/09/2017	Botanist:	Eren Reid					
Location:	Jaurdi Hills Mini	ng Project	Quadrat:	Q5					
Quadrat size:	20x20								
Vegetation group:	В								
WP:	5								
Photo number:	0		38						
Landform:			Flat/Plain						
Land surface/disturbance			No effective	disturbance					
Coarse fragments on the s	urface (abunda	nce/size/shane) [.]	No coarse fra	aments					
Rock outcrop (abundance	/runoff):		No bedrock e	exposed/Slow					
Soil (profile/field texture/s	nil surface):		Dunley/Silty	clay loam/Firm					
% Cover leaf litter:			80						
% Cover bare ground:			50						
/ Cover bare ground.			00						
Tallest stratu	m	Mid-stratu	m	Lower stratum					
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub				
Height:	6-12m	Height:	1_3m	Height:	0.5-1m				
	M 20 70		1-5in V <10		0.5-111 V <10				
Dominant taxa:	IVI 50-70	Crown cover %:	V (10	Crown cover %:	V <10				
		Dominiani laxa.	han virgata	Atriplex pumpularia aubo	n anathulata				
Eucaryptus campaspe		Elemophila interstans su	ubsp. virgata	Athpiex numinularia subs	p. spatnulata				
Eucalyplus cleiandii		Senna artemisioides suc	osp. minona	Oleana muelleri					
				Plilolus obovalus					
ALL SPECIES									
Atriplex nummularia subsp. spathulata									
Airiptex vesicaria									
		Euclimis mynocar	tomentosa						
		Eremonhila interstans sub	sp virgata						
		Eremonhila nustul	oto						
		Eremonhila scona	aria						
		Elemetrical Elemet	sne						
		Eucalyptus clelan	udii						
		Maireana george	ei						
		Maireana pentatro	pis						
		Maireana trichopte	era						
		Maireana tripter	a						
		Olearia mueller	i						
		Ptilotus aervoide	s						
		Ptilotus obovatu	S						
		Sclerolaena densif	lora						
		Senna artemisioides sub	sp. filifolia						
Solanum lasiophyllum									
					Adjacent				
				Eremophila decipiens sub	sp. decipiens				
	alaa VI 📝		ALVATION	Maire	ana sedifolia				
			XALAT	Rhagodia	arummondii				
NON 20 DAY		Let VS 1							
	SILL H		XXX						
	AK EI	BALLER AND SPACE	11: 10-	9 7					
NAME AND AND AND A		MAR AL A	NON MAD	2					
		Marchael Charles 20	NAL 16 17						
		New States N							
			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1						



		Project Name: Jau	rdi Hills							
Date:	6/07/2017 & 1	3/09/2017	Botanist:	Eren Reid						
Location:	Jaurdi Hills Mir	ning Project	Quadrat:	Q6						
Quadrat size:	20x20									
Vegetation group:	D									
WP:	8									
Photo number:			42							
Landform:			Flat/Plain							
Land surface/disturbance:			No effective di	sturbance						
Coarse fragments on the surfa	ce (abundance	/size/shape):	No coarse frag	jments						
Rock outcrop (abundance/rund	off):		No bedrock ex	posed/Slow						
Soil (profile/field texture/soil su	urface):		Duplex/Silty cl	ay loam/Firm						
% Cover leaf litter:			10							
% Cover bare ground:			60							
Tallest stratum		Mid-stratu	m	Lower st	ratum					
Growth form:	S Shrub	Growth form:	S Shrub	Growth form:	S Shrub					
Height:	3-6m	Height:	1-3m	Height:	0.5-1m					
Crown cover %:	V <10	Crown cover %:	S 10-30	Crown cover %:	S 10-30					
Dominant taxa:		Dominant taxa:		Dominant taxa:						
Atriplex nummularia subsp. spathulata Eremophila scoparia Atriplex stipitata										
Eremophila interstans subsp. virgata Senna cardiosperma				Senna cardiosperma						
		ALL SPECIE	S							
		Atriplex nummularia subs	p. spathulata							
		Atriplex stipita	ta							
		Atriplex vesica	ria							
		Carrichtera ann	ua*							
		Chenopodium gaudich	audianum							
		Enchylaena tomentosa va	ar. tomentosa							
		Eremophila glabra sub	osp. glabra							
		Eremophila interstans su	ubsp. virgata							
		Eremophila oldfieldii subs	p. angustifolia							
		Eremophila sco	oaria							
		Exocarpos aphy	/llus							
		Maireana pyram	idata							
		Maireana tomen	tosa							
		Maireana trichor	otera							
		Maireana tripte	era							
		Ptilotus obova	tus							
		Rhagodia drumm	iondii							
	Scaevola spinescens									
Sclerolaena densiflora										
	Sclerolaena diacantha									
Sclerolaena patenticuspis										
	Senna artemisioides subsp. artemisioides									
Senna artemisioides subsp. filifolia										
	Senna cardiosperma									
		Solanum lasioph	yllum							
		Solanum nummul	arium							





	F	Project Name: Jaurdi Hills						
Date:	6/07/2017 & 13/09/2017		Botanist:	Eren Reid				
Location:	Jaurdi Hills Mining Project		Quadrat:	Q7				
Quadrat size:	20x20			•				
Vegetation group:	С							
WP:	9							
Photo number:			45					
Landform:			Elat/Plain					
Land surface/disturbanc	e.		No effective disturbance					
Coarse fragments on the	surface (abundance/size/shan	o).	No coarse fra	aments				
Bock outcrop (abundance	e/runoff):	c).	No bedrock e	vnosed//erv slow				
Soil (profile/field texture)	/soil surface):		Dupley/Silty	lav loam/Firm				
% Cover leaf litter:	son sunace).		60	ay loan / Inn				
% Cover here ground			60					
% cover bare ground.			00					
Talla		Mid stratur		Lewer stret				
Talle		Mid-stratum		Lower stratt	im i			
Growth form:	M Tree Mallee (> 8m)	Growth form:	S Shrub	Growth form:	S Shrub			
Height:	6-12m	Height:	1-3m	Height:	0.5-1m			
Crown cover %:	S 10-30	Crown cover %:	V <10	Crown cover %:	M 30-70			
Dominant taxa:		Dominant taxa:		Dominant taxa:				
Eucalyptus griffithsii		Eremophila alternifolia		Senna artemisioides subs	p. artemisioides			
		Atriplex nummularia subs	sp. spathulata	Atriplex stipitata				
Ptilotus obovatus								
	ALL SPECIES							
		Acacia acuminata						
		Acacia tetragonophylla						
	Atriple	x nummularia subsp. spath	nulata					
	•	Atriplex stipitata						
		Atriplex vesicaria						
	Che	enopodium gaudichaudiani	ım		-			
	Enchy	laena tomentosa var tome	ntosa					
	Energy	Eremonhila alternifolia	moou					
	Fremo	nhila deciniens subsp. dec	iniens					
	Ere	monhila dabra subsp. dat	ra					
	Eremo	nhila oldfieldii subsp. angu	stifolia					
	Elenio	Eromonhila scoparia	Stilolla					
		Mairaana goorgai						
		Maireana triabantara						
		Maireana tricnoptera						
		Maireana triptera						
		Ptilotus obovatus						
		Rhagodia drummondii						
Scaevola spinescens								
Sclerolaena diacantha								
Senna artemisioides subsp. artemisioides								
Senna arcemisiodes subsp. fillfolia								
	Solanum nummularium							
		2		Alt				
AN PCH T								





