Aphrodite Gold Deposit

Level 2 Flora and Vegetation Assessment

APRODITE GOLD LTD

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Aphrodite Gold Deposit, Level 2 Flora and Vegetation Assessment

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DISCLAIMER

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DEFINITIONS

Term	Definition
aff.	Affinitive
AWC	Australian Weeds Committee
BAM	Biosecurity and Agriculture Management
CALM	Department of Conservation and Land Management (now DPaW)
DAF	Department of Agriculture and Food
DEC	Department of Environment and Conservation (now DPaW)
DoEE	Department of the Environment and Energy
DPaW	Department of Parks and Wildlife
EPA	Environmental Protection Authority
EPBC	Environment Protection and Biodiversity Conservation
ESCAVI	Executive Steering Committee for Australian Vegetation Information
GDA	Geocentric Datum of Australia
GDE	Groundwater Dependent Ecosystem
GIS	Geographic Information System
GPS	Global Positioning System
IBRA	Interim Biogeographic Regionalisation for Australia
INDVAL	A statistical method for analysing indicator species (indicator value)
JUICE	Software package for editing and analysing phytosociological (plant community) data
NVIS	National Vegetation Information System
OptimClass	A method of numerical classification to identify optimal partition from a series of partitions of the same set of sites
PC-ORD	Software package for multivariate statistical analysis of ecological communities
PEC	Priority Ecological Community
Pers. comm.	Personal communication
Pty Ltd	Proprietary Limited
sp.	Species
TEC	Threatened Ecological Community
UCL	Unallocated Crown Land
UPGMA	Unweighted Pair-Group Method using Arithmetic Averages – a hierarchical clustering method
VT	Vegetation Type
WA	Western Australia
WA Herb.	Western Australian Herbarium
WC	Wildlife Conservation
WoNS	Weed of National Significance
Woodman Environmental	Woodman Environmental Consulting Pty Ltd

EXECUTIVE SUMMARY

Aphrodite Gold Ltd (Aphrodite Gold) is conducting exploration at their Aphrodite Gold Deposit located in the Goldfields within the Murchison Biogeographic Region (MBR) of Western Australia. The Aphrodite Gold Deposit Study Area (the Study Area) is located approximately 55 km south south-east of Menzies, and 65km north of Kalgoorlie, east of the Goldfields Highway. The Study Area covers a total of 5,950 ha and is located on the Mt Vetters pastoral lease, south of Department of Parks and Wildlife (DPaW) managed lands (ex-Goongarrie Station).

This report presents the results of both the desktop and field survey components of a Level 2 survey of the Study Area. The aim of the survey was to provide relevant flora and vegetation information to inform applications for appropriate programs of work and/or clearing permits for exploration, and ultimately to provide the required background information to inform a mining proposal for the Development.

This survey recorded a total of 177 discrete native vascular flora taxa including one known hybrid (listed on *FloraBase* (DPaW 2017b)) within the Study Area. These taxa represent 36 families and 90 genera. The most well-represented families were Chenopodiaceae (28 taxa), Asteraceae (27 taxa) and Fabaceae (21 taxa).

The taxon total is marginally lower than an estimate made using the Chao-2 estimator for taxon richness for the Study Area (185), indicating that the Study Area was relatively well-sampled. Overall, the Study Area is considered to be of Moderate floristic diversity given the limited diversity of topography and soil types noted. It is considered that this survey was conducted in a relatively good flowering season; this being reflected in the relatively high number of annual taxa recorded (59 taxa).

No Threatened Flora taxa listed under the *Wildlife Conservation Act* (WC Act), or Threatened Species listed under the *Environment Protection and Biodiversity Conservation Act* (EPBC Act), was recorded within the Study Area. A total of three taxa recorded in the Study Area are considered to be significant flora taxa. This includes one DPaW-classified Priority flora taxon (*Gunniopsis propinqua*) and two taxa with significantly limited known distributions in WA (*Ixiochlamys nana* and *Rhodanthe uniflora*). Given the level of sampling in the Study Area, and the limited diversity of habitats and soils present, it is considered unlikely that further significant flora taxa occur in the Study Area.

A total of seven introduced flora taxa were recorded within the Study Area during this study. None of these (including those recorded by the 2008 Botanica survey) are Declared Pests or Weeds of National Significance WoNS (DAF 2016, AWC 2016). Six of these weed species are known to be particularly invasive (CALM 1999) and have relatively widespread distributions in the MBRDPaW 2017b.

Classification analysis of quadrat data from the Study Area arranged quadrats into eight plausible clusters; which were used to further define seven Vegetation Types (VTs) (following the grouping of two clusters) in the Study Area. The Study Area does not generally contain large variations in geographical features, consisting largely of undulating

plains with low hills and lower lying flats with drainage areas. As such, there are groups of species common throughout the Study Area, particularly Species Group I, as indicated in the Two-Way Table (Appendix N). There are minor drainage features present in the majority of VTs defined, however they tended to be grouped with the VT in which they were located in, indicating that while the density of the vegetation in these areas was higher, the species composition was essentially the same or very similar to the adjacent vegetation. Overall understorey species and salt tolerant species were important factors in the VT groupings.

The classification analysis undertaken for this assessment is considered to have produced a relatively robust classification with ecologically plausible clusters of quadrats and based on the analysis together with field observations, the VTs described in the Study Area are considered to be a relatively accurate reflection of the floristic, geological and topographical variability of the Study Area.

None of the VTs mapped in the Study Area are considered to represent any listed Threatened Ecological Community (TECs) or Priority Ecological Community (PECs) (DPaW 2016a, DPaW 2016d, DoEE 2017) and none of the VTs occur on uncommon substrates associated with TECs or PECs (such as banded ironstone formations or groundwater calcretes).

VT 4 (LWEcAh) was the only VT identified as being locally significant due to its limited mapped extent in the Study Area. However, this VT is located on the western edge of the Study Area and assessment of aerial photography indicates that it probably extends outside the Study Area.

It is unlikely that any VTs mapped in the Study Area are groundwater dependent however characterisation of the existing groundwater conditions is required to inform an assessment for the presence of GDEs and this should be conducted during any subsequent impact assessment process.

The results of this study will be useful in providing background information and data in potential future mine site rehabilitation. Native taxa which form an important part of the structure of each VT, including dominant taxa in each stratum, should be considered for inclusion in the relevant seeds mixes for the rehabilitation of appropriate post mining units or domains.

Rehabilitation success also requires the management of introduced species. It is important that works associated with the proposed development employ appropriate hygiene procedures, including post-impact inspections, to prevent, or in the worse-case scenario monitor, the potential introduction of new weed taxa, including Declared Pests and WoNS from other areas. In addition, as there are a number of invasive weeds known to occur in the Study Area, appropriate machine hygiene and topsoil stockpile management will be necessary to minimise the spread of these weeds into rehabilitation areas and portions of the development area with lower weed loads.

1 INTRODUCTION

1.1 Project and Assessment Description

Aphrodite Gold Ltd (Aphrodite Gold) is conducting a prefeasibility study at their Aphrodite Gold Deposit located in the Goldfields within the Murchison Biogeographic Region (MBR) of Western Australia, between Kalgoorlie and Menzies. Aphrodite Gold acquired the advanced Aphrodite Gold Deposit (the Development) from Apex Minerals NL in November 2009.

Aphrodite Gold intend to develop an open cut mine to extract ore from the oxide and transitional material to a depth of about 100 m with the potential to expand to underground mining. Supporting infrastructure will also include the construction of a 1M tonne per annum CIP/CIL (carbon-in-pulp/carbon-in-leach) conventional processing plant with an additional Pressure Oxidaton (POX) installed during later phases, waste storage facility, tailings dam and ROM pads.

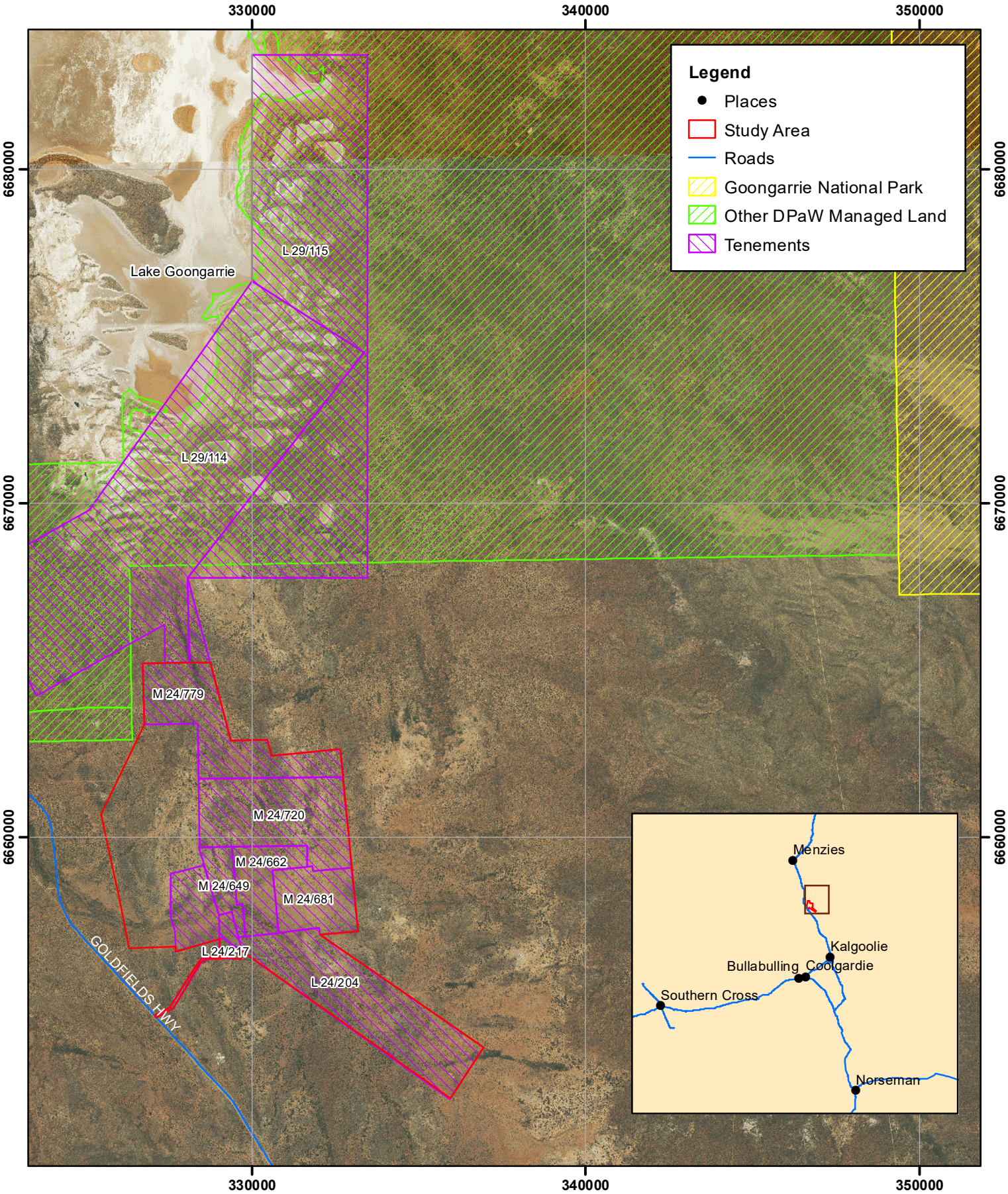
Integrate Sustainability Pty Ltd (Integrate Sustainability) is managing the flora and vegetation surveys required for the Development on behalf of Aphrodite Gold. Woodman Environmental Consulting Pty Ltd (Woodman Environmental) was commissioned to undertake a Level 2 flora and vegetation survey to support both exploration and future mining of the Aphrodite Gold Deposit. This report presents the results of both the desktop and field survey components of the Level 2 survey.

1.2 Study Area Definition

The Aphrodite Gold Deposit Study Area (the Study Area) is located approximately 55 km south south-east of Menzies, and 65km north of Kalgoorlie, east of the Goldfields Highway (Figure 1). The Study Area covers a total of 5,950 ha and is located on the Mt Vetters pastoral lease, south of Department of Parks and Wildlife (DPaW) managed lands (ex-Goongarrie Station). The Aphrodite deposit consists of 5 granted Mining Leases, 3 granted Miscellaneous Licences for water exploration and an a Miscellaneous Licence application for the establishment of the site access road (Table 1).

Table 1: Proposed Survey Area Tenements, Licenses and Extent

Tenement	Purpose
M24/649	Mining Lease
M24/662	Mining Lease
M24/681	Mining Lease
M24/720	Mining Lease
M24/779	Mining Lease
L24/204	Miscellaneous Licence – Water Exploration
L24/217 (pending)	Miscellaneous Licence – Haul Road
L29/114	Miscellaneous Licence – Water Exploration
L29/115	Miscellaneous Licence – Water Exploration



Aphrodite Study Area Location	Author: Alison Saligari	N
	WEC Ref: IntSust16-32-01	
WOODMAN ENVIRONMENTAL	Filename: IntSust16-32-01-f01.mxd	**Figure**
	Scale: 1:150,000 (A4)	1
	Projection: GDA 1994 MGA Zone 51	
This map should only be used in conjunction with WEC report IntSust16-32-01.	Revision: 0 - 16 February 2017	

1.3 Level of Assessment

The flora and vegetation assessment of the Study Area was undertaken at a Level 2 standard as defined by the Environmental Protection Authority (EPA) and Department of Parks and Wildlife (DPaW) Technical Guide (2015). The level of survey was also determined using Table 2 of Guidance Statement No. 51 (EPA 2004). In the absence of a quantified final impact for future mining, the following parameters were utilised; Study Area located within Group 2 for the Bioregion Group, and the scale and nature of impact considered to be Moderate or High.

A Level 2 survey is defined as a background research/desktop study and reconnaissance survey (as required), followed by a detailed field survey within the proposal area (Study Area). A detailed field survey was considered appropriate, as there has been a previous flora and vegetation survey undertaken within the Study Area (Botanica Consulting 2008), as well as a number of surveys in the vicinity of the Study Area (e.g. (Ecotec 2002 and Van Etten 2005), which provide regional context when considering the flora and vegetation values of the Study Area.

This report presents the results of both the desktop and field survey components of the Level 2 survey of the Study Area. The results of the background research/desktop study, which include a review of known information relevant to the Study Area through all sources of literature available, are presented in Section 2. The results of the detailed field survey of the Study Area are presented in Section 5. A reconnaissance survey (part of a Level 1 survey) was not considered necessary due to the level of background information available, and the season in which the detailed survey was undertaken (Spring).

1.4 Aims and Objectives

The aim of the survey is to provide relevant flora and vegetation information to inform applications for appropriate programs of work and/or clearing permits for exploration, and ultimately to provide the required background information to inform a mining proposal for the Development. The overall objectives of the assessment were to:

- Compile a list of flora taxa (native and introduced) that occur within the Study Area;
- Identify and record the locations of flora taxa that occur within the Study Area that are one of the following (hereafter referred to as significant flora taxa):
    - Listed Threatened Species under the *Environment Protection and Biodiversity Conservation Act* 1999 (Commonwealth) (EPBC Act);
    - Threatened Flora under the *Wildlife Conservation Act* 1950 (WA) (WC Act); and
    - Priority Flora taxa as classified by the Western Australian Department of Parks and Wildlife (DPaW);
    - Other significant flora taxa as defined by the EPA (2004; 2016).
- Identify and map the location of all Vegetation Types (VTs) that occur within the Study Area;
- Assess the condition of the remnant vegetation within the Study Area;

- Identify and map the location of VTs that occur within the Study Area that are listed as one of the following (herein referred to as significant vegetation):
    - Threatened Ecological Community (TEC) under the EPBC Act;
    - TEC as classified by DPaW and endorsed by the WA Minister for the Environment; and
    - 'Priority Ecological Community' (PEC) as classified by DPaW.

The survey and reporting works were conducted to comply with the following documents:

- *Environmental Protection (Clearing of Native Vegetation) Regulations* 2004;
- *Guidance Statement Number 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA 2004)*;
- *Technical Guide - Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA and DPaW 2015).

*Guidance Statement 51 formed part of the requirements of survey at the time the survey was undertaken. This statement has since been rescinded by the EPA, and replaced by Environmental Factor Guideline – Flora and Vegetation (EPA 2016).

2 BACKGROUND AND LITERATURE REVIEW

2.1 Climate

The Study Area is located within the MBR of the Eremaean Province of Western Australia. The climate of the MBR is arid, with summer and winter rainfall (Beard 1990). Figure 2 displays average monthly maximum and minimum temperatures, and average monthly rainfall recorded for Menzies, one of the nearest meteorological stations to the Study Area (Bureau of Meteorology 2016).

The average annual rainfall for this station is 250.5 mm (data from 1898 - 2016). Average monthly rainfall fluctuates throughout the year, peaking in Summer from February to March (as a result of cyclones in the north), as well as in winter from May to July (as a result of winter fronts coming from the south-west). Rainfall received at Menzies throughout 2016 (January to August 2016) was above the average rainfall for this period, with 249.7 mm received compared to the average of 198.4 mm for the same months. Rainfall received prior to the survey being conducted (June to August 2016) was relatively average for this period, with 71.6 mm received compared to the average of 70.1 mm for the same months (Bureau of Meteorology 2016).

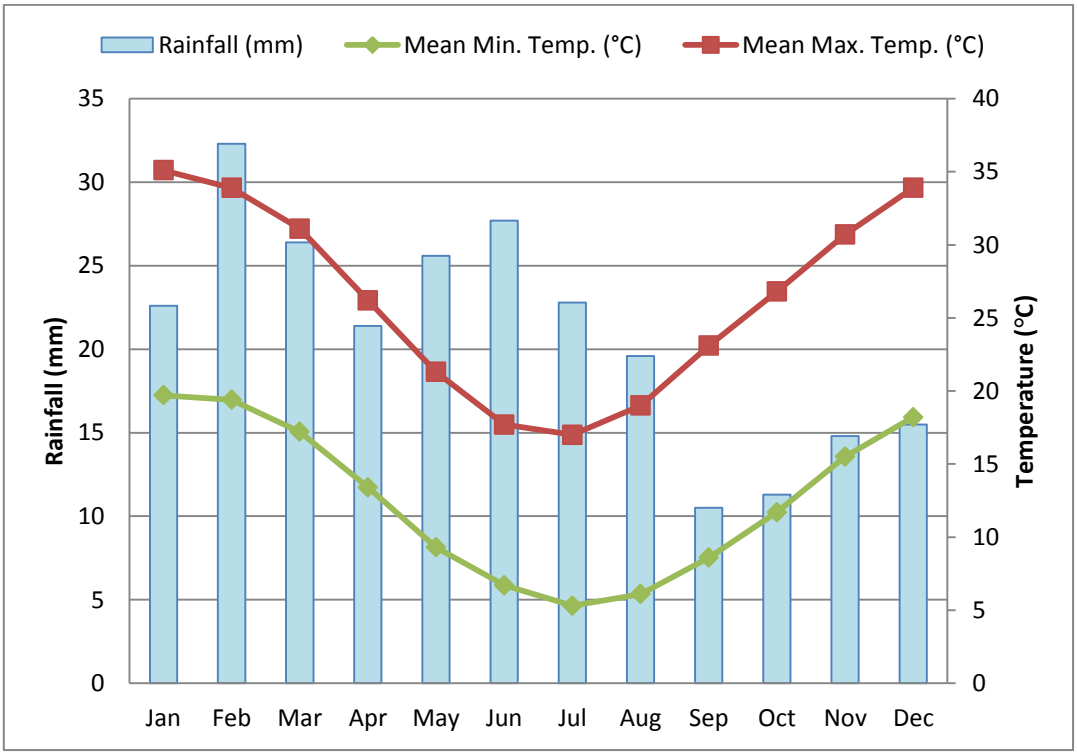


Figure 2: Mean Maximum and Minimum Temperatures and Mean Rainfall for Menzies (Bureau of Meteorology 2016)

2.2 Geology, Soils and Landforms

The Study Area is located in the Austin Botanical District, which is formed of Archaean granite with infolded volcanics and meta-sediments (greenstones) forming the Yilgarn Block. The region is undulating, consisting of occasional ranges of low hills and extensive

sandplains in the east, with principal soils of shallow earthy loam overlying red-brown hardpan; shallow stony loams on hills and red earthy sands on sand plains (Beard 1990).

The geology in the vicinity of the Study Area is largely mapped as colluvium of gravel sand and silt as sheetwash or talus. There are numerous scattered smaller areas of differing geology mapped throughout the area including laterite and reworked products, basalt, komatiite with relict olivine spinifex texture, felsic volcanic and volcaniclastic rocks and medium to coarse grained mafic rocks. In addition, there are areas of alluvium in the north and running through the centre of the Study Area consisting of clay, silt, sand and gravel occurring in channels (Hunter *et al* 1993).

2.3 Flora and Vegetation

2.3.1 Regional Vegetation

The Study Area is located within the Murchison IBRA (Interim Biogeographic Regionalisation for Australia) Region (Commonwealth of Australia 2012), specifically within the Eastern Murchison (MUR01) IBRA Subregion. The Eastern Murchison IBRA subregion is characterised by internal drainage, and extensive areas of elevated red desert sandplains with minimal dune development, and includes areas of salt lake systems associated with the occluded Paleodrainage system, broad plains of red-brown soils and breakaway complexes as well as red sandplains (Cowan 2001). The vegetation of the subregion is dominated by Mulga Woodlands which are generally rich in ephemeral species; hummock grasslands as well as saltbush and *Tecticornia* shrublands. The land is primarily used for native pasture grazing, followed by UCL and Crown Reserves and mining (Cowan 2001).

Beard (1990) described the vegetation of the Austin Botnical Distrcit (equivalent to the MBR) predominantly as mulga low woodland (*Acacia aneura*) on plains, reduced to scrub on hills with tree steppe of *Eucalyptus* spp. and *Triodia basedowii* on sandplains. The upper storey vegetation is described as predominantly *Acacia aneura* with other localised *Acacia* species and *Eucalyptus* species. Common understorey shrub taxa include *Cassia* species (now *Senna*) and *Eremophila* species over perennial/annual grasses such as *Aristida contorta*, *Monachather paradoxus, Eriachne* species and *Eragrostis* species, with a range of ephemeral herbs (Beard 1990).

Keighery *et al.* (1992) mapped the vegetation in the Kurnalpi-Kalgoorlie area, which includes the current Study Area. The vegetation of the Study Area was broadly mapped as Undulating Plains and Broad Valleys as outlined below:

- Undulating Plains: Generally consisting of woodland, with an understorey of tall shrubs on shallow soils and an understorey of low shrubs where soils were strongly calcareous. The herbaceous ground cover was fairly well-developed in season with a mixed composition reflecting minor variation in the soil. Basically the vegetation grades from woodland of *Eucalyptus* in the south to open low woodland of *Casuarina cristata* over low shrubs of *Maireana* in the north. Shallow soils on rocky ridges bore relatively dense stands of tall shrubs of *Acacia* spp. such as *Acacia acuminata*.

- Broad Valleys: Woodland of *Eucalyptus salmonophloia* with shrubs of *Alyxia buxifolia*, *Scaevola spinescens* and *Cassia nemophila* in the north-east, to woodland of *Eucalyptus salmonophloia*. *E. salubris* and, in places, *E. lesouefii*, to open woodland of *Eucalyptus salmonophloia* over *Maireana sedifolia* in the south-west.

Beard (1972) mapped vegetation of the Kalgoorlie area (including the Study Area) related to physiognomy, at a scale of 1:250,000. The vegetation mapping by Beard (1972) was used by Shepherd *et al.* (2002) to describe vegetation system associations. Vegetation system associations were also described at a scale of 1:250,000. Five vegetation system associations occur in the Study Area, as summarised in Table 2. Table 2 also presents the current extent of each vegetation system association in relation to its pre-European extent (Government of Western Australia 2015), and the percentage of the current extent of each vegetation system association currently protected for conservation (in DPaW-managed land). The vegetation systems within the Study Area have undergone minimal clearing with the majority having over 96 % of their pre-European extent remaining. Barlee_125 (salt lakes) has slightly less than this, however, there is still over 88 % remaining. However, the majority of vegetation system associations have less than 7 % of their current extent reserved, with the exception being Barlee_521 which has over 50 % reserved.

Table 2: Extent of Vegetation System Associations within the Study Area (Government of Western Australia 2015)

Vegetation System Association	Description	Current Extent (ha)	Percentage of Pre-European Extent Remaining	Percentage of Current Extent Protected for Conservation
Barlee_10	Medium woodland; red mallee group	64,757.47	99.03	4.71
Barlee_125	Bare areas; salt lakes	482,835.87	88.78	6.85
Barlee_521	Medium woodland; salmon gum & red mallee	11,711.97	100	53.64
Barlee_529	Succulent steppe with open low woodland; mulga & sheoak over bluebush	62,102.10	99.84	4.47
Barlee_2903	Medium woodland; Salmon gum, goldfield balckbutt, gimlet & Allocasuarina cristata	27,330.91	96.54	0.00

In 1994, the Department of Agriculture and Food described land systems within the north-eastern Goldfields, considering general ecological information, vegetation physiognomy and composition, patterns of variation, conservation status, gradational association and land system representation (Pringle *et al.* 1994). Six land systems occur within the Study Area (Table 3). None of these were considered to be representative of any DPaW-classified TECs (DPaW 2016d) or PECs (DPaW 2016a).

Table 3: Land Systems Located within the Study Area

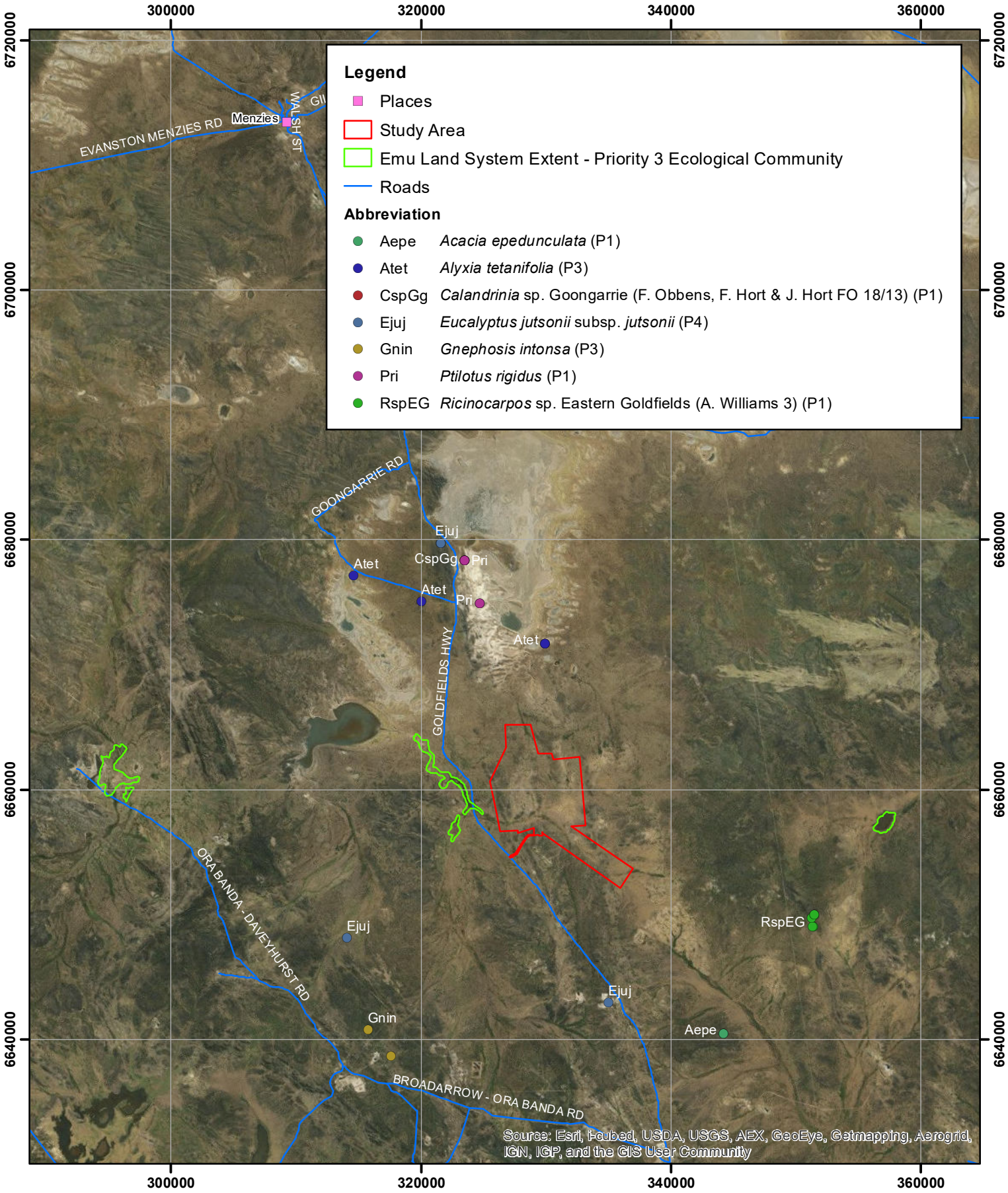
Land System	Mapped Extent (ha)	Description of Land System
Bunyip	27,300	Gilgaied drainage tracts supporting mixed halophytic shrublands occasionally with a black oak overstorey, draining greenstone hills.
Campsite	102,00	Alluvial plains, supporting eucalypt woodlands with halophytic understoreys and acacia shrublands
Doney	209,00	Alluvial plains, supporting eucalypt woodlands with halophytic understoreys and acacia shrublands
Gundockerta	210,500	Extensive, gently undulating calcareous stony plains supporting bluebush shrublands.
Leonora	107,400	Low greenstone hills and stony plains supporting mixed stony chenopod shrublands.
Moriarty	43,000	Low greenstone rises and stony plains supporting chenopod shrublands with patchy eucalypt overstoreys.

A search of the Commonwealth Department of the Environment and Energy (DoEE) database with regard to environmental matters of national significance listed under the EPBC Act was performed for the Study Area (DoEE 2016). The results of this search indicate that no TECs listed under the EPBC Act coincide with the Study Area. The results of this search are presented in Appendix A.

A search of DPaW's TEC and PEC database was undertaken for an area encompassing the Study Area with a buffer of 50 km, to identify the presence of any DPaW-classified TECs and/or DPaW-classified PECs that coincide with the search area (DPaW 2016b). No DPaW-classified TECs coincide with the search area. However, the Emu Land System, which is a Priority 3 PEC, was returned from the search (DPaW 2016b). This land system is described as a paperbark shrubland and wetland system (V. English 2016, pers. comm., 29 September 2016). There are no known locations of this PEC within the Study Area, however there are locations of the PEC approximately 5 km to the east of the Study Area (Figure 3). Appendix B presents definitions, categories and criteria for TECs and PECs (Department of Environment and Conservation (DEC) 2013).

2.3.2 Regional Flora

A search of DPaW's threatened flora databases was undertaken for an area encompassing the Study Area with a buffer of 20 km, including the Western Australian Herbarium (WA Herb.) specimen database, Threatened and Priority Flora database, and Threatened and Priority Flora List (DPaW 2016c). A total of 22 conservation significant flora taxa were returned from the database search including one taxon listed as Threatened under the WC Act, and the remainder (21) comprising DPaW-classified Priority flora taxa (full list presented in Section 2.4, Table 4). There are no known locations of conservation significant flora within the Study Area. However, there are records of *Acacia epedunculata* (P1), *Alyxia tetanifolia* (P3), *Calandrinia* sp. Goongarrie (F. Obbens, F. Hort & J. Hort FO 18/13) (P1), *Eucalyptus jutsonii* subsp. *jutsonii* (P4), *Gnephosis intonsa* (P3), *Ptilotus rigidus* (P1) and *Ricinocarpos* sp. Eastern Goldfields (A. Williams 3) (P1) within the vicinity (approximately 20 km) of the Study Area (Figure 3). Appendix C presents conservation codes for Western Australia flora (DPaW 2015).



Aphrodite Priority Ecological Community and Conservation Significant Flora Locations	Author: Alison Saligari	
	WEC Ref: IntSust16-32-01	
WOODMAN ENVIRONMENTAL	Filename: IntSust16-32-01-f03.mxd	**Figure**
	Scale: 1:400,000 (A4)	3
	Projection: GDA 1994 MGA Zone 51	
This map should only be used in conjunction with WEC report IntSust16-32-01.	Revision: 0 - 19 September 2016	

The search of the DoEE database with regard to environmental matters of national significance listed under the EPBC Act (Appendix A) returned one Threatened taxon: *Gastrolobium graniticum*. However, the nearest known record of this species is over 80 km to the south of the Study Area (DPaW 2017a), and the species is associated with the margins of rock outcrops and associated drainage features, and is therefore unlikely to occur within the Study Area.

The DoEE database search also identified two significant invasive flora taxa, or habitat for the taxa, likely to occur within the Study Area and surrounds, including *Carrichtera annua* and *Cenchrus ciliaris* (DoEE 2016). These taxa are not listed as Declared Pests in Western Australia under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) (Department of Agriculture and Food (DAF) 2016) or Weeds of National Significance (WoNS) (Australian Weeds Committee (AWC) 2016). However, they are considered by the States and Territories to pose a particularly significant threat to biodiversity (DoEE 2016).

A search for records of introduced flora taxa records within the Study Area and surrounds was performed using the online tool NatureMap (DPaW 2017a). A total of 18 introduced taxa were returned from the search (full list presented in Section 2.4, Table 5). Of these, 1 taxon is listed as both a Declared Pest and a WoNS (*Opuntia elata*). Table 5 also presents the ratings for each introduced taxon under the then-Department of Conservation and Land Management's (CALM) (now DPaW) Environmental Weed Strategy for Western Australia (CALM 1999). This strategy assessed and rated environmental weeds in terms of their environmental impact on biodiversity according to invasiveness, distribution and environmental impact, and assigned a score of 'High', 'Moderate', 'Mild' or 'Low'. One of the introduced taxa returned from the DoEE and DPaW searches was ranked as 'High' for environmental impact (*Cenchrus ciliaris*) (Table 5). Appendix D provides descriptions of each rating from CALM (1999).

2.3.3 Local Flora and Vegetation Surveys

Botanica Consulting (Botanica) undertook a flora and vegetation survey of a proposed Hall Road and Aphrodite site area in May 2008 (Botanica 2008). The area assessed by Botanica partially overlaps the current Study Area. The 2008 survey included the assessment of 27 sample locations which included a visual assessment of plants within a 50 m radius and recording dominant species. A total of 4 vegetation groups were mapped within the 2008 survey area as described below:

- Transitional Eucalyptus Woodland: Dominant species recorded include *Eucalyptus salmonophloia, Eucalyptus salubris, Casuarina pauper*, *Acacia acuminata*, *Acacia aneura*, *Dodonaea lobulata*, *Grevillea acuaria* and *Eremophila glabra*.
- Eucalyptus Transitional Creekline Vegetation: Dominant species recorded include *Eucalyptus salmonophloia*, *Eucalyptus celastroides*, *Casuarina pauper*, *Acacia acuminata*, *Acacia aneura*, *Dodonaea lobulata*, *Grevillea acuaria* and *Eremophila glabra*.
- Acacia Woodland: Dominant species recorded include *Acacia acuminata*, *Eremophila oppositifolia* subsp. *angustifolia*, *Dodonaea lobulata* and *Eremophila clarkei*.

- Casuarina Woodland: Dominant species recorded include *Acacia acuminata*, *Eremophila oppositifolia* subsp. *angustifolia*, *Dodonaea lobulata* and *Eremophila clarkei*.

There were no vegetation groups identified to be regionally significant as defined by the EPBC Act 1999. The condition of the vegetation was classed as 'Good' based on the Keighery (1994) vegetation condition scale (Botanica 2008).