6 1

Date: 6/07/2017 Botanist: Eren Reid Location: Jaudi Hills Mining Project Quadrat: QS Quadrat size: 20x20 S S VMP: 10 FinalPinin FinalPinin Proto number: No effective disturbance S Corrers dragments on the surface (abundance/size/shapp): No forcers fragments No befrock sepseal/Very slow Boil (profile/final surface): Doplaze/sand, abundance/size/shapp): No befrock sepseal/Very slow S So (over leaf litter: 70 V K Cover leaf inter: S Doplaze/sand, abundance/size/shapp): No befrock sepseal/Very slow S			Project Name: Jaurdi	Hills				
Location: Jaudi Hills Mining Project Quadrat: Q8 Vegetation group: E E WP: 10 Fell ¹ Pint Fell ¹ Pint Photo number: No directive disturbance: No directive disturbance: No directive disturbance Location: No directive disturbance: No directive disturbance: No directive disturbance: Correst fragments on the surface (abundance/size/shape): No boards stoposad/wry slow Duplax/Sang/ clay loan/Film Sold profile/field toxturo/soll surface): Duplax/Sang/ clay loan/Film S stop Sold profile/field toxturo/soll surface): The disturbance S stop Tailest stratum Growth form: 1.5 mode S stop Corrent filte: 1.2 and Height: 1.3 m Height: S stop Corrent cover %: 3.10-30 Corven cover %: S -1 m Corven cover %: V < 0	Date:	6/07/2017 & 13/	09/2017	Botanist:	Eren Reid			
Cluadra is ize: 20:20 Vegetation group: E WP: 10 Photo number: 11 Land surface/disturbance: No effector findsurbance Land surface/disturbance: No effector findsurbance Deck outrop faburdance/moff: Dubetrock top:search Soli profile/indel toxture/soli surface): Dubetrock top:search % Cover leaf littler: 1 Crown cover %: 5 Dominant taxa: Dominant taxa: Eucloppilla scoparia Assess signital Eucloppilla scoparia Assess sc	Location:	Jaurdi Hills Minin	g Project	Quadrat:	Q8			
Vegetation group: E VPP: 10 Photo number: 51 Landform: FlatPlain Landform: FlatPlain Landform: No effective disturbance Coarse fragments No effective disturbance Coarse fragments No bedroor equipation of the surface (abundance/size/shape): No coarse fragments No effective disturbance Coarse fragments No effective disturbance Starte and the surface (abundance/size/shape): No defective disturbance Starte and the surface (abundance/size/shape): Starte and the surface (abundance/size/shape): Starte and the surface (abundance/size/shape): Starte and the surface (abundance/size/shape): <	Quadrat size:	20x20			•			
IVF: 10 Photo number: 51 Land surface/disturbance: No effective disturbance Course fragments on the surface (abundance/size/shape): No coarse fragments Rick outcrop (abundance/number): No defective disturbance Soil (profile/field texturbed) surface): TO Soil (profile/field texturbed) surface): TO Soil (profile/field texturbed) surface): TO So cover later surface So cover later surface Cover later surface So cover surface Bight: To cover cover %: So 10.30 Cover surface Arright supfate Cover surface Arright supfate Cover surface So cover surface Euclaypus supfate Cover surface Cover surface Arright supfate Cover surface Cover surface Cover surface Cover surface	Vegetation group:	E						
Photo number: 51 Landform: FlatPlain Landstruct: No effective (slaturbance) Coarse fragments No coarse fragments Rock outcrop (abundance/size/shape): No coarse fragments Rock outcrop (abundance/size/shape): Duplex/Sandy clay loam/Firm X Cover leaf litter: 70 X Cover leaf litter: 70 X Cover leaf ground: 60 Tallest stratum Growth form: 5 Strub Growth form: 1 Tree Growth form: 5 Strub Maight: 12.20m Height: 15.30m Height: 0 Status Corrent cover %: 5 10.30 Crown cover %: V < CO	WP:	10						
Landsurface/isturbance Flat/Plain Land surface/isturbance No closure fragments Coarse fragments on the surface (abundance/istae/shape): No closure fragments Rock outcrop (abundance/invisol) surface): TO Soil (profile/field tosturisol) surface): TO S, Cover fair fitter: TO S, Cover fair fitter: TO S, Cover fair fitter: Soil (profile/field issurface): Cown fair field issurface): Soil (profile/field issurface): Cown	Photo number:			51				
Land surface/disturbance: No effective disturbance Coarse fragments on the surface (abundance/size/shape): No coarse fragments Rock outcrop (abundance/runoff): Duplex/Sandy clay loam/Firm % Cover leaf litter: 70 % Cover leaf surface): Duplex/Sandy clay loam/Firm % Cover leaf surface): Cover leaf surface): Sand Growth form: 1 Tree Growth form: 5 Shrub Meight: 1 220m Height: 1 3m Crown cover %: Dominant taxa: Dominant taxa: Euclayptus salmonophiola Emothylic salmonophiola Euclayptus salmonophiola Encomposal polylus Senna artemisoides subsp. filfola Chernepodium gaudichaudianum Dubiata hormootia Encomposal polylus Senna artemisoides subsp. filfola Chernepodium gaudichaudianum Dubiata hormootia Encomposal polylus Senna artemisoides subsp. filfola Chernepodium gaudichaudianum Dubiata hormootia Encomposal polylus Senna artemisoides subsp. filfola Chernepodium gaudichaudianum Dubiata hormootia Encomposal polylus Senna artemisoides subsp. filfola Chernepodium gaudichaudianum Dubiata hormontia Encomposal polylus Senna arte	Landform:			Flat/Plain				
Cores fragments on the surface (abundance/size/shape): No coarse fragments Bock outcrog (abundance/size/shape): Duplex/Sandy Cay loam/Firm Sol (profile/field texture/sol) surface): Duplex/Sandy Cay loam/Firm % Cover leaf littler: 70 % Cover leaf littler: 70 % Cover leaf littler: 10 Tailest stratum Midstratum Growth form: 5 Strub Height: 12.20m Height: 12.20m Height: 12.20m Corver over %: 5 10.30 Corven cover %: 10.30m Corven cover %: Dominant taxa: Dominant taxa: Dominant taxa: Euclyptus salmonophicia Encophila scoparia Attipes signata Attipes signata Attipes signata Scaevola spinescene Corver cover %: Scaevola spinescene Euclyptus salmonophicia Encophila scoparia Euclyptus salmonophicia Encophila scoparia Euclyptus salmonophicia Encophila scoparia Euclyptus salmonophicia Encophila scoparia En	Land surface/disturbance:			No effective dis	turbance			
Bock outcrop (abundance/runoff): No bedrock exposed/Very slow Soil (profile/fort texture/soil surface): Duplex/Santy day loam/Firm ½ Cover leaf littler: 70 ½ Cover leaf littler: 70 ½ Cover leaf littler: 5 Strub Growth form: 5 Strub Height: 1 220n Height: 1 3 20 Crown cover %: 5 10 30 Crown cover %: 5 10 30 Corwn cover %: 5 10 30 Cominant taxa: Dominant taxa: Euclyptus salmonophicia Eremophila scoparia Atriptex sitplata Scaevola spinescens Atriptex sitplata Scaevola spinescens Beckey taxa in comentos var. incentos a Eremophila scoparia Eremophila scoparia Enderspine Maireara pendaropi Maireara pendaropi Maireara pendaropi Maireara pendaropi Maireara pendaropi Maireara pendaropi Maireara pendaropi Maireara pendaropi Maireara pendaropi Scaevola spinescens Scaevola spinescens Scaevola spinescens S	Coarse fragments on the surfa	ace (abundance/s	ize/shape):	No coarse fragr	ments			
Soil (profile/field texture/soil surface): Duplex/Sandy day loam/Firm % Cover leaf littler: 70 % Cover leaf littler: 70 % Cover leaf littler: 13 Tailest stratum Midstratum Growth form: 1 Tree Growth form: 1 Shrub Height: 12.20n Height: 1.3m Crevn cover %: 5 103:0 Dominant taxa: Dominant taxa: Dual (Standard) Dominant taxa: Euclayptus salmonophicia Encophia scoparia Attplex sipitan Antipox sipitan Cheen column gaudichaudinum Scaevola spinescens Euclayptus salmonophicia Encophia scoparia Enclaybast salmanophicia Encophia scoparia Enclaybast salmanophicia Encophia scoparia Euclayptus salmonophicia Encophia scoparia Euclayptus salmonophicia Encophia scoparia Euclayptus salmonophicia Excaeros aph/lius Branca tarteria georgel Maireana pendelina Maireana tonentosa Maireana tonentosa Maireana tonentosa Enclaybast salmanophicia Excaeros aph/lius Scaerola spinescens Sciencia salmanotinentosa Maireana tonentosa Maireana tonentosa Maireana tonentos	Rock outcrop (abundance/run	off):		No bedrock exp	oosed/Very slow			
% Cover leaf litter: 70 % Cover leaf litter: 1 Growth form: 1 Tree District of the statum Growth form: 5 Strub Growth form: 5 District of the statum Growth form: 5 Strub Growth form: 5 5 Dominant taxa: 0 Dominant taxa: V < 10	Soil (profile/field texture/soil s	urface):		Duplex/Sandy of	clay loam/Firm			
% Cover bare ground: [6] Tailest stratum Mid-stratum Growth form: 1.5 Shrub Growth form: 1.7 Tree Growth form: 1.3 m. Height: 3.5 Shrub Growth form: 1.2 20m. Height: 1.3 m. Height: 0.5 Int. Cover over %: 1.3 1.0 Shrub Crown cover %: V. 0.5 Int. Dominant taxa: Dominant taxa: Dominant taxa: Dominant taxa: Excalptus satinonophiola Erenophia scoparia Atriplex sipilata Excalptus satinonophiola Erenophia scoparia Scavera subsp. filfola Berna at emisiodes subsp. filfola Erenophia scoparia Erenophia scoparia Eucalyptus satinonophioia Excarpos aphylus Scavera Berna at emisiodes subsp. filfola Eventophia scoparia Eventophia Eventophia scoparia Eucalyptus satinonophioia Eventophia Eventophia tomentosa var. tomentosa Eventophia Eventophia Berna georgei Maireana pertatropis Maireana pertatropis Maireana triptera Prilotus obovatis Eventophia Rhagodia drummodii Scavera sprinescens Sclerotaena danshifora	% Cover leaf litter:			70				
Tailest stratum Mid-stratum Lower stratum Growth form: T Tree Growth form: S Strub Growth form: S Strub Crown cover %: S 10-30 Crown cover %: S 10-30 Crown cover %: V < 10	% Cover bare ground:			60				
Growth form: T Tree Growth form: 1 strub Growth form: 5 strub Height: 12.20m Height: 1 am Height: 0.5 ml Corwn cover %: 10.3 ml 1 am Height: 0.5 ml Corwn cover %: 10.3 ml 1 am Height: 0.5 ml Corwn cover %: 10.3 ml 1 am Height: 0.5 ml Corwn cover %: 10.3 ml 1 am Height: 0.5 ml Eucalyptus salmonophioia Erenophia scoparia Atriplex sipitata Scravb aplicas antemisioides subsp. filfolia Eccarpos aphyllus Scaravbardia Scaravbardia Scaravbardia Scaravbardia Chenopodium gauchtaudinum Dubisia hopwoodii Eccarpos aphyllus Scaravbardia Scaravbardia Eucalyptus salmonophioia Excarpos aphyllus Scaraphyllus Scaravbardia Scaravbardia Eucalyptus data comentosa Erenophia scoparia Eucalyptus data Scaravbardia Scaravbardia Eucalyptus data comentosa Mareana funchopia Scaravbardia Scaravbardia Scaravbardia Eucalyptus data comentosa Scaravbardia numinatabhybita								
Growth form: I Tree Growth form: S Strub Growth form:: S Strub Crown cover %: S 10-30 Crown cover %: S 10-30 Crown cover %: V < 10	l allest stratum	1	Mid-stratun	n .	Lower stratun	1		
Height: 12.20m Height: 1-3m Height: 0.5-1m Corwn cover %: 5 10-30 Crown cover %: V <10	Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub		
Crown cover %: Is 10-30 Crown cover %: V < 10 Dominant tax:	Height:	12-20m	Height:	1-3m	Height:	0.5-1m		
Dominant taxa: Dominant taxa: Eucalyptus salmonophiola Eremophila scoparia Atripicx sipitata Excarpos aphyllus Scaevola spinescons Senna artemisioides subsp. filfolia Atripicx sipitata Chenopodium gaudichaudiarum Duboisia hopwoodi Encologiant Eucalyptus salmonophiola Everaphylus Encologiant Eucalyptus salmonophiola Excarpos aphylus Eucalyptus salmonophiola Excarpos aphylus Maireana georgei Maireana pentropis Maireana tomentosa Piluotas oboviaus Maireana trintopis Maireana trintopis Rhagedia dummondii Scalerolaena densifiora Scalerolaena dicaentha Scalerolaena dicaentha Scalerolaene Scalerolaene Scalerolaene Benna cardioosperma Scalerolaene Scalerolaene Scalerolaene Scalerolaene Scalerolaene Scalerolaene	Crown cover %:	S 10-30	Crown cover %:	S 10-30	Crown cover %:	V <10		
Eucatypus salmonophioia Eremophila scoparia Artiplex stipitata Exocarpos aphyllus Scaevola spinescens Sema artemisioides subsp. filifolia ALL SPECIES Antoplex stipitata Chenopodum gaudichaudianum Duboisia hopwoodii Duboisia hopwoodii Enchylaena tomentosa Enchylaena tomentosa var. tomentosa Enchylaena tomentosa var. tomentosa Eucatypus salmonophioia Eucatypus salmonophioia Maireana georgei Maireana georgei Maireana triptera Pilotus obvortus Pilotus obvortus Rhagodia drummondii Satalum acuminatum Scaevola spinescens Scleroleana diesnifora Scleroleana diesnifora Scleroleana di	Dominant taxa:		Dominant taxa:		Dominant taxa:			
Exocarpos aprilus Scaevola spinescens ALL SPECIES Sema artemisioides subsp. filifolia Atriplex stipitata Chenopodium gaudichaudianum Duboisia horpwoodii Enchylaena tomentosa var. tomentosa Erenophila scoparia Eccalyptus salmonophiloia Eucalyptus salmonophiloia Eccarpos aphylus Maireana georgei Maireana georgei Maireana georgei Maireana trichoptera Maireana triptera Pitolus obovatus Rhagodia drummondii Scaevola subsp. filifolia Scaevola subsp. filifolia Scaevola subsp. filifolia Baireana triptera Maireana triptera Pitolus obovatus Rhagodia drummondii Staevola subsp. filifolia Scaevola subsp. filifolia Scaevola spinescens Scierolaena deasntha Scierolaena desastus Scierolaena deasntha Solarum lasiophyllum Acacia ligg Atriplex nurmularia subsp. spitul Eucalyplus subsp. spitul Solarum lasiophyllum Eucalyplus transcontinent	Eucalyptus salmonophloia		Eremophila scoparia		Atriplex stipitata			
ALL SPECIES AtL SPECIES Attriplex stipitata Chenopodium gaudichaudianum Duboisia hopwoodii Enchylaena tomentosa var. tomentosa Erencphila scoparia Eucalyptus salmonophiola Exocarpos aphyllus Maireana georgei Maireana trichoptera Maireana trichoptera Philotus bovoruts Philotus bovoruts Rhagodia drummondii Santalum acuminatum Scaevola spinescens Sclenolaena densifora Sclenolaena densidora Bena caredicaeptera			Exocarpos aphyllus		Scaevola spinescens	<u></u>		
ALL SPECIES Atriptex stplata Chenopodium gaudichaudianum Duboisia hopwoodi Enchylaena tomentosa var. tomentosa Enchylaena tomentosa var. tomentosa Eucalyptus salmonophiola Eucalyptus salmonophiola Eucalyptus salmonophiola Maireana georgel Maireana trichoptera Maireana trichoptera Maireana trichoptera Piliotus obovatus Salmonodii Santalum acuminatum Scleroleana discritha Senna artemisioides subsp. filifolia Senna artemisioides subsp. filifolia Senna artemisioides subsp. filifolia Cencalyptus elea Eucalyptus elea Eucalyptus transcontinent					Senna artemisioides subsp. 1	ilitolia		
Attpiex stpritta Chenopodum gaudichaudianum Duboisia hopwoodii Enchyluean tomentosa var. tomentosa Eremophila scoparia Eucalyptus salamonphola Excarpos aphylius Maireana georgei Maireana pentaropis Maireana tribetra Pitolus obovatus Rhagodia drummondii Santalum acuminatum Scaevola spinescens Scierolaena diacantha Senna ardiosperma Solanum lasiophyllum Attipiex nummularia subsp. pathu Attipiex nummularia subsp. pathu Attipiex nummularia subsp. pathu Eucalyptus stease Attipiex nummularia subsp. pathu Eucalyptus tease Attipiex nummularia subsp. pathu Eucalyptus tease Attipiex nummularia subsp. pathu Eucalyptus tease Eucalyptus tease Berna ardiosperma			ALL SPECIES					
Chenopodum gaudichaudianum Duboisi hopwoodi Enchylaena tomentosa var. tomentosa Enchylaena tomentosa var. tomentosa Eremophila scoparia Eucalyptus salmonopholia Eucalyptus salmonopholia Maireana domentosa Maireana tomentosa Maireana tomentosa Maireana tomentosa Pitiotus obovatus Pitiotus obovatus Pitiotus obovatus Santalum acuminatum Scaevola spinescens Sclerotaena densifiora Sclerotaena densifiora Sclerotaena densifiora Solanum lasiophyllum Atripter nummularia subsp. spathu Eucalyptus cleat Catopolicies and the subsp. spathu Eucalyptus dela Catopolicies and the subsp. Statuse Catopolicies and the subsp. Statuse transcontinent			Atriplex stipitata	dianuma				
Dubusia nopwooli Enchylaena tomentosa var. tomentosa Eremophila scoparia Eucalyptus salmonophilai Eucalyptus salmonophilai Maireana pentatopis Maireana pentatopis Maireana tomentosa Maireana tomentosa Sclerolaena densifora Sclerolaena densifora Sclerolaena densifora Sclerolaena dascantha Senna ardenisoides subsp. filfolia Senna ardenisoides subsp. filfolia Atriplex nummularia subsp. spathu Eucalyptus teals Eucalyptus transcontinent			Unenopodium gaudichau	iuianum				
Elicipitedia dimensionale Eremophila scoparia Eucalyptus salmonophiola Eucalyptus salmonophiola Eucarops aphyllus Maireana georgiei Maireana pentaropis Maireana trichoptera Maireana trichoptera Pitlotus obovatus Rhagodia drummondii Santalum acuminatum Scaevola spinescens Scleroidaena densifiora Scleroidaena			Enchylacena temantaaa var	lli tomontoso				
Elentophila salmonophola Eucalyptis salmonophola Exocarpos aphyllus Maireana georgei Maireana tronoptera Maireana tronoptera Maireana trichoptera Mareana tronoptera Mareana tronoptera Mareana tronoptera Ptilotus oboxatus Santalum acuminatum Scaevola spinescens Sclerolaena diensifica Senna artemisioides subsp. filfola Senna artemisioides subsp. filfola Senna artemisioides subsp. filfola Atripex nummularia subsp. spathu Eucalyptus clea Eucalyptus transcontinent			Encrylaena tomentosa var.	ionieniosa				
Eccargos aprijus Maireana george Maireana pentartopis Maireana trichoptera Selerola drummondil Senna arentifora Selerolaena densifiora Selerolae			Eleniophila scopal	la bloio				
Alireana georgei Maireana georgei Maireana georgei Maireana georgei Maireana georgei Maireana trichoptera Maireana trichoptera Pitiotus obovatus Rhagodia drummondii Santalum acuminatum Scaevola spinescens Sclerolaena densiflora Sclerolaena densiflora Sclerolaena densiflora Solanum lasiophyllum Adijac Actacia ligu Atriplex nummularia usbp. spathu Eucalyptus dela Eucalyptus transcontinent			Eucaryptus saimonop					
Maireana pentatopis Maireana tomentosa Maireana triptera Ptilotus obovatus Rhagodia drummondii Santalum acuminatum Scaevola spinescens Sclerolaena densiflora Sclerolaena densiflora Sclerolaena dacantha Senna cardiosperma Solanum lasiophyllum Adjac Adjac Atriptex nummularia subsp. spathu Eucalyptus dela Eucalyptus transcontinent			Maireana deorde	i				
Maireana tichoptera Maireana tichoptera Maireana tichoptera Ptilotus obovatus Rhagodia drummondii Santalum acuminatum Scaevola spinescens Sclerolaena densifiora Sclerolaena densifiora Sclerolaena diacantha Senna ardnosperma Solanum lasiophyllum Adijac Acacia liqu Atriptex nummularia subep. spathu Eucalyptus dela Eucalyptus transcontinent			Maireana pentatro	, bis				
Maireana trichoptera Maireana triptera Ptitotus obvatus Rhagodia drummondii Santalum acuminatum Scaevola spinescens Sclerolaena densiftora Sclerolaena diacantha Senna artemisioides subsp. filifolia Senna cardiosperma Solanum lasiophylium Adjac Acacia ligu Atriptex nummularia subsp. spathu Eucalyptus clela Eucalyptus transcontinent			Maireana tomentos	a				
Maireana triptera Ptilotus obvatus Ptilotus obvatus Rhagcdia drummondii Santalum acuminatum Scaevola spinescens Sclerolaena densiflora Sclerolaena densiflora Scherolaena discantha Senna ardiosperma Solanum lasiophyllum Adjac Acacia ligu Atriptex nummularia subsp. spathu Eucalyptus clela Eucalyptus transcontinent			Maireana trichopte	ra				
Ptilotus obovatus Rhagodia drummondii Santalum acuminatum Scaevola spinescens Celerolaena densiflora Sclerolaena diacantha Senna artemisioldes subsp. filfolia Senna artemisioldes subsp. filfolia Senna cardiosperma Solanum lasiophyllum Adjac Acacia ligu Atriplex nummularia subsp. spathu Eucalyptus clela Eucalyptus clela		Maireana triptera						
Rhagodia drummondii Santalum acuminatum Scaevola spinescens Sclerolaena densifiora Sclerolaena discantha Senna artemisioides subsp. filifolia Senna cardiosperma Solanum lasiophyllum Atriplex nummularia subsp. spathu Eucalyptus cleia Eucalyptus transcontinent			Ptilotus obovatus					
Santaula aginescens Scaevola spinescens Sclerolaena densiflora Scena atemisioles subsp. filfolia Senna cardiosperma Solanum lasiophyllum Atriplex nummularia subsp. spathu Eucalyptus cleia Eucalyptus transcontinent			Rhagodia drummor	idii				
Sclerolaena densiflora Sclerolaena diacantha Senna artemisioldes subsp. filifolia Senna cardiosperma Solanum lasiophyllum Atriplex nummularia subsp. spathu Eucalyptus clela Eucalyptus transcontinent			Santalum acuminati	um				
Scierolaena diacantha Scierolaena diacantha Senna artemisioides subsp. filifolia Senna cardiosperma Solanum lasiophyllum Adjac Adjac Acacia ligu Atriplex nummularia subsp. spathu Eucalyptus clela Eucalyptus transcontinent			Scaevola spinesce	ns				
Senna artemisioides subsp. filifolia Senna cardiosperma Solanum lasiophyllum Adjac Acacia ligu Atriplex nummularia subsp. spathu Eucalyptus ciela Eucalyptus transcontinent			Sclerolaona diacant	ha				
Senna cardiosperma Solanum lasiophyllum Adjac Acacia ligu Atriplex nummularia subsp. spathu Eucalyptus clela Eucalyptus transcontinent			Senna artemisioides subs	n filifolia				
Solanum lasiophyllum Acacia ligu Atripiex nummularia subsp. spathu Eucalyptus clela Eucalyptus transcontinent			Senna cardiosperm	p: mitolia na				
Adjac Acacia ligu Atriplex nummularia subsp. spathu Eucalyptus cleal Eucalyptus transcontinent			Solanum lasiophyllu	um				
Adjac Acacia ligu Atriplex nummularia subsp. spathu Eucalyptus clea Eucalyptus transcontinent								
Acacia ligu Atriplex nummularia subsp. spathu Eucalyptus clela Eucalyptus transcontinent						Adjacent		
Atriplex nummularia subsp. spathu Eucalyptus clela Eucalyptus transcontinent						Acacia ligulata		
					Atriplex nummularia sub	osp. spathulata		
Eucalyptus transcontinent					Euca	lyptus clelandii		
					Eucalyptus tra	nscontinentalis		