A total of 61 vascular plant taxa, representing 23 plant families and 32 genera were recorded during the survey by Botanica (2008). No Threatened Flora taxa or Priority flora taxa were recorded during the survey. A total of 5 introduced taxa were recorded including *Carthamus lanatus*, *Citrullus lanatus*, *Cucumis myriocarpus*, *Lysimachia arvensis* and *Solanum nigrum* (Botanica 2008).

There is limited publicly available information in regards to previous flora and vegetation surveys undertaken within or in close proximity to the Study Area. The survey undertaken by Botanica (2008) is most relevant to the Study Area. The following studies are located further away (approximately 40 km to the south), however are still considered relevant to The Development.

In 2005, Van Etten described plant communities and flora for the Mt Pleasant active mining area (Van Etten 2005), which is located approximately 40 km to the south of the Study Area. A total of 33 relevès were undertaken as part of the study of Mt Pleasant. The study identified 5 vegetation communities as listed below:

1. Salmon Gum woodland with chenopod understorey of lowerslopes;
2. Saltmarsh and saline flat shrubland;
3. Chenopod – *Cratystylis* shrubland of drainage lines;
4. Mixed *Acacia* - *Dodonaea* -*Eremophila* shrubland on hill tops and upper slopes;
5. Blackbutt woodland with broombush understorey.

Comparison with regional-scale studies and studies in adjoining districts indicated that the plant communities found at Mt Pleasant were widespread and common throughout the area (Van Etten 2005) and therefore not regionally significant.

A total of 94 vascular plant taxa were recorded within the 33 relevès undertaken at Mt Pleasant. No Threatened Flora taxa or Priority flora taxa were recorded during the survey. Almost no introduced taxa were recorded during the survey, although this was potentially attributed to a lack of rain prior to the survey. Dried remnants of several introduced annual species, including *Medicago* spp. and thistles were noted (Van Etten 2005).

Ecotec (WA) Pty Ltd (Ecotec) undertook a flora assessment of the Aurion Gold Natal Project, located approximately 40 km south of the Study Area. The survey was undertaken in July 2002, and involved the assessment of 15 transects measuring approximately 50 m by 4 m. The assessment identified a total of 6 vegetation types including salt lake margin, rocky break-aways, Casuarina woodland, Eucalypt Woodland, Eucalypt Open Woodland and drainage channels and gullies vegetation (Ecotec 2002).

A total of 68 species of vascular plants from 18 families were recorded during the survey of the Aurion Gold Natal Project. The most abundant vascular plant families recorded were Chenopodiaceae (17 species), Myoporaceae (8 species), Myrtaceae (7 species) and Asteraceae (7 species). No Threatened Flora taxa or Priority flora taxa were recorded during the survey. One introduced species was recorded during the survey; *Dittrichia graveolens* (Ecotec 2002).

2.4 Summary of Environmental Factors

The desktop review of flora, vegetation and fauna within the Study Area identified the following key issues:

- One DPaW-classified PEC within the vicinity of the Study Area - Emu Land System (Priority 3);
- A total of 23 significant flora taxa are known from within or in the vicinity of the Study Area, including 2 taxa listed as Threatened and 21 DPaW-classified Priority Flora taxa (Table 4);
- A total of 21 introduced taxa are known to occur or have the potential to occur within or in the vicinity of the Study Area, including 1 taxon listed as a Declared Pest in Western Australia under the BAM Act (DAF 2015), and a WoNS (AWC 2016).

Table 4: Conservation significant Flora Taxa Known from within or in the Vicinity of the Study Area (DoEE 2016, DPaW 2016c)

Taxon	Status	Source*
Acacia epedunculata	P1	TPFL, WA Herb
Alyxia tetanifolia	P3	TPFL, WA Herb
Calandrinia sp. Goongarrie (F. Obbens, F. Hort & J. Hort FO 18/13)	P1	TP List, WA Herb
Eleocharis papillosa	P3	TP List
Eremophila mirabilis	P2	TP List
Eremophila praecox	P1	TP List
Eucalyptus crucis subsp. *Crucis*	T	TP List
Eucalyptus jutsonii subsp. *Jutsonii*	P4	TP List, WA Herb
Gastrolobium graniticum	T	DoE
Gnephosis intonsa	P3	TPFL, TP List, WA Herb
Gompholobium cinereum	P3	TP List
Gunniopsis propinqua	P3	TP List
Hakea rigida	P2	TP List
Homalocalyx grandiflorus	P3	TP List
Malleostemon sp. Adelong (G.J. Keighery 11825)	P2	TP List
Micromyrtus serrulata	P3	TP List
Newcastelia insignis	P2	TP List
Persoonia leucopogon	P1	TP List
Phebalium appressum	P1	TP List
Philotheca coateana	P3	TP List
Ptilotus rigidus	P1	WA Herb
Ricinocarpos sp. Eastern Goldfields (A. Williams 3)	P1	WA Herb
Thryptomene eremaea	P2	TP List

*Note: Sources of records are:

- TP List – DPaW Threatened and Priority Flora List

- TPFL – DPaW Threatened and Priority Flora Database
- WA Herb. – WA Herb. specimen database

Table 5: Introduced Flora Taxa Known from within or in the Vicinity of the Study Area

Taxon	Comments	Source		
		DoEE (2016)	DPaW (2017b)	Botanica (2008)
Agave americana (Century Plant)	Environmental impact Low (CALM 1999)		X	
Carrichtera annua (Ward's Weed)	Environmental impact High (CALM 1999)	X	X	
Carthamus lanatus (Saffron Thistle)	Environmental impact Low (CALM 1999)		X	X
Cenchrus ciliaris (Buffel Grass)	Environmental impact High (CALM 1999)	X	X	
Citrullus lanatus (Pie Melon)	Environmental impact Low (CALM 1999)			X
Conyza bonariensis (Flaxleaf Fleabane)	Environmental impact Low (CALM 1999)		X	
Cucumis myriocarpus (Prickly Paddy Melon)	Environmental impact not assessed (CALM 1999)		X	X
Dittrichia graveolens (Stinkwort)	Environmental impact Mild (CALM 1999)		X	
Echium plantagineum (Paterson's Curse)	Environmental impact not assessed (CALM 1999)		X	
Emex australis (Doublegee)	Environmental impact Low (CALM 1999)		X	
Erodium aureum	Environmental impact Moderate (CALM 1999)		X	
Hypochaeris glabra (Smooth Catsear)	Environmental impact Moderate (CALM 1999)		X	
Lysimachia arvensis (Pimpernel)	Environmental impact not assessed (CALM 1999)			X
Malva parviflora (Marshmallow)	Environmental impact Low (CALM 1999)		X	
Oligocarpus calendulaceus	Environmental impact Low (CALM 1999)		X	
Opuntia elata	Declared Pest (DAF 2016) WoNS (AWC 2016) Environmental impact not assessed (CALM 1999)		X	
Ricinus communis (Castor Oil Plant)	Environmental impact Low (CALM 1999)		X	
Rostraria pumila	Environmental impact Moderate (CALM 1999)		X	
Salvia verbenaca (Wild Sage)	Environmental impact Low (CALM 1999)		X	
Schismus arabicus (Araby Grass)	Environmental impact Moderate (CALM 1999)		X	
Solanum nigrum (Black Berry Nightshade)	Environmental impact Moderate (CALM 1999)			X

3 METHODS

3.1 Personnel and Licensing

Table 6 lists the personnel involved in both fieldwork and plant identifications for the survey of the Study Area. Personnel involved in fieldwork have had previous field experience in areas similar to the Study Area, with personnel involved in plant identifications having previous taxonomic experience with the flora of the Goldfields region. All plant material was collected under the scientific licences pursuant to the WC Act Section 23C and Section 23F as listed in Table 6.

Table 6: Personnel and Licensing Information

Personnel	Role	Flora Collecting Permit (WC Act)
Greg Woodman	Project Manager / Field manager	SL011769 (Section 23C) 117-1516 (Section 23F)
Kim Kershaw	Fieldwork	SL011770 (Section 23C) 120-1516 (Section 23F)
Bethea Loudon	Plant identifications	NA
David Coultas	Plant identifications	NA

3.2 Aerial Photography Interpretation

Initial interpretation of ortho-rectified aerial photography at a scale of 1:10,000 was conducted to determine preliminary vegetation patterns present within the Study Area, with quadrats allocated based on these patterns. A minimum of three quadrats were allocated to each discernible vegetation pattern where possible; such replication is required for meaningful results to be produced following floristic analysis of quadrat data, and to provide local context for VT distribution.

3.3 Field Survey Methods

The field survey was conducted from the 21st – 29th of September, 2016. It is considered that this visit was conducted in the most appropriate time to survey in the Murchison Bioregion, as the majority of taxa in this region flower in Spring.

Access to the Study Area was achieved on foot and by vehicle using existing vehicle and exploration tracks. However, large parts of the Study Area were not accessible by vehicle, necessitating access by foot only.

A total of 58 non-permanent flora survey quadrats measuring 20 m x 20 m were established during survey. This quadrat size is the standard size used in in the region for flora and vegetation surveys as outlined in EPA and DPaW (2015). At least 3 quadrats were surveyed within each vegetation pattern initially identified from aerial photography interpretation.

The quadrats were orientated north-south/east-west where possible, with the bearings of each side recorded for any quadrats that could not be established in this fashion.

All vascular flora taxa that were visually identifiable within each quadrat were recorded. At least one reference specimen of most taxa (excluding common, distinctive taxa) encountered was collected for verification and identification purposes.

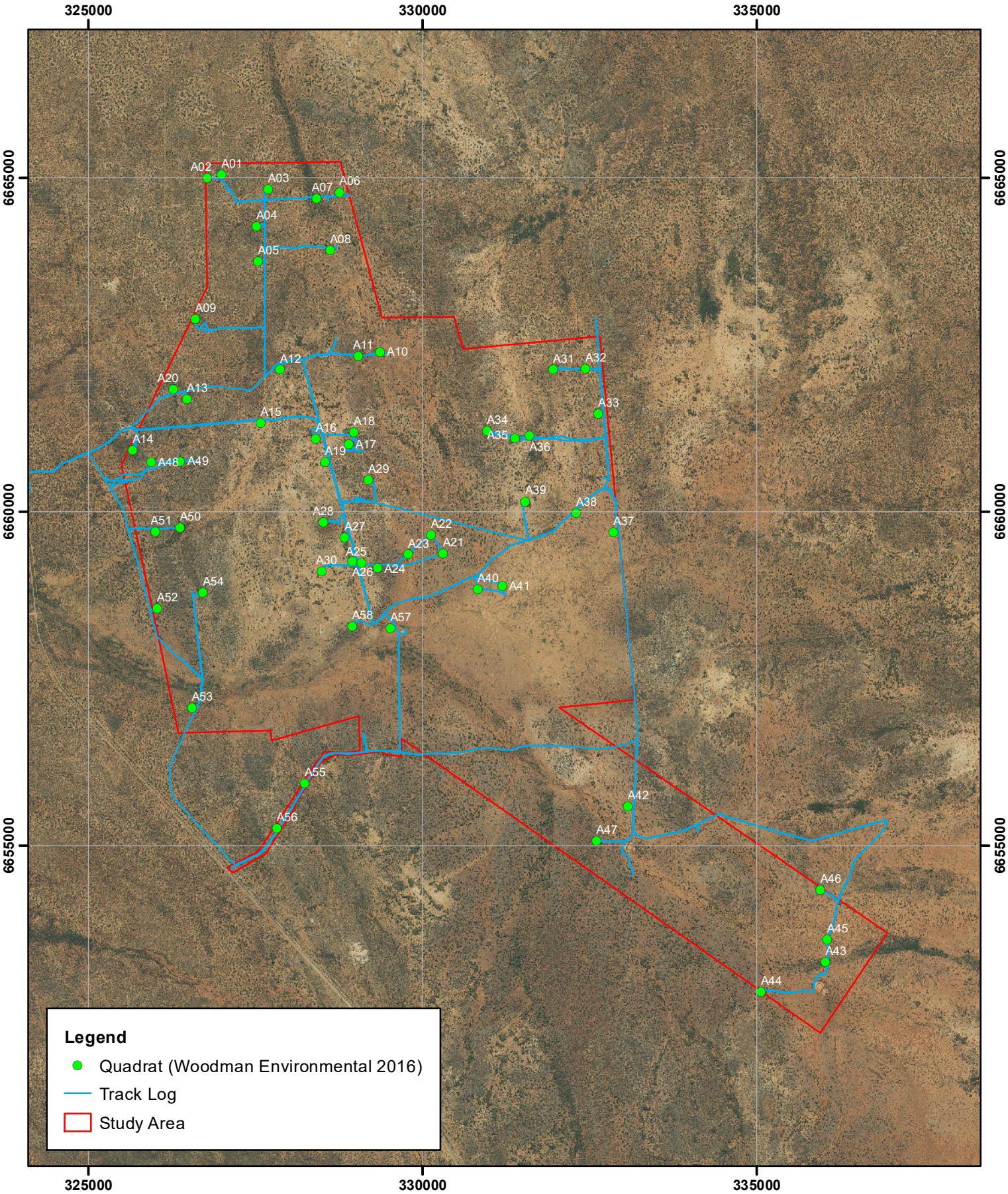
The following information was recorded at each quadrat:

- Personnel;
- Unique quadrat number;
- Date of survey;
- GPS (Global Positioning System) coordinates (GDA (Geodcentric Datum of Australia) 94);
- Site photograph;
- Topography (including landform type and aspect);
- Soil colour and type (including the presence of any rock outcropping and surface stones);
- Vegetation condition (EPA (2016) (adapted from Keighery (1994)), presented in Appendix E);
- Approximate time since fire;
- Presence of disturbance (if any);
- Percentage foliage cover (for each taxon); and
- Height (m) (for each taxon, excluding climbers/aerial shrubs).

Additional flora taxa were also recorded opportunistically in the Study Area via a search in the general vicinity of each quadrat, and during traverses on foot between quadrats.

Mapping notes of vegetation pattern boundaries and distribution were also taken while traversing on foot and by vehicle. This was to aid in mapping polygons of vegetation patterns that were not allocated quadrats. Not all vegetation pattern polygons received quadrats because of time constraints, however many polygons could be confidently allocated to a final VT using a combination of mapping notes and aerial photograph interpretation.

Specific, targeted searching for significant flora taxa in the Study Area was not undertaken as part of the survey, however searching while traversing to and between quadrats was undertaken. If populations of known significant flora taxa were identified, a representative collection of material was made, and the abundance and spatial distribution (using hand held Garmin GPS coordinates) of individuals within each population was recorded where possible. All areas traversed in the Study Area are presented as track logs on Figure 4.



Aphrodite Study Area, Survey Quadrats and Track Logs	Author: Alison Saligari	
	WEC Ref: IntSust16-32-01	
WOODMAN ENVIRONMENTAL	Filename: IntSust16-32-01-f04.mxd	**Figure**
	Scale: 1:75,000 (A4)	4
	Projection: GDA 1994 MGA Zone 51	
This map should only be used in conjunction with WEC report IntSust16-32-01.	Revision: 0 - 16 February 2017	

3.4 Plant Collection and Identification

Specimens of any unknown taxa that were collected were pressed for later identification at the WA Herbarium. Identifications were undertaken by experienced botanists Bethea Loudon and David Coultas. External experts of particular families or genera were consulted for any specimens considered to be difficult to identify or of taxonomic interest.

Taxon nomenclature generally follows *FloraBase* (DPaW 2017b) with all names checked against the current DPaW Max database to ensure their validity. However, in cases where names of plant taxa have been published recently in scientific literature but have not been adopted on *FloraBase* (DPaW 2017b), nomenclature in the published literature is followed. The conservation status of each taxon was checked against *FloraBase*, which provides the most up-to-date information regarding the conservation status of flora taxa in Western Australia.

Specimens of interest, including significant flora taxa, range extensions of taxa and potential new taxa, will be sent to the WA Herbarium for consideration for vouchering as soon as practicable. However, this process is via donation, and the WA Herbarium may not voucher all specimens, in accordance with its own requirements. The specimen vouchering will be supported by completed Threatened and Priority Flora Report Forms submitted to DPaW (Species and Communities Branch) in the case of listed significant flora (e.g. Threatened and Priority flora taxa).

3.5 Classification Analysis

Classification analysis of quadrat data from the Study Area was conducted using 58 quadrats established in the Study Area during this survey incorporating 95 vascular taxon groupings (see comment below). Taxa belonging to several categories were removed prior to analysis, as listed below:

- Ephemeral taxa – the presence of ephemeral taxa is strongly influenced by seasonal conditions, with fewer taxa and individuals usually present following below-average rainfall;
- Introduced taxa – introduced taxa were removed as their distributions are generally defined by the presence of disturbance (e.g. clearing, animal movement) rather than particular habitat types;
- Singletons (taxa recorded only once in the quadrat dataset) – singletons were removed as they provide little information in datasets;
- Taxa with ephemeral above-ground parts only – perennial taxa that produce ephemeral above-ground parts which senesce when conditions are unfavourable were also removed from the analysis. Such taxa, while easily identifiable at some sites when conditions were favourable, could not be confidently identified at all sites because such material was absent or in poor condition;
- Taxa where identification was unclear – such taxa were removed from the analysis where identification was unclear due to poor available material in the field.

Some taxa and infra-taxa were also amalgamated where taxonomy was unclear. All taxa removed and amalgamated from the classification analysis (excluding introduced taxa and known hybrids) are presented in Appendix F.

Initially, an OptimClass analysis was undertaken to determine the most suitable approach to classification based on the available data. OptimClass (Tichý *et al*. 2010) evaluates the quality of a set of different partitions of the same dataset, based on the number of taxa that are faithful to clusters of that partition. Faithful taxa are identified using the Fisher's exact test for the right-tailed hypothesis, which is a suitable measure of statistical fidelity of taxa to clusters of quadrats (Sokal and Rohlf 1995; Chytrý *et al*. 2002).