Dorations								
Project Name: Jaurdi Hills								
Date:	7/07/2017 & 1	3/09/2017	Botanist:	Eren Reid				
Location:	Jaurdi Hills Mir	ning Project	Quadrat:	Q9				
Quadrat size:	20x20							
Vegetation group:	F							
WP:	14							
Photo number:	-		63					
Landform:			Flat/Plain					
Land surface/disturbance:			No effective d	listurbance				
Coarse fragments on the surface	ace (abundance	e/size/shape):	No coarse fra	aments				
Rock outcrop (abundance/runoff): No bedrock exposed/Very slow								
Soil (profile/field texture/soil s		Duplex/Sandy	/ clav loam/Firm					
% Cover leaf litter:			80					
% Cover bare ground:			50					
Tallest stratun	ก	Mid-strat	tum	Lower st	tratum			
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub			
Height:	6-12m	Height:	1-3m	Height:	0.5-1m			
Crown cover %:	S 10-30	Crown cover %:	V <10	Crown cover %:	V <10			
Dominant taxa:		Dominant taxa:		Dominant taxa:				
Casuarina pauper		Fremophila interstans sub	osp virgata	Fremophila glabra sub	sp dlabra			
Eucalyptus clelandii		Eremophila scoparia	op. mgata	Olearia muelleri	op: glasta			
Euouryptuo oronarran	-	Elomophia coopana		Senna artemisioides si	ubsp. filifolia			
		ALL SPECIE	S					
		Acacia hemite	les					
	-	Atriplex nummularia subs	sp. spathulata					
	-	Casuarina pau	per					
		Chenopodium gaudich	naudianum					
	-	Enchylaena tomentosa va	ar, tomentosa					
	-	Eremophila glabra sub	osp. glabra					
	-	Eremophila interstans su	ubsp. virgata					
	-	Eremophila scor	paria					
		Eucalyptus clela	andii					
		Exocarpos aphy	vllus					
		Maireana geor	aei					
		Maireana tomen	itosa					
		Olearia muelle	eri					
		Ptilotus obovat	tus					
		Scaevola spines	cens					
		Sclerolaena dens	siflora					
		Sclerolaena diaca	antha					
		Senna artemisioides su	ıbsp. filifolia					
					Adjacent			
					Acacia acuminata			
Acacia colletioides								
				Eucalypt	us transcontinentalis			
	Maireana pentatropis							