For the OptimClass analysis a selection of the most widely-used techniques in community ecology were tested, including Unweighted Pair-Group Method using Arithmetic Averages (UPGMA), Beta Flexible Clustering and Ward's Method in combination with a Bray-Curtis Index, Similarity Ratio, Chord Distance and none or logarithmic and/or power transformations of species percentage foliage cover. The full list of combinations tested is shown in Appendix G. The cluster analyses used to calculate OptimClass values were performed using the software packages JUICE 7.0.123 (Tichý 2002) and PC-ORD 5.32 (McCune and Mefford 2006).

After OptimClass analysis, other association measures not available within PC-ORD were tested using the software PATN V3.12 (Belbin and Collins 2009).

The results of both analyses influenced the selection of a classification analysis using a 1-layer data matrix (presence/absence data only), with Beta Flexible Clustering (β = -0.1) as the clustering tool, and Two-Step (Belbin, L. 1980) as the association measure resulting in an ordination stress value of 0.1067.

Classification analysis was conducted using PATN, with the results of the classification produced as a dendrogram. A taxon and quadrat matrix was produced, with the matrix sorted into taxon groups generated from the classification. Indicator taxon analysis (INDVAL) was conducted using PC-Ord (McCune and Mefford 2011) using the method of Dufrene and Legendre (1997). The INDVAL measures were used to determine the indicator taxa for each VT and a Monte Carlo permutation test was used to test for the significance of the indicator taxa.

3.6 Vegetation Type Mapping and Description

The classification dendrogram and taxon group matrix were initially examined at the 8-cluster level, to determine the plausibility of clusters with regard to taxon groups, and also field observations and indicator taxon analysis. This process determined a final number of clusters, which were considered to represent VTs.

Manual re-assigning of some quadrats within the dendrogram was undertaken after classification analysis, and during detailed investigation of the individual quadrat data against the dendrogram alignment which utilised inspection of aerial photography and notes taken during field assessment. In some cases based on size of VT polygons and the

location of quadrats, some quadrats were regarded as representative of ecotones and position within the dendrogram was therefore misleading.

VT descriptions have been adapted from the National Vegetation Information System (NVIS) Australian Vegetation Attribute Manual Version 6.0 (ESCAVI 2003). This model follows nationally-agreed guidelines to describe and represent VTs, so that comparable and consistent data is produced nation-wide. It must be noted that the NVIS system utilises vegetation descriptions derived from structural characteristics of the individual community units, while the VTs presented in this report have been derived from analysis of quadrat floristics, excluding any structural data. VTs therefore may include multiple structural types. Considering the effect of disturbance factors such as fire on vegetation structure, this approach is designed to provide a map of VTs that reflect taxon composition and the influences of the physical and chemical environment rather than disturbance history.

Each VT has been given a code number (VT 1, VT2 etc.), in terms of the grouping as listed from top to bottom on the dendrogram (as presented in Appendix M). A structural code has also been assigned to each VT, consisting of the dominant structural grouping in terms of height (e.g. LW for Low Woodland, S for Shrubland), followed by the abbreviations of the dominant species for each stratum in order of tallest to lowest.

For the purposes of this report, it is considered that a VT is equivalent to a NVIS sub-association as described in ESCAVI (2003). Common taxa within each stratum were generally defined as taxa that occurred in greater than one-third of quadrats established within a particular VT (however this varied slightly depending on the number of quadrats); these may include taxa not in the VT description, as the VT description is based on dominance within each stratum, as well as the frequency that a taxon was recorded within each VT.

The locations of quadrats within each VT were used in conjunction with aerial photography interpretation and field notes taken during survey to develop VT mapping polygon boundaries. These VT mapping polygon boundaries were then digitised using Geographic Information System (GIS) software.

3.7 Vegetation Condition Mapping

Vegetation condition was recorded at all quadrats, and also opportunistically within the Study Area where areas of disturbance to vegetation were noted (e.g. weed infestations, areas of heavy grazing, mineral exploration). Vegetation condition was described using the vegetation condition scale presented in EPA and DPaW (2015) (as adapted from Keighery (1994)), and is presented in Appendix E. Vegetation condition polygon boundaries for the Study Area were developed using this information in conjunction with aerial photography interpretation, and were digitised as for VT polygon boundaries.

3.8 Significant Flora and Vegetation

3.8.1 Significant Flora

The EPA has refined the definition of significant flora since Guidance Statement 51 (EPA 2004), with EPA (2016) defining that flora taxa may be considered significant for a range of reasons, including, but not limited to the following:

- Being identified as threatened or priority species;
- Locally endemic or associated with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems);
- New species or anomalous features that indicate a potential new species;
- Representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- Unusual species, including restricted subspecies, varieties or naturally occurring hybrids;
- Relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

Significant taxa are discussed in Section 5.1.2 – 5.1.4.

No classification of the potential local significance of locations of significant flora taxa has been undertaken as part of this study. It is considered that such a classification is best undertaken as part of any overall impact assessment that may need to be undertaken for the Development, as significant flora information may change prior to such an impact assessment being conducted.

3.8.2 Significant Vegetation

As per EPA (2016), vegetation may be considered significant for a range of reasons, including, but not limited to the following:

- Being identified as a Threatened or Priority Ecological Community;
- Having restricted distribution;
- Degree of historical impact from threatened processes;
- A role as a refuge;
- Providing an important function required to maintain ecological integrity of a significant ecosystem.

These criteria are generally applicable to VTs mapped in the Study Area, and are therefore used to determine whether a VT is locally significant (with 'local' referring to the Study Area). It is more difficult to apply these criteria in a regional context, as there is no publicly-available Murchison-wide dataset of VTs. Regional significance of vegetation is discussed in relation to existing publicly available literature.

Significant vegetation is discussed in Section 5.2.4.

4 ADEQUACY AND LIMITATIONS OF SURVEY

4.1 Adequacy of Survey

The Study Area covers 5,950 ha, with 58 quadrats established within it. Quadrats were established in all preliminary vegetation patterns discernable by initial aerial photograph interpretation (see Section 3.2 and 3.3), both to adequately sample variation in vegetation throughout the Study Area, and to ensure adequacy of sampling for vascular plant taxa. The number of quadrats established in the Study Area is considered to be an acceptable number given the diversity of topography and soil types noted in the Study Area.

To provide an indication of the adequacy of this survey, a taxon accumulation curve was produced using PC-Ord (V 6) (McCune and Mefford 2011). Taxon accumulation curves represent a theoretical model of the relationship between sampling intensity and taxon accumulation; when sampling intensity is increased, taxon accumulation is reduced, and a taxon accumulation curve becomes asymptotic.

The taxon accumulation curve for quadrat data from the Study Area was generated using all native taxa (both annual and perennial) recorded within each quadrat. Taxon accumulation calculations for the Study Area were then undertaken via PC-Ord, utilising the Chao-2 estimator for species richness (Chao 1987), and compared to the actual number of taxa recorded in the Study Area. This gives some indication as to whether sufficient quadrats have been surveyed to adequately sample the species richness in the Study Area. As the generation of species accumulation curves includes quadrat data only, and not opportunistically-recorded taxa, the indication of adequacy of survey provided is considered to be conservative.

Figure 5 presents the species accumulation curve generated from quadrat data from the Study Area. Using the Chao-2 estimator, the recorded number of taxa within quadrats is equivalent to 88.1 % of the estimated taxon richness in the Study Area. Sampling was therefore considered to be adequate using this estimation measure.

It is of interest that the estimated number of taxa in the Study Area from quadrats only using Chao-2 was 185; when opportunistic records of taxa are included, 177 taxa were recorded in the Study Area (see Section 5.1.1), indicating that the Study Area was relatively well-sampled.

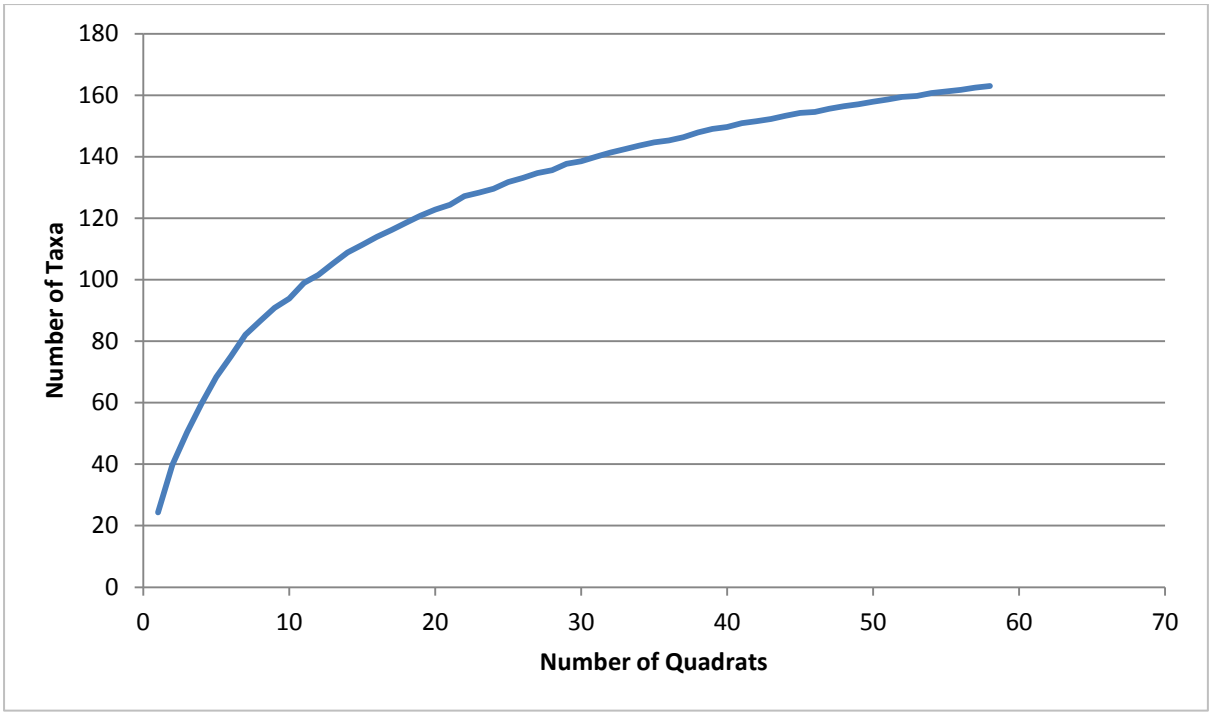


Figure 5: Study Area Species Accumulation Curve

Another adequacy of survey measure is that developed by Mueller-Dombois and Ellenberg (1974), who suggest that a cut-off point might be when a 10 % increase in quadrats surveyed results in a 5 % (or less) increase in taxa recorded. This measure was also calculated using all native taxa recorded within each quadrat. The number of quadrats established in the Study Area satisfies this adequacy measure suggested by Mueller-Dombois and Ellenberg (1974), with the final taxon increase value of 1.72 % recorded following a 10 % increase in quadrats.

4.2 Limitations of Survey

Table 7 presents the limitations of the flora and vegetation survey of the Study Area in accordance with EPA (2015).

Table 7: Limitations of the Flora and Vegetation Survey of the Study Area

Limitation	Limitation of Survey	Comment
Level of survey	No	Level 2 Detailed Survey: The detailed field survey conducted in September 2016, within the usual peak flowering season in the Murchison region. Replicated quadrats were established in each vegetation pattern identified in the Study Area. EPA (2004) indicates that survey should also be undertaken in other seasons, and it is noted that some perennial taxa expected to occur in the Study Area flower in other seasons (e.g. Winter). However, it is considered that survey in the peak flowering season only is adequate in this case, as it considered likely that most taxa that flower outside the peak flowering season could be identified during the survey period.
Competency/experience of the consultant(s) carrying out the survey	No	Senior personnel undertaking the survey have had experience in conducting similar assessments, including assessments in nearby areas in the Murchison region.
Scope (floral groups that were sampled; some sampling methods not able to be employed because of constraints?)	No	All vascular groups that were present during the detailed survey were sampled. No constraints prevented appropriate sampling techniques (quadrat establishment, foot transects) being employed.
Proportion of flora identified, recorded and/or collected	No	A high proportion of perennial vascular taxa were recorded based on the intensity and method of survey. A high proportion of ephemeral vascular taxa were recorded based on the intensity and method of survey, and above-average rainfall prior to the survey. Unknown vascular taxa were collected, with specimens identified at the WA Herbarium. Adequacy of survey measures indicate a high percentage (88.1%) of taxa expected to occur in the Study Area was recorded (Chao-2 estimator), and the number of quadrats established in the Study Area satisfies the criterion suggested by Mueller-Dombois and Ellenberg (1974), with an increase of 1.72 % in species recorded per increase of 10 % of quadrats.
Sources of information e.g. previously available information (whether historic or recent) as distinct from new data	No	Sources of information used included government databases (DPaW, DoEE) and several reports and unpublished data from the vicinity of the Study Area. Good contextual information for the Study Area was available prior to the survey.
The proportion of the task achieved and further work which might be needed	Potential minor	The Level 2 survey was completed, with the survey including some searching for significant flora taxa while traversing between quadrats. No further survey within the Study Area is considered necessary at this time however searching for significant flora may be required depending on the location of future impact areas, if these areas coincide with identified habitat for conservation significant flora.
Timing/weather/season/cycle	No	The field survey was conducted in Spring, corresponding with the optimum flowering period for the Murchison region. The flowering period was considered by Woodman Environmental to be good, with average rainfall (71.6 mm received compared to the average of 70.1 mm) (Bureau of Meteorology 2016) over the Winter period prior to survey (June-August).

Limitation	Limitation of Survey	Comment
Disturbances (e.g. fire, flood, accidental human intervention etc.), which affected results of survey	No	Although historical disturbances associated with grazing and exploration were apparent, these did not appear to have significantly impacted the flora taxa present and is therefore not considered to have affected the results of the survey.
Intensity of survey	No	The survey intensity was considered adequate to identify floristic groupings of terrestrial flora as required by a Level 2 survey, with replication of quadrats in VTs and foot searching undertaken throughout the Study Area.
Completeness and mapping reliability	No	The survey of the Study Area is considered complete in terms of mapping of VTs. Specific searching for significant flora taxa was undertaken for some species, with further searching in final impact areas potentially required. Mapping reliability was considered good as high resolution aerial photography was used, with 58 quadrats established in the Study Area, however in some instances mapping boundaries were difficult to determine from aerial photography. Foot and vehicle transects were employed.
Resources and experience of personnel	No	Adequate resources including experienced field personnel and taxonomists with appropriate expertise in Murchison region flora were utilised.
Remoteness and/or access problems	No	Access to the Study Area was considered adequate. Some parts of the Study Area were difficult to access on foot because of the distances from traversable vehicle tracks, and therefore were surveyed less intensely than areas close to traversable vehicle tracks. However, remoteness or access issues are not considered to have affected the results of the survey.

5 RESULTS

5.1 Flora of the Study Area

5.1.1 Vascular Flora Census

A total of 177 discrete native vascular flora taxa including one known hybrid (listed on *FloraBase* (DPaW 2017b)) were recorded within the Study Area. These taxa represent 36 families and 90 genera. The most well-represented families were Chenopodiaceae (28 taxa), Asteraceae (27 taxa) and Fabaceae (21 taxa).

A full list of taxa is presented in Appendix H, with raw quadrat and site data parameters presented in Appendix I.

Two collections have been submitted to the W. A. Herbarium for confirmation of identification. These include:

- *Rhodanthe uniflora* (see Section 5.1.2 below for further information). This was submitted due to the lack of reference specimens in the W.A. Herbarium and the significance of this collection. This specimen will be submitted to the W.A. Herbarium after confirmation.
- *Senna* sp. It is likely that this collection is a hybrid, and was unable to have complete identification at the W.A. Herbarium. It is unlikely that this collection represents a significant taxon.

5.1.2 Summary of Significant Flora Taxa

Table 8 presents a list of significant flora taxa recorded in the Study Area, together with location information.

A total of three significant flora taxa were recorded by this survey of the Study Area. Locations of significant flora taxa are presented in Appendix J and Figure 6, and on detailed figures presented in Appendix K.

Table 8: Summary of Significant Flora Taxa Recorded within the Study Area

Taxon	Status	Total Number of Point Locations Recorded in Study Area	Total Number of Individuals Recorded in Study Area	Vegetation Types
Gunniopsis propinqua	P3	3	52	3, 6, 7
Ixiochlamys nana	Significantly Disjunct Record / Limited Distribution in WA	1	Not counted	7
Rhodanthe uniflora	Limited Distribution in WA	2	Not counted	6, 7

Legend

Study Area

Vegetation Types

1 (LWCpAhPo) Low open woodland of *Casuarina pauper* over mid open shrubland dominated by *Acacia hemiteles*, *Eremophila* sp. Mt Jackson (G.J. Keighery 4372) and *Senna artemisioides* subsp. *filifolia* over low sparse shrubland dominated by *Ptilotus obovatus* on hill slopes and low rises on stony red loam soils.

2 (LWEcEsEp) Low woodland dominated by *Eucalyptus celastroides* subsp. *celastroides*, *Eucalyptus clelandii* and *Eucalyptus hypolaena* over tall sparse shrubland dominated by *Eremophila scoparia* and *Eremophila* sp. Mt Jackson (G.J. Keighery 4372) over low sparse shrubland dominated by *Eremophila parvifolia* subsp. *auricampa*, *Maireana sedifolia* and *Olearia muelleri* on low hills and rises on stony red to white loam soils.

3 (LWCpAbDl) Low open woodland of *Casuarina pauper* over tall sparse shrubland dominated by *Acacia burkittii* over mid sparse to open shrubland dominated by *Dodonaea lobulata* and *Senna artemisioides* subsp. *filifolia* over mid sparse shrubland dominated by *Maireana sedifolia* and *Scaevola spinescens* over low sparse shrubland of *Ptilotus obovatus* on slopes of low hills and on minor drainage features on stony red clay loam soils.