Data	7/07/2017 8 42/	0 /2017	Rotaniat:	From Doid					
	////201/ & 13/0	- Ducie at	Duradust:						
Location:	Jaurdi Hills Mining	g Project	Quadrat:	Q10					
Quadrat size:	20x20								
Vegetation group:	E								
WP:	16		1						
Photo number:			64-65						
Landform:			Flat/Plain						
Land surface/disturbance:			No effective dist	turbance					
Coarse fragments on the surfa	ce (abundance/si	ze/shape):	No coarse fragn	nents					
Rock outcrop (abundance/rund	off):		No bedrock exp	osed/Very slow					
Soil (profile/field texture/soil su	urface):		Duplex/Sandy c	lay loam/Firm					
% Cover leaf litter:			60	*					
% Cover bare ground:			50						
Tallest stratum		Mid-stratum	1	Lower stratun	ı				
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub				
Height:	6-12m	Height:	1-3m	Height:	0.5-1m				
Crown cover %:	S 10-30	Crown cover %	V <10	Crown cover %:	V <10				
Dominant taxa:		Dominant taxa:		Dominant taxa					
Fucalvotus salmonophloia		Eremonhila interstans suben	virgata	Acacia hemiteles					
		Fremonhila sconaria	. Thyata	Senna artemisioides subsn. f	filifolia				
		Exocarpos aphyllus		Senna cardiosperma	monu				
	ALL SPECIES								
<u> </u>	Accia nemiteles								
Arrigenz Preissil									
		Austrostina ologantisa	imo						
		Chonopodium gaudichau	dianum						
		Cretvetulia concerna							
		Enchylacing tementoso ver d	did tomontooo						
		Encrylaeria tomentosa var.							
		Eremophila aconari	p. virgata						
			d						
		Exocarpos aprivilus	5						
		Maireana georgei							
			a -						
			S						
		Ptilotus obovatus	-1::						
		Rhagodia drummon							
		Santaium spicatum	1						
		Scaevola spinescer	15						
		Scierolaena densiflo	ra						
		Scierolaena diacanti	na filfelie						
		Senna artemisioides subs	D. TIIITOIIA						
		Senna cardiosperm	а						
		Solanum lasiophyllu	m						
Solanum nummularium									
Adjacent									
Acacia ligulata									
Atriplex nummularia subsp. spathulata									
Eremophila alternifolia									
Eucalyptus transcontinentalis									
			A Star						

Project Name: Jourdi Hillo



Project Name: Jaurdi Hills						
Date:	7/07/2017 & 13/	09/2017	Botanist:	Eren Reid		
Location:	Jaurdi Hills Minin	g Project	Quadrat:	Q11		
Quadrat size:	20x20			•		
Vegetation group:	E					
WP:	17					
Photo number:			73			
Landform:			Flat/Plain			
Land surface/disturbance:			No effective dist	turbance		
Coarse fragments on the surfa	ce (abundance/s	ize/shape):	No coarse frage	nents		
Rock outcrop (abundance/rund	off):		No bedrock exp	osed/Very slow		
Soil (profile/field texture/soil su	urface):		Duplex/Sandy c	lay loam/Firm		
% Cover leaf litter:			40	*		
% Cover bare ground:			60			
Tallest stratum		Mid-stratum	1	Lower stratum	ı	
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub	
Height:	12-20m	Height:	1-3m	Height:	0.5-1m	
Crown cover %:	S 10-30	Crown cover %:	V <10	Crown cover %:	V <10	
Dominant taxa:		Dominant taxa:		Dominant taxa:	1	
Eucalyptus salmonophloia		Eremophila interstans subsp	virgata	Eremophila alternifolia		
		Eremophila scoparia	9	Ptilotus obovatus		
		Exocarpos aphyllus		Senna artemisioides subsp. f	ilifolia	
		ALL SPECIES		•		
		Acacia hemiteles				
		Acacia prainii				
		Austrostipa elegantiss	ima			
		Enchylaena tomentosa var.	tomentosa			
		Eremophila alternifo	lia			
		Eremophila glabra subsp	. glabra			
		Eremophila interstans subs	p. virgata			
		Eremophila oldfieldii subsp. a	angustifolia			
		Eremophila scopari	a			
		Eucalyptus salmonoph	nloia			
		Exocarpos aphyllus	S			
		Maireana trichopter	а			
		Maireana triptera				
		Marsdenia australi	S			
		Olearia muelleri				
		Pimelea microcephala subsp. r	nicrocephala			
		Pittosporum angustifo	lium			
		Ptilotus obovatus				
		Rhagodia drummon	dii			
		Santalum spicatum	า			
		Scaevola spinescer	าร			
		Sclerolaena densiflo	ra			
		Sclerolaena diacant	ha			
		Senna artemisioides subs	p. filifolia			





		Project I	Name: Jaurdi Hills	I = · ·	
Date:	7/07/2017 & 1	13/09/2017	Botanist:	Eren Reid	
Location:	Jaurdi Hills Mi	ning Project	Quadrat:	Q12	
Vegetation group:	20x20				
WP:	18				
Photo number:			76		
Landform:			Flat/Plain		
Land surface/disturbance): ourfood (abur	danaa/aiza/ahana):	No effective disturbance		
Rock outcrop (abundance	e/runoff):	iualice/size/silape).	No bedrock exposed/Very slow		
Soil (profile/field texture/s	soil surface):		Duplex/Sandy clay loam/Firm		
% Cover leaf litter:			60		
% Cover bare ground:			60		
Tallest stratum	n	N	lid-stratum	l ower stratur	n
Growth form:	T Tree	Growth form:	Y Shrub Mallee (< 8m)	Growth form:	S Shrub
Height:	12-20m	Height:	3-6m	Height:	0.5-1m
Crown cover %:	S 10-30	Crown cover %:	V <10	Crown cover %:	V <10
Dominant taxa:		Dominant taxa:		Dominant taxa:	
Eucalyptus salmonophloia		Eucalyptus oleosa subs	p. oleosa	Daviesia benthamii subsp.	acanthoclona
				Senna cardiosperma	
		AI	LL SPECIES	oenna oardiospenna	
		Chenopodi	um gaudichaudianum		
		Da	viesia aphylla		
		Enchylaena to	mentosa var. tomentosa		
		⊑remophia Frem	a giabra subsp. glabra lophila scoparia		
		Eucalyptus	oleosa subsp. oleosa		
		Eucalyp	tus salmonophloia		
		Exoc	carpos aphyllus		
		Maire	eana trichoptera		
		Ma	ireana triptera		
		Ptil	otus obovatus		
		Rhage	odia drummondii		
		Sclero	blaena densiflora		
		Sclero	blaena diacantha		
		Senna arten	nisioides subsp. filifolia		
		Senn	a cardiosperma		
and the second se	The start				



Project Name: Jaurdi Hills					
Date:	7/07/2017 & 13/0	09/2017	Botanist:	Eren Reid	
Location:	Jaurdi Hills Mining	g Project	Quadrat:	Q13	
Quadrat size:	20x20			•	
Vegetation group:	E				
WP:	19				
Photo number:			80		
Landform:			Flat/Plain		
Land surface/disturbance:			No effective dist	turbance	
Coarse fragments on the surface	ce (abundance/si	ze/shape):	No coarse frage	nents	
Rock outcrop (abundance/runc	off):		No bedrock exp	osed/Very slow	
Soil (profile/field texture/soil su	urface):		Duplex/Sandy c	lay loam/Firm	
% Cover leaf litter:			80		
% Cover bare ground:			50		
Tallest stratum		Mid-stratum	ı	Lower stratum	1
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub
Height:	12-20m	Height:	1-3m	Height:	0.5-1m
Crown cover %:	S 10-30	Crown cover %:	S 10-30	Crown cover %:	V <10
Dominant taxa:		Dominant taxa:		Dominant taxa:	
Eucalyptus salmonophloia		Eremophila caperata		Acacia hemiteles	
Eucalyptus transcontinentalis		Eremophila scoparia		Atriplex vesicaria	
				Senna artemisioides subsp. f	ilifolia
		ALL SPECIES		· · ·	
		Acacia hemiteles			
		Acacia ligulata			
		Atriplex nummularia subsp.	spathulata		
		Atriplex stipitata			
		Atriplex vesicaria			
		Daviesia aphylla			
		Eremophila caperat	ta		
		Eremophila scopar	ia		
		Eucalyptus salmonopl	hloia		
		Eucalyptus transcontine	entalis		
		Exocarpos aphyllu	s		
		Maireana sedifolia	1		
		Olearia muelleri			
		Scaevola spinescer	าร		
		Sclerolaena densific	ora		
		Senna artemisioides subsp. a	rtemisioides		
		Senna artemisioides subs	p. filifolia		
		Senna cardiosperm	na		
					Adiacent

Eucalyptus oleosa subsp. oleosa Santalum acuminatum





	-	Project Name: Jau	rdi Hills				
Date:	7/07/2017 & 13/	/09/2017	Botanist:	Eren Reid			
Location:	Jaurdi Hills Minir	ng Project	Quadrat:	Q14			
Quadrat size:	20x20			-			
Vegetation group:	E						
WP:	20						
Photo number:			83				
Landform:			Flat/Plain				
Land surface/disturbance:			No effective di	sturbance			
Coarse fragments on the surfa	ace (abundance/	size/shape):	No coarse frag	jments			
Rock outcrop (abundance/run	off):		No bedrock ex	posed/Very slow			
Soil (profile/field texture/soil s	surface):		Duplex/Sandy	clay loam/Firm			
% Cover leaf litter:			60				
% Cover bare ground:			30				
Tallest stratum		Mid-stratu	n	Lower s	tratum		
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub		
Height:	12-20m	Height:	1-3m	Height:	0.5-1m		
Crown cover %:	S 10-30	Crown cover %:	V <10	Crown cover %:	M 30-70		
Dominant taxa:		Dominant taxa:		Dominant taxa:			
Eucalyptus salmonophloia		Eremophila scoparia		Eremophila ionantha			
				Eremophila scoparia			
				Senna artemisioides subsp. filifolia			
		ALL SPECIE	S				
		Acacia hemite	es				
		Atriplex nummularia subs	p. spathulata				
		Atriplex stipita	ta				
		Atriplex vesica	ria				
		Austrostipa elegan	tissima				
		Chenopodium gaudich	audianum				
		Enchylaena tomentosa va	ar. tomentosa				
		Eremophila iona	ntha				
		Eremophila oldfieldii subs	p. angustifolia				
		Eremophila sco	oaria				
		Eucalyptus salmon	ophloia				
		Exocarpos aphy	/llus				
		Maireana geor	gei				
		Maireana tomen	tosa				
		Maireana tripte	era				
		Pimelea microcephala subs	p. microcephala		-		
		Ptilotus obova	us				
Rhagodia drummondii							
			ilis iflere				
Sclerolaena dens			inora				
		Scierolaena patent	icuspis				
			ban filifolio				
			usp. IIIIolia				
		Solanum nummu	anum				



Adjacent Eucalyptus transcontinentalis Eucalyptus yilgarnensis Santalum spicatum





	Proje	ect Name: Jaurdi Hills			
Date:	7/07/2017 & 13/09/2017		Botanist:	Eren Reid	
Location:	Jaurdi Hills Mining Project		Quadrat:	Q15	
Vegetation group:	F				
WP:	22				
Photo number:			87		
Landform:			Flat/Plain	11-4	
Coarse fragments on the s	surface (abundance/size/shape)		No effective o	aments	
Rock outcrop (abundance	/runoff):		No bedrock e	xposed/Very slow	
Soil (profile/field texture/s	oil surface):		Duplex/Sandy	/ clay loam/Firm	
% Cover leaf litter:			80		
% Cover bare ground:			50		
Talle	est stratum	Mid-stratun	n	Lower stratu	m
Growth form:	M Tree Mallee (> 8m)	Growth form:	S Shrub	Growth form:	S Shrub
Height:	6-12m	Height:	1-3m	Height:	0.5-1m
Crown cover %:	M 30-70	Crown cover %:	V <10	Crown cover %:	V <10
Eucalyptus clelandii		Eremophila scoparia		Acacia merrallii	
Eucalyptus salubris		Santalum acuminatum		Eremophila caperata	
				Eremophila ionantha	
		ALL SPECIES Acacia merrallii			
	Cra	itystylis conocephala			
	E	remophila caperata			
	Eremophila	a decipiens subsp. decipien	IS		
	E	remophila scoparia			
	E	ucalyptus clelandii			
	E	Eucalyptus salubris			
	M	aireana pentatropis			
	Pimelea micr	ocephala subsp. microceph	nala		
	i intered inter	Ptilotus obovatus	laia		
	Sa	ntalum acuminatum			
	Serre	caevola spinescens			
	Senna a	enna cardiosperma			
	So	lanum nummularium			