4 (LWEcAh) Low woodland of *Eucalyptus concinna* over mid sparse shrubland dominated by *Acacia hemiteles*, *Dodonaea lobulata* and *Senna artemisioides* subsp. *filifolia* on flats to midslopes on red to brown sandy loam and clay soils.

5 (WEsCpMs) Mid open woodland to woodland dominated by *Eucalyptus salmonophloia* and *Eucalyptus salubris* over low open woodland of *Casuarina pauper* over mid sparse shrubland dominated by *Eremophila scoparia* and *Maireana sedifolia* over low sparse chenopod shrubland of mixed species including *Maireana georgei*, *Maireana triptera* and *Sclerolaena diacantha* on stony flats and lower slopes on red to brown-white clay loam and clay soils.

6 (LWCpEoMp) Low open woodland of *Casuarina pauper* over tall sparse shrubland dominated by *Eremophila oldfieldii* subsp. *angustifolia* and *Templetonia incrassata* over mid sparse shrubland dominated by *Maireana pyramidata* and *Maireana sedifolia* over low sparse shrubland dominated by *Ptilotus obovatus* over low sparse chenopod shrubland of mixed species including *Maireana trichoptera* and *Sclerolaena diacantha* on flats and drainage lines on red clay soils.

7 (SMpMgSd) Mid sparse shrubland dominated by *Maireana pyramidata* over low sparse chenopod shrubland of mixed species including *Maireana georgei*, *Sclerolaena diacantha* and *Sclerolaena patenticuspis* on stony flats on red clay soils.

C Cleared Land

Significant Flora

- Gpr *Gunniopsis propinqua* (P3)
- Ina *Ixiochlamys nana*
- Run *Rhodanthe uniflora*

WOODMAN ENVIRONMENTAL

This map should only be used in conjunction with WEC report IntSust16-32-01.

N

Vegetation Types and Significant Flora of the Study Area

Revision: 0 - 16 February 2017 Scale: 1:1,625

Author: Alison Salagari

WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-f06-1.mxd

Projection: GDA 1994 MGA Zone 51

Figure

6.1

325000 327500 330000 332500 335000

6665000 6662500 6660000 6657500 6655000 6652500

Gpr
Gpr
Run
Ina Gpr
Run

325000 327500 330000 332500 335000

WOODMAN ENVIRONMENTAL

N

This map should only be used in conjunction with WEC report IntSust16-32-01.

Vegetation Types and Significant Flora of the Study Area

Revision: 0 - 16 February 2017 Scale: 1:45,000

Author: Alison Salagari

WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-f06-2.mxd

Projection: GDA 1994 MGA Zone 51

Figure

6.2

5.1.4 Listed Significant Flora Taxa

No Threatened Flora taxa listed under the WC Act, or Threatened Species listed under the EPBC Act, were recorded within the Study Area.

One DPaW-classified Priority Flora taxon was recorded within the Study Area; *Gunniopsis propinqua* (P3).

***Gunniopsis propinqua* (P3)**

Gunniopsis propinqua (P3) is a prostrate annual or perennial herb growing to 0.1 m high (Plate 1), occurring on stony sandy loam, lateritic outcrops and winter-wet sites. This taxon occurs over a range of approximately 760 km in Western Australia (where it is endemic), from north-east of Paraburdoo in the north-west, to Laverton in the south-east (DPaW 2017a). *Gunniopsis propinqua* is known from 18 DPaW records (DPaW 2017a), none of which occur in the Study Area. These records represent 14 broad localities across its range. One locality occurs in Mount Augustus National Park and one locality is located on the DPaW managed ex-Doolgunna Station (DPaW 2017a).

Gunniopsis propinqua (P3) was recorded at three locations within the Study Area (Appendix J; Figure 6; Appendix K (Sheets 5; 6). It was recorded within VTs 3, 6 and 7 occurring on clay flats and drainage lines. The collection in the Study Area is an extension of the known range of this taxon to the south.

Plate 1: *Gunniopsis propinqua* (P3) (Photo: Woodman Environmental)

5.1.5 Other Taxa of Interest

Ixiochlamys nana is a decumbent to ascending annual herb growing to 0.2 m high (DPaW 2017b) (Plate 2). This species is known from just one record in Western Australia, located on Middalya Station, 20 km north of Kennedy Range National Park and over 900 km north-west of the Study Area (DPaW 2017a). It is generally common throughout the Northern

Territory and South Australia, with records also known from inland Queensland and New South Wales (Council of Heads of Australasian Herbaria 2017). However, it is a significant collection given it is widely disjunct at the locality within the Study Area, both from the main centre of distribution in central Australia and from the only other WA collection in the Carnarvon bioregion (M. Hislop *pers. comm.* 2017).

Ixiochlamys nana was recorded at one location within the Study Area, within VT 7 on a clay flat (Appendix J; Figure 6; Appendix K (Sheet 5 (6)).

Plate 2: ***Ixiochlamys nana*** **(Photo: South Australian Seed Conservation Centre, 2017)**

Rhodanthe uniflora is an erect, woolly annual, herb growing to 0.1 m high (Plate 3), occurring on brown earth (DPaW 2017b). It is known from just one record in Western Australia, located 20 km north of Kalgoorlie. This species is common throughout central South Australia, south-western Queensland and north-western New South Wales (Council of Heads of Australasian Herbaria 2017). The collection within the Study Area represents a slight range extension of approximately 40 km within WA, however it is significant in that it is currently known from just one record within the State. As this species is uncommon in WA, the collection has been sent to the WA Herbarium for verification of the identification.

Rhodanthe uniflora was recorded at two locations within the Study Area within VT 6 and 7, on clay flats and drainage lines (Appendix J; Figure 6; Appendix K (Sheets 4, 5 (6)).

Plate 3: ***Rhodanthe uniflora*** **(Photo: South Australian Seed Conservation Centre, 2017)**

Santalum spicatum (Sandalwood) is a hemiparasitic shrub growing to 5 m high (Plate 4) occurring on red sandy soils (DPaW 2017b). It has a substantial known range of over 1600 km in WA (DPaW 2017a). This species was relatively common throughout the Study Area with 15 locations recorded.

The clearing of Sandalwood in Western Australia is currently regulated under the *Sandalwood Act 1929* on both Crown Land and alienated lands as defined under the Act. This Act is in the process of being replaced by the *Biodiversity Conservation Act 2016* (DPaW 2016e) which when fully enacted will include an exemption for parties with an approval to clear land under other legislation. DPaW currently advise that there is no permit required to clear Sandalwood provided there is no intent to harvest and sell the wood (Lyle Gilbert (DPaW) *pers. comm*.).

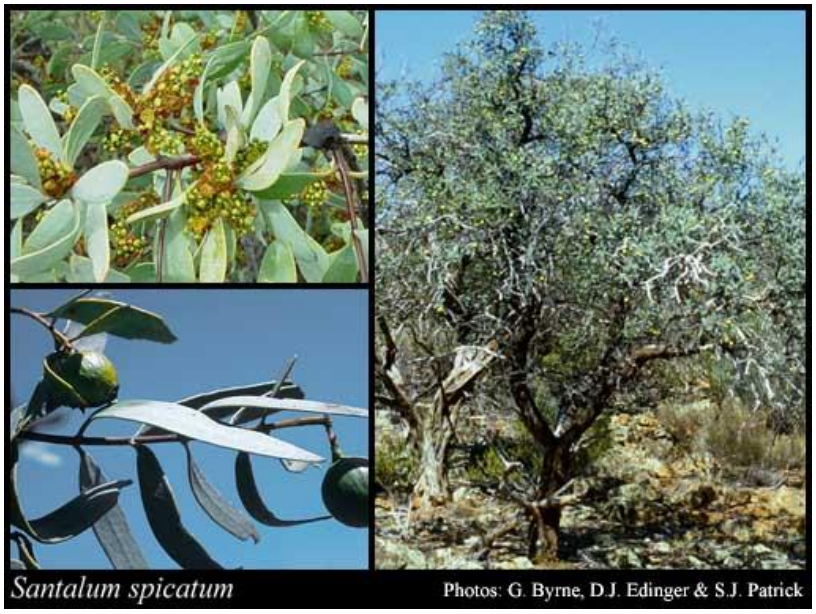


Plate 4: ***Santalum spicatum*** **(Sandalwood) (Photos: G. Byrne, D. J. Edinger and S.J. Patrick (DPaW 2017b))**

5.1.6 Distribution Extensions and Distribution Gaps

Table 9 presents taxa where the collections from the Study Area represent significant range extensions to the known distribution of these taxa, or otherwise fill significant gaps within the known distribution of such taxa, according to NatureMap (DPaW 2017a).

Both the current known ranges and numbers of populations for the majority of these taxa are considerable, and therefore the location of these taxa within the Study Area are not considered to be significant.

Table 9: Taxa Where Collections Represent Extensions to the Known Ranges of these Taxa, or Fill Distribution Gaps (DPaW 2017a)

Taxon	Description	Current Distribution (DPaW 2017a)
Gunniopsis propinqua (P3)	Extension of known distribution to the south (approx. 90 km)	680 km W-E; 580km N-S; approx. 14 populations known
Ixiochlamys nana	Extension of known distribution to the south east (900k m from known population)	One known population in WA (near Carnarvon) although known from Northern Territory (NT) and South Australia (SA)

It is likely that the majority of these taxa are relatively poorly collected (for example, *Ixiochlamys nana*, an annual taxon), with the added possibility of lack of specimens being submitted to the WAHerb for inclusion into the collection.

5.1.7 Introduced Taxa

A total of seven introduced flora taxa were recorded during the survey of the Study Area. Table 10 presents a list of the introduced flora taxa recorded in the Study Area, together with location information, and ratings for each introduced taxon under the Environmental

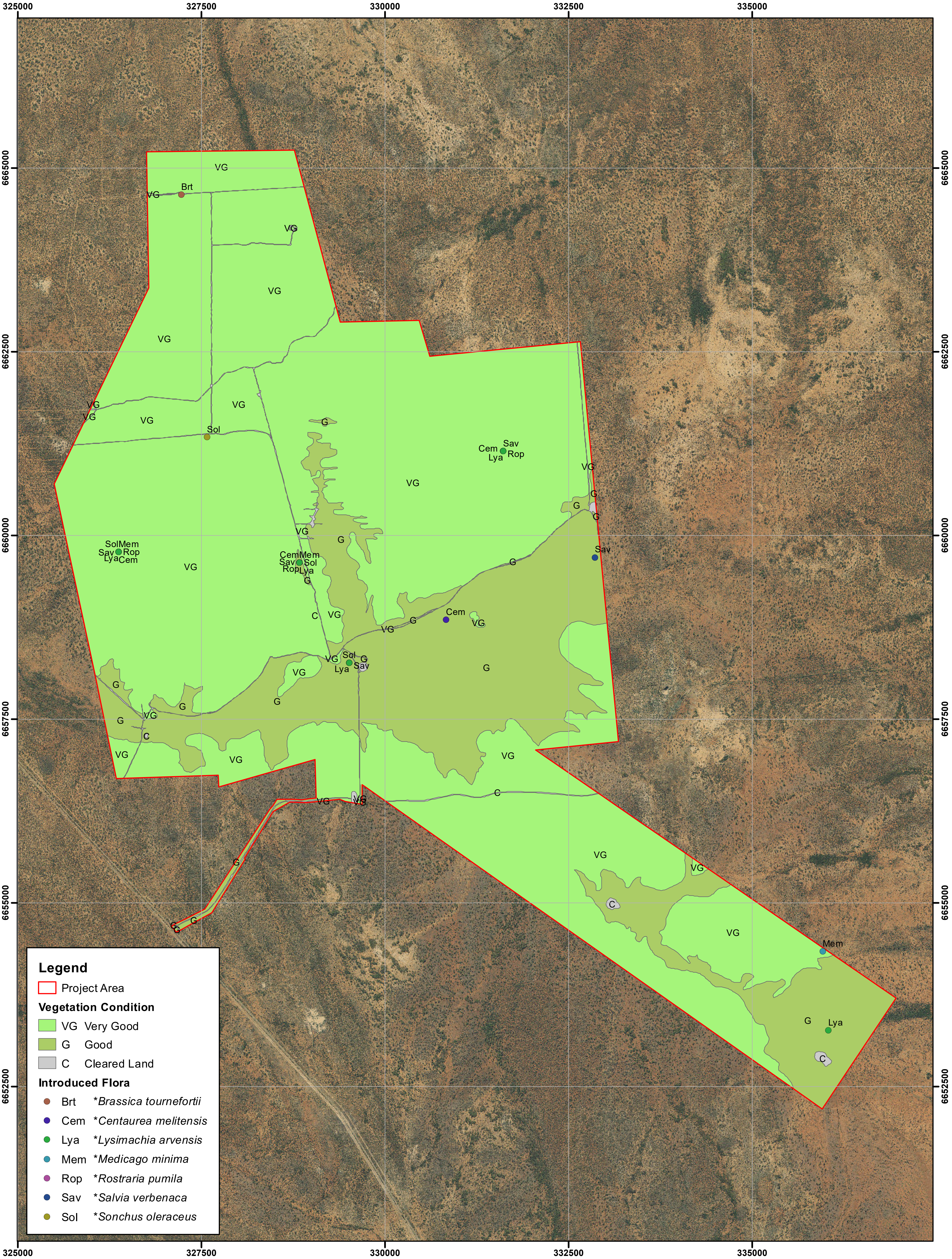
Weed Strategy for Western Australia (CALM 1999). There were no Declared Pests under the BAM Act (WA) or WoNS recorded within the Study Area (DAF 2016, AWC 2016). Details regarding the locations of each of these flora taxa are presented in Appendix J, with locations also presented in Appendix L.

Table 10: Summary of Introduced Taxa Recorded from within the Study Area

Taxon	Number of Locations Recorded in the Study Area	Vegetation Types	Environmental Weeds Rating (CALM 1999)
**Brassica tournefortii*	1	C	High
**Centaurea melitensis*	4	6; 7	Moderate
**Lysimachia arvensis*	5	6; 7	Moderate
**Medicago minima*	3	5; 6	Mild
**Rostraria pumila*	3	6	Moderate
**Salvia verbenaca*	5	5; 6; 7	Low
**Sonchus oleraceus*	4	6; 7	Moderate

Brassica tournefortii (Wild Turnip) (Plate 5) is an annual herb growing to 0.6m and occurs mainly on sandy soils. It is a common and aggressive weed of disturbed lands, roadsides and grazed woodlands, and is common in agricultural crops, between Carnarvon and Eucla (Hussey *et al.* 2007; DPaW 2017b). This taxon was ranked as High under the Environmental Weed Strategy for Western Australia as it is considered to be an invasive species, has a wide current distribution and has a high level of environmental impact to structure, composition and function of ecosystems (CALM 1999). It was recorded at only one opportunistic location (Figure 7; Appendix J; Appendix L Sheet 1).

Plate 5: *Brassica tournefortii* (Wild Turnip) (Photos: K. C. Richardson and J. F. Smith (DPaW 2017b))



WOODMAN ENVIRONMENTAL

This map should only be used in conjunction with WEC report IntSust16-32-01.

Vegetation Condition of the Study Area	Author: Alison Salagari WEC Ref: IntSust16-32-01 Filename: IntSust16-32-01-f07.mxd	**Figure** 7
Revision: A - 30 January 2017 Scale: 1:45,000	Projection: GDA 1994 MGA Zone 51	

Centaurea melitensis (Maltese Cockspur) (Plate 6) is an erect annual or biennial, herb growing to 1 m high. It is a weed of roadsides cultivated areas and other disturbed areas occurring from Carnarvon, through to the arid zone across to the Nullabor (DPaW 2017b, Hussey *et al.* 2007). This taxon was rated as Moderate under the Environmental Weed Strategy for Western Australia as it is considered to be an invasive species, and has a wide current distribution (CALM 1999). *Centaurea melitensis* was recorded at four locations within the Study Area (Figure 7; Appendix J; Appendix L Sheets 4, 5, 6).

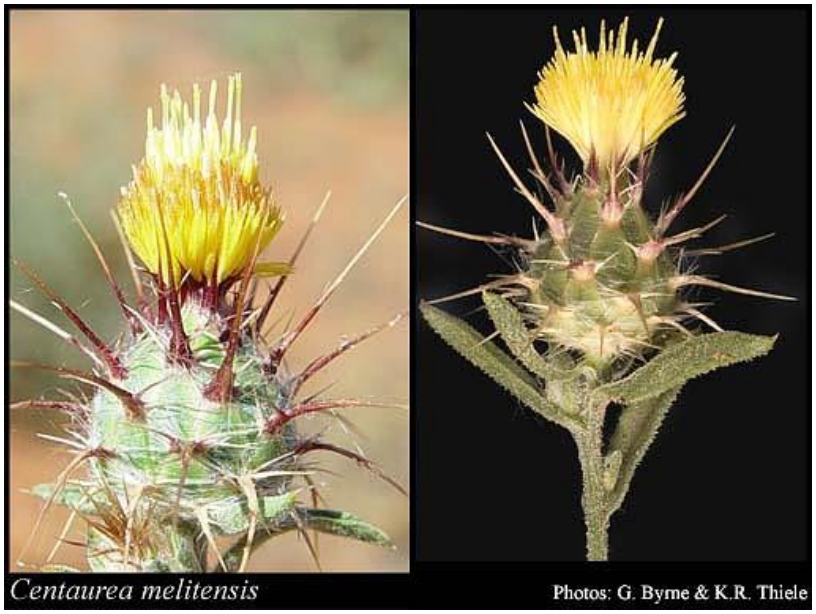


Plate 6: ***Centaurea melitensis*** **(Maltese Cockspur) (Photos: G. Byrne, K. R. Thiele (DPaW 2017b))**

Lysimachia arvensis (Pimpernel) (Plate 7) is a hairless spreading annual, with opposite, ovate, stalkless leaves, and blue or scarlet flowers produced in spring. It is a relatively common weed in gardens, paddocks, granite rocks and disturbed bushland throughout the south-west (Hussey *et al.* 2007). This taxon was rated as Moderate under the Environmental Weed Strategy for Western Australia as it is considered to be an invasive species, and has a wide current distribution (CALM 1999). *Lysimachia arvensis* was recorded at five locations within the Study Area, with four locations being in VT 6 (Figure 7; Appendix J; Appendix L (Sheets 4, 5, 6, 12).