		Project Name: Jaurd	i Hills		
Date:	7/07/2017 & 13/0	9/2017	Botanist:	Eren Reid	
Location:	Jaurdi Hills Mining	Project	Quadrat:	Q16	
Quadrat size:	20x20				
Vegetation group:	G				
WP:	23				-
Photo number:			90 On an damage		
Land surface/disturbance:			No offective di	ion (vale)/Drainage depression	<u>n</u>
Coarse fragments on the surf	ace (abundance/s	ize/shane)	No coarse frac	aments	
Rock outcrop (abundance/rur	noff):		No bedrock ex	posed/Verv slow	
Soil (profile/field texture/soil	surface):		Duplex/Sandy	clay loam/Firm	
% Cover leaf litter:	•		95		
% Cover bare ground:			30		
Tallest stratur	n	Mid-stratum	1	Lower strat	tum
Growth form:	1 Iree	Growth form:	S Shrub	Growth form:	S Shrub
	3-6m	Height:	1-3m	Height:	0.5-1m
Crown cover %:	IVI 30-70	Crown cover %:	5 10-30	Crown cover %:	IVI 30-70
Eucalyptus clelandii		Acacia merrallii		Acacia colletioides	
Eucalyptus cleanan	а	Senna artemisioides subsp.	filifolia	Eremophila decipiens subs	sp. decipiens
Eucalyptus salubris				Eremophila ionantha	
		ALL SPECIES		· · ·	
		Acacia colletioide	s		
		Acacia merrallii			
		Austrostipa elegantis	sima		
		Casuarina paupe	er a daainin		
		Eremophila decipiens subs	p. decipiens		
		Eremophila scopa	ria		
		Eleniophila scopa	dii		
		Eucalyptus oleosa subsp	o. oleosa		
		Eucalyptus salubr	is		
		Pimelea microcephala subsp.	microcephala		
		Senna artemisioides subsp. a	artemisioides		
		Senna artemisioides subs	sp. filifolia		



Project Name: Jaurdi Hills							
Date:	7/07/2017 & 13/09	9/2017	Botanist:	Eren Reid			
Location:	Jaurdi Hills Mining	Project	Quadrat:	Q17			
Quadrat size:	20x20						
Vegetation group:	G						
WP: Rhoto number:	24		04				
Landform:			94 Open depressio	n (vale)/Drainage depression			
Land surface/disturbance:			No effective dis	turbance			
Coarse fragments on the surfa	ace (abundance/siz	ze/shape):	No coarse frage	nents			
Rock outcrop (abundance/run	off):	• •	No bedrock exp	osed/Very slow			
Soil (profile/field texture/soil s	urface):		Duplex/Sandy of	lay loam/Firm			
% Cover leaf litter:			40				
% Cover bare ground:			40				
Tallest stratum	า	Mid-stratum		Lower stratu	m		
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub		
Height:	6-12m	Height:	1-3m	Height:	0.5-1m		
Crown cover %:	M 30-70	Crown cover %:	S 10-30	Crown cover %:	S 10-30		
Dominant taxa:		Dominant taxa:		Dominant taxa:			
Eucalyptus cleandii	2	Eremophila scoparia		Acacia colletioldes	filifolia		
Eucalyptus oleosa subsp. oleosa Eucalyptus salubris	a	Senna artemisioides subsp.	filifolia	Eremophila ionantha	Innona		
		ALL SPECIES		Lionopina ionanana			
		Acacia colletioides					
		Acacia hemiteles					
		Acacia merrallii Eromonbilo alternife	lia				
		Eremophila decipiens subsp	deciniens				
		Eremophila ionanth	a				
		Eremophila scopari	а				
		Eucalyptus cleland	ii				
		Eucalyptus oleosa subsp.	oleosa				
		Eucalyptus salubris	3				
		Ptilotus obovatus	5				
		Santalum acuminatu	Im				
		Senna artemisioides subsp. a	rtemisioides				



		Project Name: Ja	urdi Hills		
Date:	7/07/2017 & 14,	/09/2017	Botanist:	Eren Reid	
Location:	Jaurdi Hills Minir	ng Project	Quadrat:	Q18	
Quadrat size:	20x20				
Vegetation group:	F				
WP:	26				
Photo number:			98		
Landform:			Flat/Plain		
Land surface/disturbance:			No effective di	sturbance	
Coarse fragments on the surfa	ace (abundance/	/size/shape):	No coarse frag	gments	
Rock outcrop (abundance/run	off):		No bedrock ex	(posed/Slow	
Soil (profile/field texture/soil s	surface):		Duplex/Sandy	clay loam/Firm	
% Cover leaf litter:			40		
% Cover bare ground:			60		
Tallest stratum		Mid-stra	tum	Lower s	tratum
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub
Height:	6-12m	Height:	1-3m	Height:	0.5-1m
Crown cover %:	S 10-30	Crown cover %:	M 30-70	Crown cover %:	S 10-30
Dominant taxa:		Dominant taxa:		Dominant taxa:	
Eucalyptus clelandii		Eremophila interstans su	bsp. virgata	Acacia hemiteles	
		Santalum spicatum		Exocarpos aphyllus	
		Senna artemisioides sub	sp. filifolia	Senna artemisioides su	ubsp. filifolia
		ALL SPEC	IES		
		Acacia hemit	teles		
		Atriplex nummularia sul	bsp. spathulata		
		Atriplex vesion	caria		
		Eremophila glabra s	ubsp. glabra		
		Eremophila interstans	subsp. virgata		
		Eremophila oldfieldii sub	osp. angustifolia		
		Eremophila sc	oparia		
		Eucalyptus cle	elandii		
		Exocarpos ap	hyllus		
		Maireana tome	entosa		
		Maireana trich	optera		
		Olearia mue	lleri		
		Olearia pimele	eoides		
		Ptilotus obov	atus		
		Rhagodia drum	imondii		
		Santalum acum	inatum		
		Santalum spic	catum		
		Scaevola spine	escens		
		Scierolaeria de	risiliora		
		Senna alternisioides sub	sp. anemisioides		
		Serina arternisioldes	supsp. IIIIolia		
		Selina Cardios	bullum		
L		Solanum numm	ularium		
			uanum		
1					

Adjacent Eremophila decipiens subsp. decipiens





		Project Name: Jaurdi Hills	;			
Date:	7/07/2017 & 14/09/2017		Botanist:	Eren Reid		
Location:	Jaurdi Hills Mining Project		Quadrat:	Q19		
Quadrat size:	20x20					
Vegetation group:	F					
WP:	27					
Photo number:	·		101			
Landform:			Hillock/Mound			
Land surface/disturbanc	ce:		No effective di	sturbance		
Coarse fragments on the	e surface (abundance/size/shap	e):	Very; abundar	nt/Fine gravelly; small pebble	es/Subrounded	
Rock outcrop (abundand	ce/runoff):		No bedrock ex	posed/Slow		
Soil (profile/field texture	/soil surface):		Duplex/Sandy	clay loam/Firm		
% Cover leaf litter:			30			
% Cover bare ground:			70			
Talle	est stratum	Mid-stratur	n	Lower stratu	m	
Growth form:	M Tree Mallee (> 8m)	Growth form:	S Shrub	Growth form:	S Shrub	
Height:	6-12m	Height:	1-3m	Height:	0.5-1m	
Crown cover %:	S 10-30	Crown cover %:	<1	Crown cover %:	S 10-30	
Dominant taxa:		Dominant taxa:		Dominant taxa:		
Eucalyptus clelandii		Eremophila oldfieldii subs	p. angustifolia Acacia erinacea			
Eucalyptus griffithsii		•	Eremophila pustulata			
			Scaevola spinescens			
		ALL SPECIES		· · ·		
		Acacia colletioides				
		Acacia erinacea				
		Acacia hemiteles				
		Amyema preissii				
		Austrostipa elegantissima				
	Ere	emophila glabra subsp. glat	ora			
	Eren	ophila interstans subsp. vir	gata			
	Eremo	phila oldfieldii subsp. angus	stifolia			
		Eremophila pustulata				
		Eucalyptus clelandii				
		Eucalyptus griffithsii				
		Exocarpos aphyllus				
		Marsdenia australis				
		Olearia muelleri				
		Ptilotus obovatus				
		Scaevola spinescens				
	Sen	na artemisioides subsp. filif	olia			
		Senna cardiosperma				
		Westringia rigida				
					Adjacent	
				Atriplex nummularia sub	sp. spathulata	
				Δt	rinley vesicaria	

Santalum acuminatum antalum spicatum





		rioject Name. Jaur	urrinis		
Date:	11/07/2017 & 14	4/09/2017	Botanist:	Eren Reid	
Location:	Jaurdi Hills Minin	ig Project	Quadrat:	Q20	
Quadrat size:	20x20				
Vegetation group:	E				
WP:	30				
Photo number:	•		105-106		
Landform:			Flat/Plain		
Land surface/disturbance:			No effective distu	Irbance	
Coarse fragments on the surfa	ce (abundance/	size/shape):	No coarse fragme	ents	
Rock outcrop (abundance/run	off):	• •	No bedrock expo	sed/Verv slow	
Soil (profile/field texture/soil s	urface):		Duplex/Sandv cla	av loam/Firm	
% Cover leaf litter:			60	,	
% Cover bare ground:			50		
Tallest stratum		Mid-stratu	n	Lower stra	itum
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub
Height:	12-20m	Height:	1-3m	Height:	0 5-1m
Crown cover %:	S 10-30	Crown cover %:	M 30-70	Crown cover %:	S 10-30
Dominant taxa:	3 10-30	Dominant taxa:	101 30-70	Dominant taxa:	3 10-30
Eucolyntus colmonophlaia		Eromonhila ionantha		Atriplex etipitete	
Eucaryptus saimonophiola		Eremophila scoparia		Attriplex Supitata	
		Sonna artomisioidos subsp	filifolia		
				Oleana Indellen	
)		
			25		
			5 anathulata		
		Auplex numinularia subs	o. Spatriulata		
			a		
		Alliplex vesical	lä		
		Enchylaena tomentosa va	r. tomentosa		
		Eremophila decipiens sub	sp. decipiens		
		Eremophila glabra sub	sp. glabra		
		Eremophila Ionar	itha		
		Eremophila scop			
		Eriochiton scierolae	noides		
		Eucalyptus salmond	phiola		
		Exocarpos apnyl	ius		
		Maireana georg	el .		
		Maireana pentatr	opis		
		Maireana sedito			
		Olearia muelle	ri		
		Pimelea microcephala subsp	. microcepnala		
		Ptilotus obovatu	ls		
		Santalum acumina	atum		
		Santalum spicat	um		
		Scaevola spinesc	ens		
		Sclerolaena densi	tiora		
		Sclerolaena diaca	ntha		
		Senna artemisioides subsp.	artemisioides		
		Senna artemisioides sub	osp. tilifolia		
		Senna cardiospe	ma		
		Solanum nummula	irium		
A STATE OF THE OWNER	Jacob P				