Plate 7: ***Lysimachia arvensis*** **(Pimpernel) (Photo: Don and Betty Wood (Atlas of Living Australia 2017)**

Medicago minima (small burr medic) (Plate 8) is the smallest of the burr-fruited medics naturalised in Western Australia, with stems to 30cm in length, with yellow flowers produced in winter and spring. The taxon is distinguished by the small spiny fruit, hairiness of the entire plant, and its small size. It has been recorded as scattered throughout the eastern wheatbelt and adjacent pastoral regions from Geraldton to Madura on farmland, roadsides, wasteland, natural bushland and granite rocks (Hussey *et al.* 2007). This taxon was rated as Mild under the Environmental Weed Strategy for Western Australia due to current and potential distribution (CALM 1999). *Medicago minima* was recorded at three locations within the Study Area, with two locations being in VT 6 (Figure 7; Appendix J; Appendix L (Sheets 4, 5, 12).

Plate 8: ***Medicago minima*** **(Small burr medic) (Photo: Russel Cumming (Atlas of Living Australia 2017))**

Rostraria pumila (Rough Cat's Tail) (Plate 9) is a tufted annual grass growing to 0.2 m high occurring on sand, sandy clay or clay, limestone, sand dunes and cliff slopes. (DPaW 2017b). It is a common weed of grazed semi-arid woodlands and shrublands in inland parts of the wheatbelt and adjacent rangelands from Shark Bay to Eucla (Hussey *et al.* 2007). *Rostraria pumila* was rated as Moderate under the Environmental Weed Strategy for Western Australia as it is considered to be an invasive species, and has a wide current distribution (CALM 1999). *Rostraria pumila* was recorded at three locations within the Study Area (Figure 7; Appendix J; Appendix L Sheet 4, 5, 6), all within VT 6.

Plate 9: ***Rostraria pumila*** **(Rough Cat's Tail) (Photo: D. Wood (Atlas of Living Australia 2017))**

Salvia verbenaca (Wild Sage) (Plate 10) is a perennial herb usually flowering in late spring with blue and purple flowers on quadrangular flowering stalks growing to 1m with rosettes of rough, lobed stalked leaves. It is known to occur between Kalgoorlie and Esperance, on roadsides, railway tracks, pastures and disturbed woodlands (Hussey et al. 2007). It was ranked as Low under the Environmental Weed Strategy for Western Australia as it is not considered to be a significant weed in terms of invasiveness, distribution and or environmental impact (CALM 1999). *Salvia verbenaca* was recorded at five locations within the Study Area (Figure 7; Appendix J; Appendix L Sheet 4, 5, 6), with three of these in VT 6.

Plate 10: ***Salvia verbenaca*** **(Wild Sage) (Photo: questagame.com/honeybee (Atlas of Living Australia 2017))**

Sonchus oleraceus (Common Sowthistle) (Plate 11) is an erect annual herb growing to 1.5 m high with yellow flowers (DPaW 2017b). This species is widespread on roadsides, gardens and wasteland throughout Western Australia, but is most common in the south-west (Hussey *et al.* 2007). *Sonchus oleraceus* was rated as Moderate under the Environmental Weed Strategy for Western Australia as it is considered to be an invasive species, and has a wide current distribution (CALM 1999). *Sonchus oleraceus* was recorded at four locations within the Study Area (Figure 7; Appendix J; Appendix L Sheets 4, 5), with three of these locations in VT 6.

Plate 11: *Sonchus oleraceus* (Common Sowthistle) (Photos: S. M. Armstrong, L. Fontanini (DPaW 2017b))

5.2 Vegetation of the Study Area

5.2.1 Vegetation Type Mapping

Examination of the quadrat classification dendrogram at the 8-cluster level found that two clusters could be grouped, based on further examination of taxon groups, as well as consideration of field observations, and indicator taxon analysis. This resulted in seven clusters being recognised, which are considered to represent VTs.

Appendix M presents the classification dendrogram, with the VTs ordered from 1 to 7 on the left hand side of the dendrogram. The optimal 8-cluster level is also shown on the dendrogram. Appendix N presents the associated two-way table output from the analysis. Both Appendices M and N show the positioning of quadrats prior to manual moving of quadrats, which is presented in Appendix O and the methods for re-assigning of quadrats described in Section 3.6. Appendix P presents the results of the indicator taxon analysis.

At a higher level in the classification dendrogram, the seven VTs were arranged into two broad groups, as outlined below:

- Group 1 (VTs 1-4) corresponds to Low Woodlands dominated by *Casuarina pauper* and/or *Eucalyptus* species over sparse shrublands mainly occurring on hill slopes (lower to upper slopes) and rises. These VTs also were species-poor in comparison to VTs of Group 2. Common species include those grouped into Species Groups G, H and I (Appendix N).
- Group 2 (VTs 5-7) corresponds to shrublands dominated by salt tolerant species (*Maireana* and *Sclerolaena* species) with occasional Low Woodlands dominated by *C. pauper* and Eucalyptus species on loamy flats or drainage lines. These VTs were generally more species-rich than those associated with Group 1, with Species Groups B – F and part of Species Group I being more common in comparison to Group 1 (Appendix N).

Average taxon richness per quadrat was 24.36 (± 10.04), with the greatest number of taxa recorded in a single quadrat being 48, and the lowest number being nine.

The VTs described in the Study Area are summarised in Table 11 below, including:

- Coding and description of the VT (as per Section 3.6),
- Total area mapped in the Study Area,
- Number of quadrats (and identifiers) established,
- Presence of significant taxa,
- Average taxon richness and greatest and lowest number of taxa recorded, and
- Indicator species.

Table 11: Summary of Vegetation Types Mapped in the Study Area

VT	Description	Extent (ha); Percentage of Study Area	Significant Indicator Taxa* and Presence of Significant Flora Taxa	Representative Photograph
1 LWCpAhPo	**Description:** Low open woodland of *Casuarina pauper* over mid open shrubland dominated by *Acacia hemiteles*, *Eremophila* sp. Mt Jackson (G.J. Keighery 4372) and *Senna artemisioides* subsp. *filifolia* over low sparse shrubland dominated by *Ptilotus obovatus* on hill slopes and low rises on stony red loam soils. **Sampling:** 6 quadrats (A02; A03; A49; A51; A53; A55) **Average species richness**: 20.83 species per quadrat ± 4.4 SD	232.8 ha 3.91 %	Indicator Taxa *Austrostipa elegantissima*; *Grevillea acuaria*; *Ptilotus obovatus*; *Zygophyllum aurantiacum* CS Flora Taxa Nil recorded	 **Plate 12:** Quadrat A03

VT	Description	Extent (ha); Percentage of Study Area	Significant Indicator Taxa* and Presence of Significant Flora Taxa	Representative Photograph
2 LWEcEsEp	**Description:** Low woodland dominated by *Eucalyptus celastroides* subsp. *celastroides*, *Eucalyptus clelandii* and *Eucalyptus hypolaena* over tall sparse shrubland dominated by *Eremophila scoparia* and *Eremophila* sp. Mt Jackson (G.J. Keighery 4372) over low sparse shrubland dominated by *Eremophila parvifolia* subsp. *auricampa, Maireana sedifolia* and *Olearia muelleri* on low hills and rises on stony red to white loam soils. **Sampling:** 5 quadrats (A12; A18; A24; A29; A58) **Average species richness**: 15 species per quadrat ± 2.5 SD	428.2 ha 7.19 %	Indicator Taxa *Eremophila* sp. Mt Jackson (G. J. Keighery 4372); *Eucalyptus clelandii*; *Eucalyptus hypolaena*; *Maireana sedifolia* CS Flora Taxa Nil recorded	 **Plate 13:** Quadrat A12
3 LWCpAbDl	**Description:** Low open woodland of *Casuarina pauper* over tall sparse shrubland dominated by *Acacia burkittii* over mid sparse to open shrubland dominated by *Dodonaea lobulata* and *Senna artemisioides* subsp. *filifolia* over mid sparse shrubland dominated by *Maireana sedifolia* and *Scaevola spinescens* over low sparse shrubland of *Ptilotus obovatus* on slopes of low hills and on minor drainage features on stony red clay loam soils. **Sampling:** 15 quadrats (A04; A05; A08; A11; A13; A14; A17; A20; A28; A31; A33; A34; A47; A48; A54) **Average species richness**: 15.53 species per quadrat ± 3.7 SD	1431.8 ha 24.07 %	Indicator Taxa Nil Indicator species CS Flora Taxa *Gunniopsis propinqua* (P3)	 **Plate 14:** Quadrat A54

VT	Description	Extent (ha); Percentage of Study Area	Significant Indicator Taxa* and Presence of Significant Flora Taxa	Representative Photograph
4 LWEcAh	**Description:** Low woodland of *Eucalyptus concinna* over mid sparse shrubland dominated by *Acacia hemiteles*, *Dodonaea lobulata* and *Senna artemisioides* subsp. *filifolia* on flats to midslopes on red to brown sandy loam and clay soils. **Sampling:** 2 quadrats (A09; A56) **Average species richness**: 9.5 species per quadrat ± 0.7 SD	57.1 ha 0.96 %	Indicator Taxa *Dodonaea lobulata*; *Eremophila interstans*; *Eucalyptus concinna*; *Rhagodia preissii* subps. *preissii* CS Flora Taxa Nil recorded	 **Plate 15:** Quadrat A56
5 WEsCpMs	**Description:** Mid open woodland to woodland dominated by *Eucalyptus salmonophloia* and *Eucalyptus salubris* over low open woodland of *Casuarina pauper* over mid sparse shrubland dominated by *Eremophila scoparia* and *Maireana sedifolia* over low sparse chenopod shrubland of mixed species including *Maireana georgei*, *Maireana triptera* and *Sclerolaena diacantha* on stony flats and lower slopes on red to brown-white clay loam and clay soils. **Sampling:** 18 quadrats (A01; A06; A07; A10; A16; A19; A21; A25; A26; A30; A32; A35; A37; A39; A42; A44; A46; A52) **Average species richness**: 21.78 species per quadrat ± 3.4 SD	1979.5 ha 33.27 %	Indicator Taxa *Eucalyptus salmonophloia*; *Eucalyptus salubris*; *Senna artemisioides* subsp. *filifolia* CS Flora Taxa Nil recorded	 **Plate 16:** Quadrat A30

VT	Description	Extent (ha); Percentage of Study Area	Significant Indicator Taxa* and Presence of Significant Flora Taxa	Representative Photograph
6 LWCpEoMp	**Description:** Low open woodland of *Casuarina pauper* over tall sparse shrubland dominated by *Eremophila oldfieldii* subsp. *angustifolia* and *Templetonia incrassata* over mid sparse shrubland dominated by *Maireana pyramidata* and *Maireana sedifolia* over low sparse shrubland dominated by *Ptilotus obovatus* over low sparse chenopod shrubland of mixed species including *Maireana trichoptera* and *Sclerolaena diacantha* on flats and drainage lines on red clay soils. **Sampling:** 10 quadrats (A15; A22; A23; A27; A36; A38; A41; A43; A45; A50) **Average species richness**: 30.5 species per quadrat ± 6.1 SD	1067.8 ha 17.95 %	Indicator Taxa *Acacia tetragonophylla*; *Rhagodia ulicina*; *Rytidosperma caespitosum*; *Sporobolus caroli* CS Flora Taxa *Gunniopsis propinqua* (P3), *Rhodanthe uniflora*	 **Plate 17:** Quadrat A22
7 SMpMgSd	**Description:** Mid sparse shrubland dominated by *Maireana pyramidata* over low sparse chenopod shrubland of mixed species including *Maireana georgei*, *Sclerolaena diacantha* and *Sclerolaena patenticuspis* on stony flats on red clay soils. **Sampling:** 2 quadrats (A40; A57) **Average species richness**: 19.5 species per quadrat ± 0.7 SD	711.6 ha 11.96 %	Indicator Taxa *Maireana georgei*; *Maireana pyramidata*; *Sclerolaeana diacantha* CS Flora Taxa *Gunniopsis propinqua* (P3), *Ixiochlamys nana*, *Rhodanthe uniflora*	 **Plate 18:** Quadrat A40

5.2.2 Other Areas Mapped

Significant areas where no vegetation occurred because of human disturbance were mapped as 'Cleared Land' (C) (Appendix K, Sheets 1-9; 12). This included obvious access tracks, dams and other small cleared areas visible on aerial photography. A total of 40.7 ha of 'Cleared Land' were mapped, representing 0.68 % of the Study Area. Some smaller tracks were not mapped as 'Cleared Land' because of their complexity and small size.

5.2.3 Vegetation Condition Mapping

Vegetation condition mapping polygons are displayed on Figure 7, with detailed mapping presented in Appendix L. The majority of the vegetation in the Study Area (74.63 %) was considered to be in 'Very Good' condition (EPA and DPaW 2015), with evidence of some disturbance including cattle grazing and tracks, minor historical exploration tracks and minor weed presence.

The remainder of the vegetation was ranked as being in 'Good' condition (24.69 %), largely through the centre and the southern parts of the Study Area (Figure 7). These areas included evidence of historical clearing associated with more intensive mineral exploration, water harvesting diversion drains (mainly in the far eastern portion of the Study Area) and drainage areas and dams with holding yards that had associated higher weed covers and evidence of grazing.

The majority of weed locations were recorded within VT 6, which is likely to be related to the higher occurrence of drainage features, and therefore increased stock movement and distribution of weed seed by surface water movement.

The areas in the Study Area mapped as 'Cleared Land' (see Section 5.2.2) were not allocated condition scores, as they are essentially completely cleared. They have been mapped as C in Appendix L (Sheets 1 – 9; 12).

5.2.4 Significant Vegetation

Regional Significance

None of the VTs mapped in the Study Area are considered to represent any TECs as classified by DPaW and endorsed by the Western Australian Minister for Environment (DPaW 2016d), or as listed under the EPBC Act (DoEE 2016; 2017). None of the VTs mapped in the Study Area are considered to represent any DPaW-classified PECs (DPaW 2016a). As previously mentioned, no known locations of any DPaW-classified TECs, TECs listed under the EPBC Act, or DPaW-classified PECs, coincide with the Study Area (DoEE 2016; DPaW 2016b).

There is no available quadrat dataset to allow for determination of the extent of VTs within the region. In context, there is only one TEC recognised by the State that occurs within the Goldfields-Murchison bioregion (TEC 99 Depot Springs stygofauna community). Of the 63 PECs listed for the Goldfields (DPaW 2016a), the majority are associated with banded ironstone formations or otherwise various unique assemblages of invertebrates in groundwater calcretes.

None of the VTs mapped occur on uncommon substrates, or contain uncommon or unique assemblages of plant taxa.

Local Significance

VTs may be locally significant due to factors including limited mapped extent within the Study Area, or due to the provision of suitable habitat for significant flora taxa.

VT 4 is considered to be of local significance in the context of the Study Area only due to its limited mapped extent in the Study Area (it represents less than 1 % of the Study Area). However, when considered in a regional context and given the species composition of this community, VT 4 is likely to be well represented elsewhere (as discussed further in Section 6.2).

VTs 3, 6 and 7 provide habitat for significant flora taxa (including *Gunniopsis propinqua*, *Ixiochlamys nana* and *Rhodanthe uniflora*). However, these VTs are not considered as a whole to be significant, given these significant flora taxa are widespread (either in WA or throughout the eastern states) and tend to occur in drainage and outwash areas which are not restricted to these VTs.

6 DISCUSSION AND CONCLUSIONS

6.1 Flora of the Study Area

A total of 177 native discrete vascular flora taxa and one known hybrid were recorded within the Study Area. The taxon total is marginally lower than the estimate made using the Chao-2 estimator for taxon richness for the Study Area (185), indicating that the Study Area was relatively well-sampled. The taxon total is somewhat higher than the previous relevè based studies undertaken within the vicinity of the Study Area (61 taxa recorded during the Haul Road and Aphrodite site area survey undertaken by Botanica (2008); 94 taxa recorded for the Mt Pleasant survey by Van Etten (2005)). However, as these studies were not Level 2 quadrat-based assessments taxa numbers are expected to be lower. Overall, the Study Area is considered to be of Moderate floristic diversity given the limited diversity of topography and soil types noted in the Study Area. It is considered that this survey of the Study Area was conducted in a relatively good flowering season; this being reflected in the relatively high number of annual taxa recorded (59 taxa).

A total of three taxa recorded in the Study Area are considered to be significant flora taxa. This includes one DPaW-classified Priority flora taxon (*Gunniopsis propinqua*) and two taxa with significantly limited known distributions in WA (*Ixiochlamys nana* and *Rhodanthe uniflora*). Given the level of sampling in the Study Area, and the limited diversity of habitats and soils present, it is considered unlikely that further significant flora taxa occur in the Study Area.

Gunniopsis propinqua (P3) is known from numerous (18) DPaW records and has a widespread range in WA (approximately 760 km). However, the locations recorded in the Study Area are a range extension of the known distribution of this taxon to the south, making this population the most southern extent of its range (DPaW 2017a). The VTs in which *Gunniopsis propinqua* was recorded for this study (VTs 3 (LWCpAbDl), 6 (LWCpEoMp) and 7 (SMpMgSd)) are generally common on a regional and local scale, with landforms including flats and drainage lines. In addition, it is an annual taxon and was found to have high numbers of individuals when it was counted (approximately 50 individuals at one location) indicating that this taxon is likely to be common within the local area.

Ixiochlamys nana and *Rhodanthe uniflora* have very limited distributions and records in WA with just one previous record for each taxon (DPaW 2017b), although both have widespread distributions in other States. In addition, the location recorded for *Ixiochlamys nana* is a significantly disjunct record with the nearest record being 900 km to the north-west (DPaW 2017a). DPaW currently do not recognise these as conservation significant flora taxa (i.e. they are not listed as Threatened or Priority flora). However, they are considered significant in accordance with the definition provided in Section 7.5 of EPA and DPaW (2015), and EPA (2016). These taxa are also annual plants occurring in common VT types (VTs 6 (LWCpEoMp) and 7 (SMpMgSd)), and therefore are likely to be locally common.