		Project Name: Jaur			
Date:	11/07/2017 &	14/09/2017	Botanist:	Eren Reid	
Location:	Jaurdi Hills Mi	ning Project	Quadrat:	Q21	
Quadrat size:	20x20	- /			
Vegetation group:	F				
WP:	33				
Photo number:			114		
Landform:			Flat/Plain		
Land surface/disturbance:			No effective dist	turbance	
Coarse fragments on the surface	ce (abundance	e/size/shape):	No coarse fragn	nents	
Rock outcrop (abundance/runo	ff):	- F - 7	No bedrock exp	osed/Very slow	
Soil (profile/field texture/soil su	irface):		Duplex/Sandy c	lay loam/Firm	
% Cover leaf litter:			60	-	
% Cover bare ground:			50		
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~					
Tallest stratum		Mid-stratum		Lower stratur	n
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub
Height:	6-12m	Height:	1-3m	Height:	0.5-1m
Crown cover %:	V <10	Crown cover %:	S 10-30	Crown cover %:	S 10-30
Dominant taxa:		Dominant taxa:		Dominant taxa:	
Eucalyptus clelandii		Eremophila caperata		Acacia merrallii	
		Eremophila scoparia		Cratvstvlis conocephala	
				Eremophila scoparia	
		ALL SPECIES	6		
		Acacia colletioid	es		
		Acacia merrall	ii		
		Atriplex nummularia subst	o. spathulata		
		Austrostipa eleganti	ssima		
		Chenopodium gaudicha	audianum		
		Cratystylis conocer	ohala		
		Eremophila cape	rata		
		Eremophila scop	aria		
		Eriochiton sclerolae	noides		
		Eucalyptus clela	ndii		
		Exocarpos aphyl	lus		
		Frankenia interio	oris		
		Maireana georg	ei		
		Maireana sedifo	lia		
		Maireana toment	osa		
		Maireana trichop	era		
		Ptilotus aervoid	es		
		Rhagodia drummo	ondii		
		Sclerolaena densi	flora		
		Sclerolaena diaca	ntha		
		Sclerolaena patenti	cuspis		
		Senna artemisioides sub	osp. filifolia		
		Senna cardiospe	ma		
		Solanum nummula	rium		
				5-33	
				1. 12 1. 14	





	Proj	ject Name: Jaurdi Hills			
Date:	11/07/2017 & 14/09/2017		Botanist:	Eren Reid	
Location:	Jaurdi Hills Mining Project		Quadrat:	Q22	
Quadrat size:	20x20		•	•	
Vegetation group:	F				
WP:	34				
Photo number:			115		
Landform:			Flat/Plain		
Land surface/disturbance			No effective of	disturbance	
Coarse fragments on the	surface (abundance/size/shape):		No coarse fra	agments	
Rock outcrop (abundance	/runoff):		No bedrock e	exposed/Very slow	
Soil (profile/field texture/s	oil surface):		Duplex/Sand	v clav loam/Firm	
% Cover leaf litter:			80	,,	
% Cover bare ground:			50		
// cover sure ground			00		
Talle	st stratum	Mid-stratur	n	Lower strat	ım
Growth form:	M Tree Mallee (> 8m)	Growth form:	S Shrub	Growth form:	S Shrub
Hoight:	6-12m	Hoight:	1_2m	Hoight:	0.5-1m
	5 10 20		1-3111 6 10 20		0.3-111 6 10 20
Crown cover %:	3 10-30	Crown cover %:	5 10-30	Crown cover %:	5 10-30
Dominant taxa:		Dominant taxa:		Dominant taxa:	
Eucalyptus oleosa subsp. o	leosa	Eremophila interstans su	ubsp. virgata	Cratystylis conocephala	
		Eremophila scoparia		Eremophila decipiens sui	osp. decipiens
				Eremophila parvitolia suc	sp. auricampa
		ALL SPECIES			
		Atriplex stipitata			
		Atriplex vesicaria			
	Chenc	podium gaudichaudianum			
	Ci	ratystylis conocephala			
		cratystylis microphylla			
	Enchylae	na tomentosa var. tomento	osa		
	Eremophi	ila decipiens subsp. decipi	ens		
	Eremo	ophila glabra subsp. glabra	1		
	Eremopl	hila interstans subsp. virga	ita		
		Eremophila ionantha			
	Eremophi	la parvifolia subsp. auricar	npa		
	Eremor	phila praecox (P1)- 2 plant	S		
		Eremophila scoparia			
	Eric	ochiton sclerolaenoides			
	Eucaly	ptus oleosa subsp. oleosa	1		
		Exocarpos aphyllus			
		Frankenia interioris			
	n	Maireana pentatropis			
		Maireana tomentosa			
		Maireana trichoptera			
		Olearia muelleri			
	Pimelea mic	crocephala subsp. microce	phala		
		Ptilotus obovatus			
	F	Rhagodia drummondii			
	S	Sclerolaena densiflora			
	Senna	artemisioides subsp. filifoli	а		
	S	olanum nummularium			
					Adjacent

Austrostipa elegantissima Dodonaea viscosa subsp. angustissima





Project Name: Jaurdi Hills							
Date:	11/07/2017 & 14/09/2017		Botanist:	Eren Reid			
Location:	Jaurdi Hills Mining Project		Quadrat:	Q23			
Quadrat size:	20x20						
Vegetation group:	Н						
WP:	36						
Photo number:			119				
Landform:			Flat/Plain				
Land surface/disturbance	:		No effective of	disturbance			
Coarse fragments on the	surface (abundance/size/shape):		No coarse fragments				
Rock outcrop (abundance	e/runoff):		No bedrock exposed/Very slow				
Soil (profile/field texture/s	soil surface):		Duplex/Sandy clay loam/Firm				
% Cover leaf litter:			20				
% Cover bare ground:			60				
Talle	est stratum	Mid-stratur	n	Lower stra	atum		
Growth form:	Y Shrub Mallee (< 8m)	Growth form:	S Shrub	Growth form:	S Shrub		
Height:	3-6m	Height:	1-3m	Height:	0.5-1m		
Crown cover %:	S 10-30	Crown cover %:	V <10	Crown cover %:	S 10-30		
Dominant taxa:		Dominant taxa:		Dominant taxa:			
Eucalyptus oleosa subsp. o	leosa	Eremophila interstans su	ubsp. virgata	Cratystylis subspineso	cens		
Eucalyptus yilgarnensis				Eremophila scoparia			
				Maireana pyramidata			
		ALL SPECIES					
		Atriplex stipitata					
		Atriplex vesicaria					
	Chenop	podium gaudichaudianum					
	Cra	atystylis conocephala					
	Cra	tystylis subspinescens					
	Enchylaer	na tomentosa var. tomento	sa				
	Eremophil	a decipiens subsp. decipie	ns				
	Eremo	phila glabra subsp. glabra					
	Eremoph	ila interstans subsp. virgat	а				
	E	remophila scoparia					
	Erio	chiton sclerolaenoides					
	Eucaly	otus oleosa subsp. oleosa					
	Eu	icalyptus yligarnensis					
		Exocalpos aplivilus					
	N	laireana pyramidata					
	10	Maireana sedifolia					
	Waireana teorioidee						
Maireana Uicsiülues Maireana fimentosa							
Maireana Uniferinosa							
Pimelea microcephala subsp. microcephala							
Ptilotus aervoides							
		Ptilotus obovatus					
	Rhagodia drummondii						
	So	clerolaena densiflora					
	So	clerolaena diacantha					
	Scle	erolaena patenticuspis					
	Senna artemisioides subsp. filifolia						
Senna cardiosperma							





- Post		Project Name, Jauru								
Date:	11/0//201/&14/	/09/201/	Botanist:	Eren Reid						
Location:	Jaurdi Hills Mining Project		Quadrat:	Q24						
Quadrat size:	20x20									
Vegetation group:	F									
WP:	41									
Photo number:			122-123							
Landform:	Flat/Plain									
Land surface/disturbance:			No effective di	sturbance						
Coarse fragments on the surfa	ce (abundance/si	ze/shape):	No coarse fragments							
Rock outcrop (abundance/rund	off):		No bedrock ex	posed/Very slow						
Soil (profile/field texture/soil su	urface):		Duplex/Sandy	clav loam/Firm						
% Cover leaf litter:			50	<b>,</b>						
% Cover bare ground:	-		60		-					
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	-				-					
Tallest stratum		Mid-stratum		l ower stratur	n					
Growth form:	T. Troo	Growth form:	c Chrub	Growth form:	C Chrub					
Growth form.	1 1166	Growth form.	3 311100	Growth torm.	3 311100					
Height:	6-12m	Height:	1-3m	Height:	0.5-1m					
Crown cover %:	S 10-30	Crown cover %:	V <10	Crown cover %:	V <10					
Dominant taxa:		Dominant taxa:		Dominant taxa:						
Eucalyptus oleosa subsp. oleosa		Eremophila caperata		Daviesia aphylla						
Eucalyptus clelandii		Eremophila scoparia		Eremophila scoparia						
		Senna artemisioides subsp. f	ilifolia	Olearia muelleri						
		ALL SPECIES		-						
		Acacia colletioides								
		Atriplex vesicaria								
		Austrostina elegantiss	ima							
<b>-</b>			a							
			_							
		Eremophila caperat	a .							
		Eremophila parvifolia subsp.	auricampa							
		Eremophila scopari	а							
		Eucalyptus clelandi	I							
		Eucalyptus oleosa subsp.	oleosa							
		Exocarpos aphyllus	3							
		Maireana pentatropi	is							
-		Maireana tomentos	а							
		Olearia muelleri	4							
		Senna artemisioides subsr	filifolia							
		Genna alternisioides subsp	. mnona							
					Adiacont					
					Adjacent					
					Acacia merrailii					
				Euc	alyptus salubris					
				Santall	im acuminatum					
Stand Hall	CAR DA CAR	hill and	A State of the second							
			in the other water	A CAN A CA	The Area of the					
	VIM		A TIME							
		A ALL AND	AL AND	* Delta Al Court	hist in					
NOT THE ALL NOT			N POWER HE	State of the second	Carles 1					
MARCHINE AND MALE		HI GO WAY		the second s	1 - 1/2					
STREET, PLAN	FI A MONTH			A AND STORAGE A	CAN-1 CO					
	NT ABLIGHT			and the second states	Sec. 1					
			and the second	A LAND AND AN	1 19 2					
		A CARLON AND A CARLON	1600	STATE TOUS	1073					
	C Destroyed		ARA I							
	No 1- 1- 1				1 Come					
	A STREET IN CONTRACTOR OF A		the second se		Contra 1					
			Van							
	A Hell		AN							
CAN ALL UN			M							
NU ARE ATTA			M							
			M	K Z X						
			M							



December         Display         Double allowing in the project           Vegetation group:         1           Soll profilefield texture-loop armines:         1           Growth form:         1         1           Growth form:         1         1           Soll profilefield texture-loop armines:	Data:	11/07/2017 8	12/00/2017	Reteniet	Fran Daid	
Joadard 1982: 2000. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 2007. 10. 20	Location:	laurdi Hills Mining Project		Quadrat:	025	
Vegetian group: 43 Phole number: 43 Hole number: 43 Ho	Quadrat size:	Quadrat size: 20x20			Q23	
web- landform:         143.           Pholo number:         HitoCollound           Landform:         HitoCollound           Landform:         HitoCollound           Landform:         HitoCollound           Landform:         HitoCollound           Landform:         HitoCollound           Landform:         HitoCollound           Coarts fragmentic on the sufface (landforme/size/happ):         Deplex/Sandy Say Leam/Firm           Solic portIonHitoL structures (landforme/size/happ):         Deplex/Sandy Say Leam/Firm           % Cover har grandfit         5 Strub         Growth form:           Y Cover hor grandfit         Excerptor grandfit         9 Structure           Dominant taxa:         Dominant taxa:         Dominant taxa:           Excerptor grandfit         Excerptor grandfit         0 Acata merailit           Afger variable structures fittin         10 Prottenore         0 Prottenore	Vegetation group:	1				
Photo number:         127           Landform:         Hilloc/Mound           Landform:         Hilloc/Mound           Soft programmed in the surface (abundance/size/shape)         Uvery abundanCobby, or cabules/Rounded           Soft programmed in the surface (abundance/size/shape)         Uvery abundanCobby, or cabules/Rounded           Soft programmed in the surface (abundance/size/shape)         Uvery abundanCobby, or cabules/Rounded           Soft programmed in the surface (abundance/size/shape)         To be abundance/size/shape)         To be abundance/size/shape)           Soft programmed in the surface (abundance/size/shape)         To be abundance/size/shape)         To be abundance/size/shape)           Soft programmed in the surface (abundance/size/shape)         To be abundance/size/shape)         To be abundance/size/shape)         To be abundance/size/shape)           Mediatic         Soft programmed in the surface (abundance/size/shape)         To be abundance/size/shape)         To be abundance/size/shape)           Dominant taxis         Do programmed taxis         Auge (abundance/size/shape)         To be abundance/size/shape)           Location programmed in surface (abundance/size/shape)         To be abundance/size/shape)         To be abundance/size/shape)           Location programmed in surface (abundance/size/shape)         To be abundance/size/shape)         To be abundance/size/shape)           Location programmed in surface (a	WP:	43				
Land surface/disturbance: Land surface/distu	Photo number:	•		127		
Land extraciditurbance:         Linked claring           Gearse fragments on the surface (abundances):size(shape)         Sign/unclev/sllow           Rock exterior (abundances):size(shape)         Sign/unclev/sllow           No exterior (abundances):         Daw           No exterior (abundances):         Struct           Secon (abundances):         Struct     <	Landform:			Hillock/Mound		
Gazes fragments on the surface (abundance/size/shape):         Very, abundanc/che/y, or cobbles/Rounded           Bock outcrop (abundance/size/shape):         Dights/Can/y clay (cam)*m           So (provide fragments)         Sights/Can/y clay (cam)*m           So (cam)         Coron (cover %:           So (cam)         Cam)	Land surface/disturbance:			Limited clearing		
Reck outcog (abundance/undf).         Sightly rock/slow           30 (oroficine/day day lean/Firm         10           31 (oroficine/day day lean/Firm         10           32 (oroficine/day day lean/Firm         50           32 (oroficine/day day lean/Firm         510           32 (oroficine/day day lean/Firm         510           33 (oroficine/day day lean/Firm         5100           43 (oroficine/day day lean/Firm         5100           45 (oroficine/day day lean/Firm         5100           45 (oroficine/day day lean/Firm         5100           46 (oroficine/day day lean/Firm         61000           46 (oroficine/day day lean/Firm         61000           46 (oroficine/day day lean/Firm	Coarse fragments on the surface	e (abundance)	/size/shape):	Very; abundant/	Cobbly; or cobbles/Rounded	
Seal groutehand taxturesce): UpdoxSandy day learnine: 15 K Cover har ground: 17 K Cover bare ground: 1	Rock outcrop (abundance/runo	ff):		Slightly rocky/Slo	ow	
2 Cover have ground: 10 Telefest statum to the second status of the s	Soil (profile/field texture/soil su	rface):		Duplex/Sandy cl	ay loam/Firm	
A cover statum term in 10 cover statum i 10 cove	% Cover leaf litter:			15		
Talket stratum         Tree         Growth form:         5. Shub         Cover interm         5. Shub           Height:         0-12m         Height:         13m         Height:         0.2 m           Coven cover %:         0         100         Dominant taxa:         0.2 m           Dominant taxa:         0         00minant taxa:         0.2 m           Eucalyptus cleiandii         Excapos aphylus         Acada merailii         Anglez vesicaria           Eucalyptus cleiandii         Excapos aphylus         Acada merailii         Anglez vesicaria           Att SPECES         Acada lighta         Anglez vesicaria         Image: Special Spec	% cover bare ground.			70		
Growth form:       1. Toe       Growth form:       5. Strub       Growth form:       5. Strub         Growth cover %:       V. 400       Crown cover %:       5. 30-30       Crown cover %:       V. 410         Dominant taxa:	Tallest stratum		Mid-stratum		Lower stratum	1
Height:     6-12m     Height:     1-3n     Height:     0-3.1n       Corom cover %:     V     -10     Corom cover %:     V     -10       Dominant taxa:     Dominant taxa:     Dominant taxa:     V     -10       Eucalyptus cleandi     Height:     Acada meralli     Arapia veskana       Height:     Acada meralli     Arapia veskana       Acada meralli     Acada meralli     Arapia veskana       Acada meralli     Acada meralli     Arapia veskana       Acada meralli     Acada meralli     Acada meralli       Acada meralli     Acada meralli     Acada meralli       Arapia veskana     Acada merali     Acad	Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub
Crown cover ½:         V          10-30         Crown cover ½:         V          10-30           Deminant Lasz:         Dominant Lasz:	Height:	6-12m	Height:	1-3m	Height:	0 5-1m
Dominant taxe:         Dominant taxe:         Dominant taxe:           Eucalyptis defandii         Eccarpos aphylus         Acadam meralli           Malacua sheathana         Atriplex vesicaria           Brana attentisciose subsp. fiffola         Westringia rigida           ALL SPECIES         Acada meralli           Atriplex vesicaria         Acada meralli           Atriplex vesicaria         Acada meralli           Atriplex vesicaria         Acada meralli           Atriplex vesicaria         Acadam meralli           Beranplita deciprem subsp. decipiens         Eremophila decipiens autralis           Mareana trinkoptera         Merana trinkoptera           <	Crown cover %:	V <10	Crown cover %:	S 10-30	Crown cover %:	V <10
Eucalyptis delandii         Exocapos aphylus         Acada meralii           Bena atemisiodes subsp. fiffola         Westringia rigida           Acada ligutata         Acada ligutata           Acada ligutata         Acada ligutata           Atrijek vesicaria         Acada meralii           Cheropodium gaudchaudiarum         Cheropodium gaudchaudiarum           Cheropodium gaudchaudiarum         Cheropodium gaudchaudiarum           Cheropodium gaudchaudiarum         Cheropodium gaudchaudiarum           Cheropodium gaudchaudiarum         Eromophila decipons ataba, decipons           Elemophila decipons ataba, decipons         Elemophila decipons ataba, decipons           Marsana pentatogia         Marsana pentatogia           Marsana pentatogia         Marsana pentatogia           Caraa meraliodia dummondii         Sclerolaena dicantha           Solennu numular	Dominant taxa:		Dominant taxa:		Dominant taxa:	
Melakuca sheathiana     Atriplex veskaria       Senna attenisioidis subsp. filfola     Westringia rigida       ALL SPECIES     Acacia ligutata       Acacia meraliti     Acacia meraliti       Atripex vesicaria     Chencopolum gaudichaudiarum       Cetteytiki subspinescuesa     Cetorephila partificia subsp. decineta       Berconphila partificia subsp. auricaripa     Ecoraripa sphilus cleandi       Ecoraripa sphilus cleandi     Ecoraripa sphilus cleandi       Berconpila partificia subsp. auricaripa     Mercaria george       Mareara george     Mareara george       Mareara george     Mercaria george       Mareara george     Mercaria george       Berconpila gautosis autosis     Berconpila gautosis       Berconpila gautosis     Berconpila gautosis       Berconpila gautosis     Berconpila gautosis       Berconp	Eucalyptus clelandii		Exocarpos aphyllus		Acacia merrallii	
Senna artemisiodes subsp. fiffolia     Westringla rigida       Acada liguitata     Acada liguitata       Acada liguitata     Acada liguitata       Atripex numnularia subsp. spathulata     Atripex resicaria       Austrostipa elegantisima     Contextifia subsp. analutatianum       Cheingodium gaudichaudianum     Eremophila andrealistima       Eremophila decipiens atlibap. decipiens     Eremophila subsp. analutatianum       Eremophila decipiens atlibap. decipiens     Eremophila subsp. analutatianum       Mairsana pentariogia     Mairsana pentariogia       Mairsana pentariogia     Mersdenia australia       Mairsana pentariogia dummondii     Sclerolaera discantha       Sclerolaera discantha     Sclerolaera discantha       Sclerolaera dacantha     Sclerolaera discantha       Westringin rigida     Sclerolaera discantha	71		Melaleuca sheathiana		Atriplex vesicaria	
ALL SPECIS         Acacia liguita         Acacia liguita         Acacia merralli         Attrjek rumularia subsp. spathulata         Attrjek rumularia subsp. spathulata         Autrostina         Chenopodium gaudchaudianum         Cathylis subspinescens         Dodonaea viscosa subsp. angustissima         Eremophila deopines subsp. angustissima         Eremophila subspinescens         Dedonaea viscosa subsp. angustissima         Eremophila subspinescens         Beranghila subspinescens         Mareana georgi         Beranghila subspinescens         Beranghila subspinescens         Beranghila subspinescens         Beranghila subspinescens         Schorolarea densiliva         Schorolarea densiliva         Schorolarea densiliva     <			Senna artemisioides subsp. fil	ifolia	Westringia rigida	
Acada inversalia			ALL SPECIES			
Acada meralili Atriper vesicaria Atriper vesicaria Atriper vesicaria Atriper vesicaria Chenopodum gaudchaudianum Chatytifi subspinesens Dodonnea viscosa subsp. angustissima Erronphila subsp. angustissima Erronphila subsp. auricampa Ecalytis delafination Maireana georgei Selendaria de subsp. angustissima Ecalytis delafination Chatytifi autophanea viscosa subsp. angustissima Ecalytis delafination Chatytifi autophanea viscosa subsp. angustissima Chatytifi autophanea viscosa subsp. angustifi autophanea viscosa subsp. angustissima Chatytifi autophanea viscosa subsp. angustifi autophanea viscosa subsp. angustifi autophanea viscosa subsp. angustifi autophanea viscosa automini autophanea viscosa autopha			Acacia ligulata			
Atrijes numularia subsp. spathulata Atstrostija elegantissima Ceneropolum gaudchaudiarum Cratystijis subsp.nescens Dodozne avi tokosa subsp. nuricempa Eremophila decipens subsp. decipiens Eremophila georgia Mareana georgia Mareana Mareana			Acacia merrallii			
Australization eleganda automatica antica a substration antica an			Atriplex nummularia subsp.	spathulata		
Austosupe degativisaria Chenopolum gaudichaudianum Cratystylis subspinescens Dedonaeia viscosa subsp. auricampa Eremophila despinen subsp. descipiens Eremophila despinen subsp. descipiens Eremophila despinen subsp. descipiens Eremophila despinen subsp. descipiens Eucalytus cleandi Excarps aphylus Maireana gentratopis Maireana parturopis Maireana partur			Atriplex vesicaria	aima		
Ciercopodumi guardinationi Cravytylis subspinsesens Dedonaea viscosa subsp. angustissima Eremophila garvifolia subsp. decipiens Eremophila garvifolia subsp. auricampa Ecocarpos aphylus Maireana georgiel Maireana georgiel Scierolarena discartha Scierolarena discartha Scierolarena densifiora Scierolarena discartha Scierolarena discartha Scierolarena discartha Scierolarena discartha Scierolarena discartha Mestrigan riguta				sima		
Dodonaev viscosa subginistedia Eremophia despiens subs. despiens Eremophia despiens subs. despiens Eremophia despiens subs. despiens Eremophia parkola subs. despiens Eremophia parkola subs. despiens Eremophia subs. autcampa Eucalytius cleandi Excarps aphylus Maireana pentaropis Maireana pentaropis Maireanaa pentaropis Mairea						
Eremophile despiners aubsp. decipiens Eremophile parviolei subsp. decipiens Eremophile parviolei subsp. decipiens Eremophile parviolei subsp. decipiens Eremophile parviolei subsp. decipiens Eremophile georgie Baireana georgie Mareana georgie Mareana georgie Mareana attochoptera Mareana fuchoptera Mareana fuchoptera Mareana fuchoptera Mareana fuchoptera Celerale muelleri Rhagodia dummordii Sclerolaena densifora Sclerolaena densifora Sclerolaena dicantha Solarum nummularium Westringia rigida				nguetiesima		
Eremophile part/folis subsp. autcampa Eucal/ptus cletandii Excarpos aph/fus Maireana georgei Maireana georgei Maireana trichoptera Marsdenia australis Melaleuca sheathiana Olearia muelleri Rhagodia drummondii Scierolaena diacantha Scierolaena diacantha Solarum nummularium Westringa rigita			Eremophila decipiens subsp. a	decipiens		
Eucarpos aphylus Eucarpos aphylus Maireana georgei Maireana tricoptra Mareana tricoptra Mareana tricoptra Mareana tricoptra Mareana tricoptra Mareana tricoptra Mareana tricoptra Mareana tricoptra Ceraira nuelleri Rhagodia drummodii Sclerolaena densifora Sclerolaena densifora Sclerol			Eremophila parvifolia subsp	. auricampa		
Excarpos aphylus Maireana georgel Maireana trichoptera Marsdenia australis Melaleuca sheathiana Olearia muelleri Rhagodia drummondii Sclerolaena densifora Sclerolaena diacantha Sclerolaena diacantha Solarum nummularium Westringia rigida			Eucalyptus cleland	dii		
Maireana georgel Maireana trichoptera Marsenia australis Melateuca sheathiana Olearia muelleri Rhagotia drummondii Sclerolaena densiftora Sclerolaena dicantha Sclerolaena dicantha Sclerolaena dicantha Solarum mumularium Westringia rigida			Exocarpos aphyllu	JS		
Maireana throhoptera Mareana throhoptera Maredenia australis Melateuca sheathiana Oleania muelleti Rhagodia drummondii Scierolaena diacantha Scierolaena diacantha Solarum nummularium Westingia rigida			Maireana george			
Marieana tirkoptera Marieana australia Olearia nuelleri Cheoria australia Cheoria densifiora Sclerolaena densifiora Sclerolaena dacantha Seriar atemisiodes subsp. filfolia Solarum nummularium Westringia rigida			Maireana pentatro	pis		
Marsdenia australias Melaleuce sheathiana Olearia muelleri Rhagodia drummondii Sclerolaena densifiora Sclerolaena densifiora Senna artemisiodes subsp. filfolia Solanum nummularium Westringia rigida Westringia rigida			Maireana trichopte	era		
Meleica sheathiana Olerain muelleri Sclerolaena diacantha Sclerolaena diacantha Sclerolaena diacantha Sclaroni mummilarium Westringia rigida			Marsdenia austra	lis		
Deara muelen Bragodia drummondii Sclerolaena densifora Sclerolaena discantha Senna artemisloides subsp. filifolia Solarum nummularium Westingia rigida			Melaleuca sheathia	ana		
Bierolaena densifiora Scierolaena dacantha Sema artemisiodes subsp. filólia Solanum nummularium Westingia rigida			Olearia muelleri			
Scierolaena diacanida Scierolaena diacanida Sena artemisioides subsp. fiifolia Solanum nummularium Westringia rigida			Rhagodia drummoi			
			Scierolaena densiii	tha		
Solanum nummularium Westringia rigida				una an filifolia		
Westringia rigida			Solanum nummular	ium		