A total of seven introduced flora taxa were recorded within the Study Area during this study. An additional four introduced taxa were identified by the survey undertaken by Botanica (2008) (Section 2.3.3). None of these (including those recorded by the 2008

Botanica survey) are Declared Pests or WoNS (DAF 2016, AWC 2016). Six of these weed species are known to be particularly invasive (CALM 1999) and have relatively widespread distributions in the MBR DPaW 2017b.

6.2 Vegetation of the Study Area

Classification analysis of quadrat data from the Study Area arranged quadrats into eight plausible clusters; which were used to further define seven VTs (following the grouping of two clusters) in the Study Area. There are resemblances with the four vegetation groups described by Botanica (2008), although as the VTs in this study were defined by pattern analysis and quadrat based sampling (as opposed to structural mapping) as well as a greater area being mapped for the current study, there were differences in the groupings and mapping as to be expected.

The Study Area does not generally contain large variations in geographical features, consisting largely of undulating plains with low hills and lower lying flats with drainage areas. As such, there are groups of species common throughout the Study Area, particularly Species Group I, as indicated in the Two-Way Table (Appendix N). There are minor drainage features present in the majority of VTs defined, however they tended to be grouped with the VT in which they were located in, indicating that while the density of the vegetation in these areas was higher, the species composition was essentially the same or very similar to the adjacent vegetation. Overall understorey species and salt tolerant species were important factors in the VT groupings.

The classification analysis undertaken for this assessment is considered to have produced a relatively robust classification with ecologically plausible clusters of quadrats. There are a number of clusters which contain a small number of quadrats (VTs 4 and 7 each have two quadrats), and therefore some VTs were defined using somewhat limited data. Further sampling has the potential to influence the vegetation types. However based on the analysis together with field observations, the VTs described in the Study Area are considered to be a relatively accurate reflection of the floristic, geological and topographical variability of the Study Area.

None of the VTs mapped in the Study Area are considered to represent any listed TECs or PECs (DPaW 2016a, DPaW 2016d, DoEE 2017) and none of the VTs occur on uncommon substrates associated with TECs or PECs (such as banded ironstone formations or groundwater calcretes). Overall, the regional significance of the VTs described in the Study Area is unknown as there is no regional dataset available for comparison. However, on a regional scale, the VTs described are broadly representative of the vegetation described by Keighery *et al.* (1992) for the area. There are also similar vegetation communities (in particular Communities 1, 4 and 5) mapped at Mt Pleasant (located approximately 40 km to the south) (Van Etten 2005).

VT 4 was the only VT identified as being locally significant due to its limited mapped extent in the Study Area. However, this VT is located on the western edge of the Study Area and assessment of aerial photography indicates that it probably extends outside the Study Area. Therefore its limited extent within the Study Area appears to be due to the location and size

of the Study Area rather than this being a restricted or significant VT. The remaining VTs defined also appear to extend outside the Study Area in the local area.

6.3 Study Implications for Mine Development

The results of this study will be useful in providing background information and data in potential future mine site rehabilitation. Native taxa which form an important part of the structure of each VT, including dominant taxa in each stratum, should be considered for inclusion in the relevant seeds mixes for the rehabilitation of appropriate post mining units or domains. There is also a group of taxa common throughout the Study Area indicated on the Two-Way table (Appendix N), indicating that these taxa may be able to establish in a range of substrate and topographical types, and as such may be useful taxa in terms of rehabilitation. The VT mapping will also be useful in providing guidance for the potential number and locations of analogue quadrats to inform rehabilitation planning and monitoring programs in future. Establishing analogue quadrats to specific VTs (which may be grouped to provide rehabilitation vegetation types) provides data which can be used in the development of completion criteria for vegetation and also inform development of habitat development criteria. The rehabilitation vegetation type assigned to each rehabilitation domain should reflect naturally occurring communities (VTs) that exist within functionally and topographically similar parts of the natural landscape.

Rehabilitation success also requires the management of introduced species. It is important that works associated with the proposed Development employ appropriate hygiene procedures, including post-impact inspections, to prevent, or in the worse-case scenario monitor, the potential introduction of new weed taxa, including Declared Pests and WoNS from other areas. In addition, as there are a number of invasive weeds known to occur in the Study Area, appropriate machine hygiene and topsoil stockpile management will be necessary to minimise the spread of these weeds into rehabilitation areas and portions of the Development area with lower weed loads.

It is unlikely that any VTs mapped in the Study Area are groundwater dependent however characterisation of the existing groundwater conditions is required to inform an assessment for the presence of GDEs and this should be conducted during any subsequent impact assessment process.

The information provided in this report is considered adequate as supporting information to determine the Developments impacts to flora and vegetation. Final Development footprints should be utilised to identify potential impacts of the proposal to flora and vegetation; both direct and indirect, the results of which should be used to address environmental approvals under Part 4 (environmental impact assessment) or Part 5 (native vegetation clearing permit – assessment against clearing principles) of the *Environmental Protection Act 1986*.

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Appendix A: Results of Search of the Department of the Environment and Energy Database with Regard to Environmental Matters of National Significance (DoEE 2016)

Australian Government

Department of the Environment

EPBC Act Protected Matters Report

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

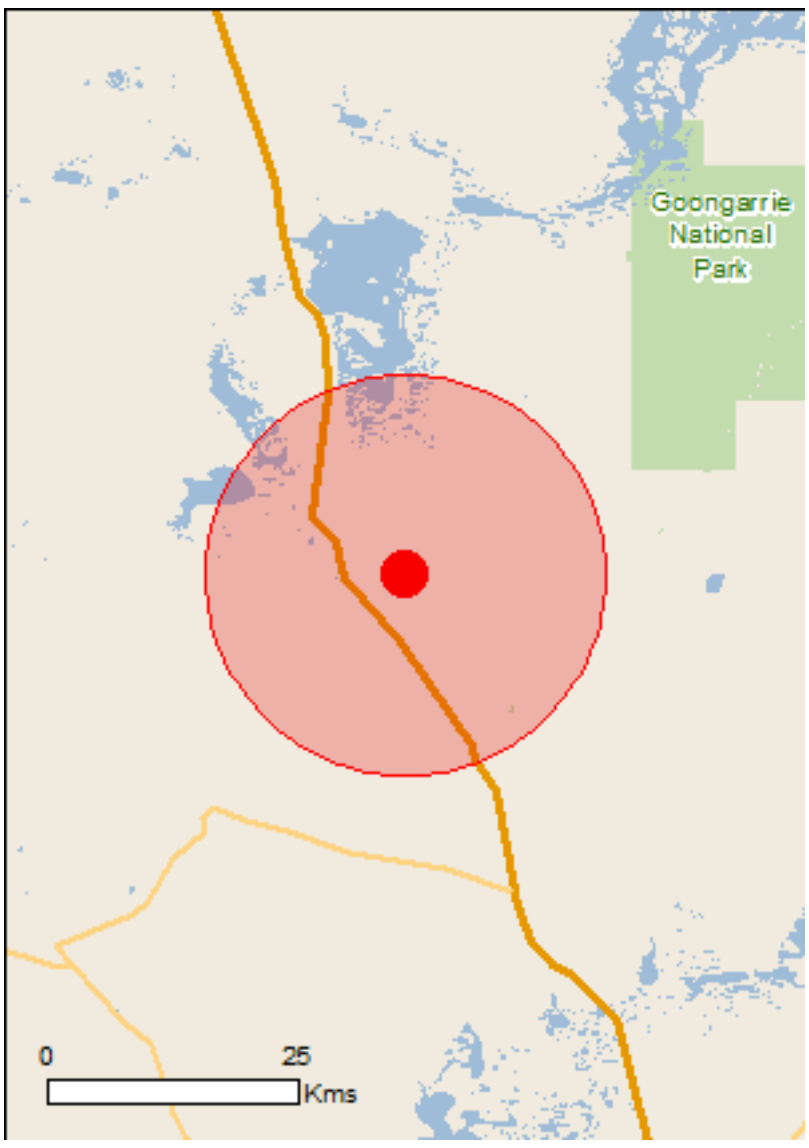
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 15/09/16 13:50:13

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

Caveat
Acknowledgements



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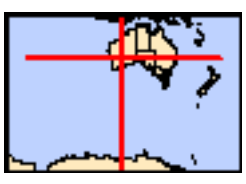

Summary

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:	5
Listed Migratory Species:	3

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	6
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:	10
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Leipoa ocellata		
Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Pezoporus occidentalis		
Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Polytelis alexandrae		
Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat may occur within area
Plants		
Gastrolobium graniticum		
Granite Poison [14872]	Endangered	Species or species habitat likely to occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat may occur within area

Extra Information

Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Mammals		

Name	Status	Type of Presence
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Carrichtera annua Ward's Weed [9511]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area

Caveat

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

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

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

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

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

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

-30.1975 121.23389

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
-Parks and Wildlife Commission NT, Northern Territory Government
-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, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-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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Appendix B: Definitions, Categories and Criteria for Threatened and Priority Ecological Communities (DPaW 2013)

1. GENERAL DEFINITIONS

Ecological Community: A naturally occurring biological assemblage that occurs in a particular type of habitat.

Note: The scale at which ecological communities are defined will often depend on the level of detail in the information source, therefore no particular scale is specified.

A **threatened ecological community** (TEC) is one which is found to fit into one of the following categories; "presumed totally destroyed", "critically endangered", "endangered" or "vulnerable".

Possible threatened ecological communities that do not meet survey criteria are added to DEC's Priority Ecological Community Lists under Priorities 1, 2 and 3. Ecological Communities that are adequately known, are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

An **assemblage** is a defined group of biological entities.

Habitat is defined as the areas in which an organism and/or assemblage of organisms lives. It includes the abiotic factors (eg. substrate and topography), and the biotic factors.

Occurrence: a discrete example of an ecological community, separated from other examples of the same community by more than 20 metres of a different ecological community, an artificial surface or a totally destroyed community.

By ensuring that every discrete occurrence is recognised and recorded future changes in status can be readily monitored.

Adequately Surveyed is defined as follows:
"An ecological community that has been searched for thoroughly in most likely habitats, by relevant experts."

Community structure is defined as follows:
"The spatial organisation, construction and arrangement of the biological elements comprising a biological assemblage" (eg. *Eucalyptus salmonophloia* woodland over scattered small shrubs over dense herbs; structure in a faunal assemblage could refer to trophic structure, eg. dominance by feeders on detritus as distinct from feeders on live plants).

Definitions of Modification and Destruction of an ecological community:
Modification: "changes to some or all of ecological processes (including abiotic processes such as hydrology), species composition and community structure as a direct or indirect

result of human activities. The level of damage involved could be ameliorated naturally or by human intervention."

Destruction: "modification such that reestablishment of ecological processes, species composition and community structure within the range of variability exhibited by the original community is unlikely within the foreseeable future even with positive human intervention."

Note: Modification and destruction are difficult concepts to quantify, and their application will be determined by scientific judgement. Examples of modification and total destruction are cited below:

Modification of ecological processes: The hydrology of Toolibin Lake has been altered by clearing of the catchment such that death of some of the original flora has occurred due to dependence on fresh water. The system may be bought back to a semblance of the original state by redirecting saline runoff and pumping waters of the rising underground watertable away to restore the hydrological balance. Total destruction of downstream lakes has occurred due to hydrology being altered to the point that few of the original flora or fauna species are able to tolerate the level of salinity and/or water logging.

Modification of structure: The understorey of a plant community may be altered by weed invasion due to nutrient enrichment by addition of fertiliser. Should the additional nutrients be removed from the system the balance may be restored, and the original plant species better able to compete. Total destruction may occur if additional nutrients continue to be added to the system causing the understorey to be completely replaced by weed species, and death of overstorey species due to inability to tolerate high nutrient levels.

Modification of species composition: Pollution may cause alteration of the invertebrate species present in a freshwater lake. Removal of pollutants may allow the return of the original inhabitant species. Addition of residual highly toxic substances may cause permanent changes to water quality, and total destruction of the community.

Threatening processes are defined as follows:
"Any process or activity that threatens to destroy or significantly modify the ecological community and/or affect the continuing evolutionary processes within any ecological community."

Examples of some of the continuing threatening processes in Western Australia include: general pollution; competition, predation and change induced in ecological communities as a result of introduced animals; competition and displacement of native plants by introduced species; hydrological changes; inappropriate fire regimes; diseases resulting from introduced microorganisms; direct human exploitation and disturbance of ecological communities.

Restoration is defined as returning an ecological community to its pre-disturbance or natural state in terms of abiotic conditions, community structure and species composition.

Rehabilitation is defined as the re-establishment of ecological attributes in a damaged ecological community although the community will remain modified.

2. DEFINITIONS AND CRITERIA FOR PRESUMED TOTALLY DESTROYED, CRITICALLY ENDANGERED, ENDANGERED AND VULNERABLE ECOLOGICAL COMMUNITIES

Presumed Totally Destroyed (PD)
An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.

An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant **and either** of the following applies (A or B):

A) Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats **or**

B) All occurrences recorded within the last 50 years have since been destroyed

Critically Endangered (CR)
An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.

An ecological community will be listed as **Critically Endangered** when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting **any one or more** of the following criteria (A, B or C):

A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% **and either or both** of the following apply (i or ii):

i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years);

ii) modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated.

B) Current distribution is limited, **and one or more** of the following apply (i, ii or iii):

i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years);

ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes;

iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes.

C) The ecological community exists only as highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately 10 years).

Endangered (EN)
An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.

An ecological community will be listed as **Endangered** when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information by it meeting **any one or more** of the following criteria (A, B, or C):

A) The geographic range, and/or total area occupied, and/or number of discrete occurrences have been reduced by at least 70% since European settlement **and either or both** of the following apply (i or ii):

i) the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term future (within approximately 20 years);

ii) modification throughout its range is continuing such that in the short term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated.

B) Current distribution is limited, **and one or more** of the following apply (i, ii or iii):

i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 20 years);

ii) there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes;

iii) there may be many occurrences but total area is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes.

C) The ecological community exists only as very modified occurrences that may be capable of being substantially restored or rehabilitated if such work begins in the short-term future (within approximately 20 years).

Vulnerable (VU)
An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

An ecological community will be listed as **Vulnerable** when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium (within approximately 50 years) to long-term future. This will be determined on the basis of the best available information by it meeting **any one or more** of the following criteria (A, B or C):

A) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated.

B) The ecological community may already be modified and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations.

C) The ecological community may be still widespread but is believed likely to move into a category of higher threat in the medium to long term future because of existing or impending threatening processes.

3. DEFINITIONS AND CRITERIA FOR PRIORITY ECOLOGICAL COMMUNITIES PRIORITY ECOLOGICAL COMMUNITY LIST

Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community Lists under Priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community. Ecological Communities that are adequately known, and are rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

Priority One: Poorly-known ecological communities:

Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral

leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.

Priority Two: Poorly-known ecological communities:

Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.

Priority Three: Poorly known ecological communities:

(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:

(ii) Communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or;

(iii) Communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc.

Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.

Priority Four: Ecological communities:

Communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.

(i) Rare. Ecological communities known from few occurrences 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 communities are usually represented on conservation lands.

(ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for a higher threat category.

(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.

Priority Five: Conservation Dependent ecological communities:

Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Current as of January 2013

Department of Environment and Conservation (2013)
Definitions, Categories and Criteria for Threatened and Priority Ecological Communities. January 2013. Available: www.dpaw.wa.gov.au

Appendix C: Conservation Codes for Western Australian Flora and Fauna (DPaW 2015)

Specially protected fauna or flora are species* which have been adequately searched for and are deemed to be, in the wild, either rare, at risk of extinction, or otherwise in need of special protection, and have been gazetted as such.

Categories of specially protected fauna and flora are:

T Threatened species
Published as Specially Protected under the *Wildlife Conservation Act* 1950, and 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
Listed as Specially Protected under the *Wildlife Conservation Act 1950,* published under Schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed

Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora (which may also be referred to as Declared Rare Flora).

Species which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such.

IA Migratory birds protected under an international agreement
Listed as Specially Protected under the Wildlife Conservation Act 1950, listed under Schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice.

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), relating to the protection of migratory birds.

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.

1: 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.

2: 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.

3: 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.

4: 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 do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.
(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

*Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies, variety or forma).

Current as of 11th November 2015

Appendix D: Environmental Weed Strategy - Criteria for the Assessment and Rating of Weeds in Terms of their Environmental Impact on Biodiversity (CALM 1999)

ENVIRONMENTAL WEEDS RATING

- **Invasiveness-** ability to invade bushland in good to excellent condition or ability to invade waterways (Score as yes or no).
- **Distribution** – wide current or potential distribution including consideration of known history of wide spread distribution elsewhere in the world (Score as yes or no).
- **Environmental Impacts** – ability to change the structure, composition and function of ecosystems; in particular an ability to form a monoculture in a vegetation community (Score as yes or no).

The Rating System used in the Environmental Weed Strategy for Western Australia

High	A weed species would have to score yes for all three criteria. Rating a weed species as high would indicate prioritising this weed for control and/or research.
Moderate	A weed species would have to score yes for two of the above criteria. Rating a weed species as moderate would indicate that control or research effort should be directed to it if funds are available; however it should be monitored (possibly a reasonably high level of monitoring).
Mild	A weed species scoring one of the criteria. A mild rating would indicate monitoring of the weed and control where appropriate.
Low	A weed species would score none of the criteria. A low ranking would mean that this species would require a low level of monitoring.

Appendix E: Vegetation Condition Scale for the Eremaean and Northern Botanical Provinces (EPA (2015) as adapted from Keighery (1994))

Condition Ranking	Description
E (Excellent)	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
VG (Very Good)	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
G (Good)	More obvious signs of damage caused by human activities since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
P (Poor)	Still retains basic vegetation structure or ability to regenerate to it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
VP (Very Poor)	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
D (Completely Degraded)	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising of weed or crop species with isolated native trees or shrubs.