Project Name: Jaurdi Hills							
Date:	11/07/2017 & 13	/09/2017	Botanist: Eren Reid				
Location:	Jaurdi Hills Mining Project Quadrat: 026						
Quadrat size:							
Vegetation group:							
WP:	44						
Photo number:	Photo number 130						
Landform:			Hillock/Mound				
Land surface/disturbance:							
Coarse fragments on the surfa	ce (abundance/s	ize/shape):	Verv: abundant/	Coarse gravelly: large pebbles	Rounded		
Rock outcrop (abundance/rung	off):		Slightly rocky/SI	ow			
Soil (profile/field texture/soil s	urface):		Duplex/Sandv c	lav loam/Firm			
% Cover leaf litter:			40				
% Cover bare ground:			60				
			•				
Tallest stratum		Mid-stratum	l .	m			
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub		
Height:	6-12m	Height:	1-3m	Height:	0.5-1m		
Crown cover %:	S 10-30	Crown cover %:	V <10	Crown cover %:	S 10-30		
Dominant taxa:	5 10 50	Dominant taxa:	10	Dominant taxa:	5 10 50		
Eucalyptus clelandii		Acacia bemiteles		Acacia colletioides			
Euclaryptus oleiandii		Exocarpos aphyllus		Cratystylis conocenhala			
		Melaleuca sheathiana		Eremonhila sconaria			
				Elemophila scopana			
		ALL SPECIES	c				
			5				
			•				
		Acacia merrallii					
		Attriptex vesicaria	- !				
		Austrostipa elegantis	sima				
		Cratystylis conocepr					
		Dodonaea Viscosa subsp. ar	ngustissima				
		Eremophila parvifolia subsp.	auricampa				
		Eremophila scopar	na 				
		Eucalyptus cleland					
		Exocarpos aphyllu	IS				
		Maireana pentatrop	Dis				
		Maireana tomentos	sa				
		Melaleuca sheathia	ina				
		Olearia muelleri					
		Rhagodia drummor	ndii				
		Senna artemisioides subs	sp. filifolia				



Broject Name: Jaurdi Hills						
Data	Proj	ect Name: Jaurui Hills	<b>Botonist</b>	From Doid		
Date.	11/07/2017 & 13/09/2017		Botanist:	Eren keid		
Duadrat size:			Quaurat.	Q27		
Quadrat Size:	20820					
wp.	1					
Photo number:	40		13/			
Landform: Hillock/Mound						
Land surface/disturbance			Limited clearing			
Coarse fragments on the	surface (abundance/size/shape):		Verv: abunda	nt/Cobbly: or cobbles/Rou	nded	
Rock outcrop (abundance	/runoff):		Slightly rocky	/Slow		
Soil (profile/field texture/s	oil surface):		Duplex/Sandy	/ clay loam/Firm		
% Cover leaf litter:			50			
% Cover bare ground:			50			
Talle	st stratum	Mid-stratun	n	Lower stratu	im	
Growth form:	M Tree Mallee (> 8m)	Growth form:	S Shrub	Growth form:	S Shrub	
Height:	6-12m	Height:	1-3m	Height:	0.5-1m	
Crown cover %:	V <10	Crown cover %:	V <10	Crown cover %:	S 10-30	
Dominant taxa:		Dominant taxa:		Dominant taxa:	-	
Eucalyptus cleiandii		Acacia nemiteles		Acacia colletioides		
		weiaieuca srieatniana		Westringia rigida		
		ALL SPECIES				
		Acacia colletioides				
		Acacia hemiteles				
	Ad	cacia tetragonophylla				
		Atriplex vesicaria				
	Dianella	i revoluta subsp. divaricata				
	Dodonaea	viscosa subsp. angustissir	na			
	Eremophil	a decipiens subsp. decipie	ns			
	Eremo	phila glabra subsp. glabra				
	E	remophila ionantha				
	Eremophili	a parvitolia subsp. auricam	ра			
	E	Eremophila scoparia				
		Exocarpos aphyllus				
		Grevillea acuaria				
	N	laireana pentatropis				
	Ν	/aireana tomentosa				
	Μ	lelaleuca sheathiana				
		Olearia muelleri				
	R	hagodia drummondii				
		Scaevola collaris				
	Sonno c	caevola spinescens				
	Sellila a	olanum nummularium				
		Triodia rigidissima				
		Westringia rigida				
		······································				
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Project Name: Jaurdi Hills						
Date:	11/07/2017 & 13	/09/2017	Botanist:	Eren Reid		
Location:	Jaurdi Hills Mining Project Quadrat: Q28					
Quadrat size:	20x20					
Vegetation group: 1						
WP: 50						
Photo number:			142 Hillook/Mound			
Land surface/disturbance:			No effective dis	sturbance		
Coarse fragments on the surfa	ce (abundance/s	ize/shape)	No qualifier: co	ommon/Coarse gravelly: large	pebbles/Rounded	
Rock outcrop (abundance/run	off):		No bedrock ex	posed/Slow		
Soil (profile/field texture/soil s	urface):		Duplex/Sandy	clay loam/Firm		
% Cover leaf litter:			60	-		
% Cover bare ground:			50			
Tallest stratum	[	Mid-stratum		Lower strate	um	
Growth form:	I Iree	Growth form:	S Shrub	Growth form:	S Shrub	
Height:	6-12m	Height:	1-3m	Height:	0.5-1m	
Crown cover %:	S 10-30	Crown cover %:	S 10-30	Crown cover %:	S 10-30	
Dominant taxa:		Dominant taxa:		Dominant taxa:		
		Melaleuca sileatillaria		Eremonhila sconaria		
				Westringia rigida		
		ALL SPECIES				
		Acacia hemiteles	 ;			
		Acacia merrallii				
		Cratystylis conocept	nala			
		Cratystylis microphy	ylla			
		Enchylaena tomentosa var.	tomentosa			
		Eremophila glabra subsp	o. glabra			
		Eremophila parvifolia subsp	. auricampa			
		Eremophila scopal				
		Eucaryptus cieland				
		Maireana pentatror	nis			
		Melaleuca sheathia	ina			
		Olearia muelleri				
		Rhagodia drummor	ndii			
		Senna artemisioides subs	sp. filifolia			
		Westringia rigida				



Project Name: Jaurdi Hills						
Date [.]	11/07/2017 & 14/0	19/2017	Botanist:	Fren Beid		
Location:	laurdi Hills Mining Project Quadrat: 029					
Quadrat size:				~~~~		
Vegetation group:	F					
WP:	52					
Photo number:	02		148			
Landform:			Flat/Terrace pla	ain		
Land surface/disturbance:			No effective dis	turbance		
Coarse fragments on the surfa	ice (abundance/si	ze/shape):	No coarse frage	ments		
Rock outcrop (abundance/run	off):		No bedrock exp	oosed/Very slow		
Soil (profile/field texture/soil s	urface):		Duplex/Sandy of	lay loam/Firm		
% Cover leaf litter:			70			
% Cover bare ground:			40			
Tallest stratun	<u>1</u>	Mid-stratum		Lower stratu	stratum	
Growth form:	T Tree	Growth form:	S Shrub	Growth form:	S Shrub	
Height:	6-12m	Height:	1-3m	Height:	0.5-1m	
Crown cover %:	M 30-70	Crown cover %:	S 10-30	Crown cover %:	S 10-30	
Dominant taxa:		Dominant taxa:		Dominant taxa:		
Eucalyptus clelandii		Acacia hemiteles		Acacia merrallii		
Eucalyptus salubris		Eremophila caperata		Olearia muelleri		
		Eremophila scoparia		Westringia rigida		
		ALL SPECIES				
		Acacia colletioides				
		Acacia hemiteles				
		Acacia merrallii				
		Austrostipa elegantiss	ima			
		Eremophila caperat	a			
		Eremophila parvifolia subsp.	auricampa			
		Eremophila scopari	a			
		Eucalyptus clelandi	1			
		Eucalyptus salubris	6			
		Exocarpos aphyllus	8			
		Scaevola collaris	-			
		Scaevola spinescen	15 rtomininidon			
		Sonna artomisioidos subsp. al				
		Westringia rigida	5. IIIIOlia			
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