Appendix F: Vascular Plant Taxa Amalgamated in or Omitted From the Floristic Analysis

Description	Taxon	Reasoning
Omitted Taxa	*Senna* sp.	Taxonomy unclear
Amalgamated Taxa	*Atriplex* ?*nummularia*	Amalgamated with *Atriplex nummularia* subsp. *spathulata*
	Austrostipa ?*scabra*	Amalgamated with *Austrostipa scabra* subsp. *scabra*
	Zygophyllum ?*aurantiacum*	Amalgamated with *Zygophyllum aurantiacum*

Appendix G: OptimClass Combinations Tested for Classification Analysis

Clustering	Resemblance	Transformation
Average Linkage (UPGMA)	Bray-Curtis	none
Average Linkage (UPGMA)	Bray-Curtis	log(2)
Average Linkage (UPGMA)	Bray-Curtis	power 0.333
Average Linkage (UPGMA)	Bray-Curtis	power 0
Average Linkage (UPGMA)	Jaccard	none
Average Linkage (UPGMA)	Jaccard	log(2)
Average Linkage (UPGMA)	Jaccard	power 0.333
Average Linkage (UPGMA)	Jaccard	power 0
Beta flexible (□ = -0.25)	Bray-Curtis	none
Beta flexible (□ = -0.25)	Bray-Curtis	log(2)
Beta flexible (□ = -0.25)	Bray-Curtis	power 0.333
Beta flexible (□ = -0.25)	Bray-Curtis	power 0
Beta flexible (□ = -0.25)	Jaccard	none
Beta flexible (□ = -0.25)	Jaccard	log(2)
Beta flexible (□ = -0.25)	Jaccard	power 0.333
Beta flexible (□ = -0.25)	Jaccard	power 0
Beta flexible (□ = -0.1)	Bray-Curtis	none
Beta flexible (□ = -0.1)	Bray-Curtis	log(2)
Beta flexible (□ = -0.1)	Bray-Curtis	power 0.333
Beta flexible (□ = -0.1)	Bray-Curtis	power 0
Beta flexible (□ = -0.1)	Jaccard	none
Beta flexible (□ = -0.1)	Jaccard	log(2)
Beta flexible (□ = -0.1)	Jaccard	power 0.333
Beta flexible (□ = -0.1)	Jaccard	power 0
Beta flexible (□ = -0.4)	Bray-Curtis	none
Beta flexible (□ = -0.4)	Bray-Curtis	log(2)
Beta flexible (□ = -0.4)	Bray-Curtis	power 0.333
Beta flexible (□ = -0.4)	Bray-Curtis	power 0
Beta flexible (□ = -0.4)	Jaccard	none
Beta flexible (□ = -0.4)	Jaccard	log(2)
Beta flexible (□ = -0.4)	Jaccard	power 0.333
Beta flexible (□ = -0.4)	Jaccard	power 0
Ward's method (= ISS)	Chord (= normalised ED)	none
Ward's method (= ISS)	Chord (= normalised ED)	log(2)
Ward's method (= ISS)	Chord (= normalised ED)	power 0.333
Ward's method (= ISS)	Chord (= normalised ED)	power 0
Ward's method (= ISS)	Euclid	none
Ward's method (= ISS)	Euclid	log(2)
Ward's method (= ISS)	Euclid	power 0.333
Ward's method (= ISS)	Euclid	power 0
Furthest neighbour (CLC)	Bray-Curtis	none
Furthest neighbour (CLC)	Bray-Curtis	log(2)
Furthest neighbour (CLC)	Bray-Curtis	power 0.333
Furthest neighbour (CLC)	Bray-Curtis	power 0
Furthest neighbour (CLC)	Jaccard	none
Furthest neighbour (CLC)	Jaccard	log(2)
Furthest neighbour (CLC)	Jaccard	power 0.333
Furthest neighbour (CLC)	Jaccard	power 0

Appendix H: Vascular Plant Taxa Recorded in the Study Area

Note: * denotes introduced taxon

Family	Taxon
Aizoaceae	*Gunniopsis propinqua* (P3)
	Tetragonia eremaea
Amaranthaceae	*Ptilotus aervoides*
	Ptilotus gaudichaudii subsp. *eremita*
	Ptilotus helipteroides
	Ptilotus holosericeus
	Ptilotus nobilis subsp. *nobilis*
	Ptilotus obovatus
Apiaceae	*Daucus glochidiatus*
Apocynaceae	*Alyxia buxifolia*
	Marsdenia australis
	Rhyncharrhena linearis
Asparagaceae	*Thysanotus manglesianus*
Asphodelaceae	*Bulbine semibarbata*
Asteraceae	*Actinobole uliginosum*
	Angianthus tomentosus
	Brachyscome ciliaris
	Calotis multicaulis
	**Centaurea melitensis*
	Cephalipterum drummondii
	Chrysocephalum puteale
	Cratystylis subspinescens
	Gnephosis brevifolia
	Gnephosis tenuissima
	Ixiochlamys nana
	Minuria cunninghamii
	Olearia muelleri
	Olearia pimeleoides
	Podolepis capillaris
	Podolepis lessonii
	Pogonolepis muelleriana
	Rhodanthe charsleyae
	Rhodanthe chlorocephala subsp. *splendida*
	Rhodanthe floribunda

Asteraceae cont.	*Rhodanthe stricta*
	Rhodanthe uniflora
	Schoenia cassiniana
	**Sonchus oleraceus*
	Streptoglossa liatroides
	Trichanthodium skirrophorum
	Vittadinia cervicularis var. *cervicularis*
	Vittadinia eremaea
	Waitzia fitzgibbonii
Brassicaceae	**Brassica tournefortii*
	Lepidium phlebopetalum
	Menkea australis
	Stenopetalum lineare var. *lineare*
Campanulaceae	*Wahlenbergia gracilenta*
	Wahlenbergia tumidifructa
Casuarinaceae	*Casuarina pauper*
Chenopodiaceae	*Atriplex codonocarpa*
	Atriplex nummularia subsp. *spathulata*
	Atriplex ?acutibractea
	Atriplex ?vesicaria
	Chenopodium curvispicatum
	?Didymanthus roei
	Dissocarpus paradoxus
	Enchylaena tomentosa var. *tomentosa*
	Eriochiton sclerolaenoides
	Maireana carnosa
	Maireana georgei
	Maireana glomerifolia
	Maireana pyramidata
	Maireana radiata
	Maireana sedifolia
	Maireana tomentosa subsp. *tomentosa*
	Maireana trichoptera
	Maireana triptera
	Rhagodia drummondii
	Rhagodia preissii subsp. *preissii*
	Rhagodia spinescens
	Rhagodia ulicina
	Salsola australis
	Sclerolaena cuneata
	Sclerolaena densiflora

Chenopodiaceae cont.	*Sclerolaena diacantha*
	Sclerolaena patenticuspis
	Tecticornia disarticulata
Convolvulaceae	*Convolvulus remotus*
Crassulaceae	*Crassula colorata* var. *acuminata*
Euphorbiaceae	*Euphorbia philochalix*
Fabaceae	*Acacia aneura*
	Acacia aptaneura
	Acacia burkittii
	Acacia caesaneura
	Acacia erinacea
	Acacia hemiteles
	Acacia jennerae
	Acacia merrallii
	Acacia murrayana
	Acacia nyssophylla
	Acacia oswaldii
	Acacia ramulosa var. *ramulosa*
	Acacia tetragonophylla
	Acacia xerophila var. *xerophila*
	Cullen cinereum
	Lotus cruentus
	**Medicago minima*
	Senna artemisioides subsp. *filifolia*
	Senna artemisioides subsp. x *artemisioides*
	Senna sp.
	Swainsona kingii
	Templetonia incrassata
Frankeniaceae	*Frankenia interioris* var. *interioris*
	Frankenia ?l*axiflora*
	Frankenia setosa
Geraniaceae	*Erodium cygnorum*
Goodeniaceae	*Goodenia berardiana*
	Goodenia havilandii
	Goodenia mimuloides
	Goodenia pinnatifida
	Scaevola spinescens
	Velleia rosea

Haloragaceae	*Haloragis trigonocarpa*
Lamiaceae	**Salvia verbenaca* *Spartothamnella canescens*
Loranthaceae	*Amyema gibberula* var. *gibberula*
Malvaceae	*Brachychiton gregorii* *Lawrencia repens* *Sida calyxhymenia* *Sida intricata* *Sida spodochroma*
Myrtaceae	*Eucalyptus celastroides* subsp. *celastroides* *Eucalyptus clelandii* *Eucalyptus concinna* *Eucalyptus horistes* *Eucalyptus hypolaena* *Eucalyptus longissima* *Eucalyptus oleosa* subsp. *oleosa* *Eucalyptus salmonophloia* *Eucalyptus salubris*
Oxalidaceae	*Oxalis perennans*
Pittosporaceae	*Pittosporum angustifolium*
Plantaginaceae	*Plantago drummondii* *Plantago turrifera*
Poaceae	*Aristida contorta* *Austrostipa elegantissima* *Austrostipa eremophila* *Austrostipa scabra* subsp. *scabra* *Dichanthium sericeum* subsp. *humilius* *Enneapogon avenaceus* *Enteropogon ramosus* *Eragrostis australasica* *Eragrostis dielsii* *Eragrostis xerophila* *Paspalidium gracile* *Poaceae* sp. **Rostraria pumila* *Rytidosperma caespitosum* *Sporobolus caroli*

Poaceae cont.	*Triodia* ?*irritans*
Portulacaceae	*Calandrinia eremaea* *Calandrinia ptychosperma*
Primulaceae	**Lysimachia arvensis*
Proteaceae	*Grevillea acuaria* *Grevillea nematophylla* subsp. *nematophylla* *Hakea preissii*
Pteridaceae	*Cheilanthes sieberi* subsp. *sieberi*
Santalaceae	*Santalum acuminatum* *Santalum spicatum*
Sapindaceae	*Alectryon oleifolius* subsp. *canescens* *Dodonaea lobulata* *Dodonaea* ?*viscosa* subsp. *angustissima*
Scrophulariaceae	*Eremophila alternifolia* *Eremophila clarkei* *Eremophila decipiens* subsp. *decipiens* *Eremophila glabra* subsp. *glabra* *Eremophila granitica* *Eremophila interstans* *Eremophila ionantha* *Eremophila latrobei* subsp. *latrobei* *Eremophila miniata* *Eremophila oldfieldii* subsp. *angustifolia* *Eremophila opositifolia* subsp. *angustifolia* *Eremophila parvifolia* subsp. *auricampa* *Eremophila scoparia* *Eremophila* sp. Mt Jackson (G.J. Keighery 4372)
Solanaceae	*Lycium australe* *Solanum cleistogamum* *Solanum nummularium*
Thymelaeaceae	*Pimelea microcephala* subsp. *microcephala*
Zygophyllaceae	*Zygophyllum aurantiacum* *Zygophyllum eremaeum* *Zygophyllum ovatum*

Appendix I: Raw Data Recorded within Quadrats in the Study Area

Site Name: A01
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 22/09/2016
GPS Location: GDA94 Zone 51 326990E 6665062N
Community: 5
Landform Type: Flat, Open depression (other)
Slope Class: Level (0 degrees)
Soil Type: Clay Loam
Soil Colour: Red
Rock Outcrop: No bedrock exposed
CF Abundance: <2%
Vegetation Condition: Northern Vegetation Condition - VG - Very Good
Fire: >5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Eucalyptus salmonophloia*
Upper Stratum 2: *Casuarina pauper*, *Eremophila oldfieldii* subsp. *angustifolia*
Mid Stratum 1: *Eremophila scoparia*
Lower Stratum 1: *Atriplex ?vesicaria*
Lower Stratum 2: *Maireana triptera*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia erinacea	1.5	2
Acacia hemiteles	1	2
Acacia nyssophylla	1	
Acacia oswaldii	2	
Acacia tetragonophylla	2	1
Alectryon oleifolius subsp. *canescens*	4	
Atriplex nummularia subsp. *spathulata*	2	4
Atriplex ?vesicaria	0.7	1
Austrostipa elegantissima	0.5	0.1
Casuarina pauper	8	1
Dodonaea lobulata	1	
Enchylaena tomentosa var. *tomentosa*	0.5	0.2
Eremophila decipiens subsp. *decipiens*	1	1
Eremophila oldfieldii subsp. *angustifolia*	4	1.3
Eremophila parvifolia subsp. *auricampa*	0.5	
Eremophila scoparia	2	3
Eremophila sp. Mt Jackson (G.J. Keighery 4372)	2	1
Eucalyptus salmonophloia	20	40
Maireana georgei	0.2	0.1
Maireana trichoptera	0.1	0.1
Maireana triptera	0.2	2
Olearia muelleri	1	1
Pittosporum angustifolium	2.5	0.3
Ptilotus holosericeus	0.01	0.1
Ptilotus nobilis subsp. *nobilis*	0.2	0.1
Ptilotus obovatus	0.3	0.1
Rhagodia preissii subsp. *preissii*	1	0.1
Scaevola spinescens	1	2
Senna artemisioides subsp. *filifolia*	1	4
Solanum cleistogamum	0.1	0.1

Zygophyllum ovatum	0.01	0.1

PHOTO

Site Name:	A02
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	22/09/2016
GPS Location:	GDA94 Zone 51 326769E 6665003N
Community:	1
Landform Type:	Other, S - Simple slope, M - Mid slope (other)
Slope Class:	Very Gently Inclined (1 degree)
Aspect:	E
Soil Type:	Sandy clay loam (other)
Soil Colour:	Red
Rock Outcrop:	No bedrock exposed
CF Abundance:	<2%
CF Sizes:	2-6mm
CF Types:	Ironstone, Calcrete (other)
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	(other) - Pastoral track, Pig/Animal Disturbance - Rabbits (poo)
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Casuarina pauper*
Mid Stratum 1:	*Acacia hemiteles*, *Senna artemisioides* subsp. *filifolia*
Lower Stratum 1:	*Ptilotus obovatus*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia erinacea	0.3	
Acacia hemiteles	2	6
Acacia nyssophylla	2	0.5
Acacia oswaldii	3	0.5
Alectryon oleifolius subsp. *canescens*	3	
Alyxia buxifolia	2	1
Austrostipa elegantissima	0.3	0.1
Casuarina pauper	8	5
Dodonaea lobulata	1.5	0.3
Eremophila glabra subsp. *glabra*	1	0.2
Eremophila oldfieldii subsp. *angustifolia*	2	0.5
Eriochiton sclerolaenoides	0.1	0.1
Maireana georgei	0.2	0.1
Maireana radiata	0.2	0.1
Maireana sedifolia	0.5	
Maireana trichoptera	0.1	0.1
Ptilotus obovatus	0.3	1
Scaevola spinescens	1	0.4
Senna artemisioides subsp. *filifolia*	1.5	8
Zygophyllum aurantiacum	0.1	0.1
Zygophyllum ovatum	0.1	0.1

PHOTO

Site Name:	A03
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	22/09/2016
GPS Location:	GDA94 Zone 51 327684E 6664839N
Community:	1
Landform Type:	Other, M - Mid slope, S - Simple slope (other)
Slope Class:	Very Gently Inclined (1 degree)
Aspect:	E
Soil Type:	Sandy clay loam (other)
Soil Colour:	Red
Rock Outcrop:	No bedrock exposed
CF Abundance:	<2%
CF Sizes:	2-6mm
CF Types:	Calcrete (other)
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	Pig/Animal Disturbance - Rabbits, (other) - Tracks
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Casuarina pauper*
Upper Stratum 2:	*Acacia hemiteles*, *Senna artemisioides* subsp. *filifolia*
Lower Stratum 1:	*Ptilotus obovatus*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia hemiteles	2	8
Acacia nyssophylla	1	2
Acacia tetragonophylla	1	0.2
Alectryon oleifolius subsp. *canescens*	1	0.1
Alyxia buxifolia	2	0.5
Austrostipa elegantissima	1	0.1
Casuarina pauper	8	2
Dodonaea lobulata		
Eremophila decipiens subsp. *decipiens*	0.5	0.2
Eremophila parvifolia subsp. *auricampa*	0.4	0.2
Eriochiton sclerolaenoides	0.1	0.1
Maireana georgei	0.2	0.1
Ptilotus obovatus	0.3	0.5
Scaevola spinescens	1	1
Senna artemisioides subsp. *filifolia*	1.5	3
Templetonia incrassata	2	0.2
Zygophyllum aurantiacum	0.1	0.1
Zygophyllum ovatum	0.1	0.2

PHOTO

Site Name:	A04
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	22/09/2016
GPS Location:	GDA94 Zone 51 327505E 6664284N
Community:	3
Landform Type:	Other, F - Flat, P - Plain (other)
Slope Class:	Level (0 degrees)
Aspect:	W
Soil Type:	Sandy clay loam (other)
Soil Colour:	Red
Rock Outcrop:	No bedrock exposed
CF Abundance:	50-90%
CF Sizes:	2-6mm, 6-20mm
CF Types:	Ironstone, Calcrete, Quartz (other)
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	(other) - Vehicle tracks, previous exploration
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Casuarina pauper*
Mid Stratum 1:	*Acacia aneura*, *Acacia burkittii*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia aneura	5	15
Acacia burkittii	4	3
Acacia tetragonophylla	1	0.1
Atriplex ?vesicaria	0.5	0.1
Casuarina pauper	12	2
Dodonaea lobulata	1.5	0.5
Eremophila clarkei	1	0.2
Eremophila oldfieldii subsp. *angustifolia*	1	
Maireana sedifolia	0.5	
Maireana trichoptera	0.1	0.1
Ptilotus obovatus	0.3	0.3
Rhyncharrhena linearis	0.1	0.1
Scaevola spinescens	1.5	2
Senna artemisioides subsp. *filifolia*	2	3
Trichanthodium skirrophorum	0.1	0.1
Waitzia fitzgibbonii	0.1	0.1
Zygophyllum ?aurantiacum	0.1	0.1
Zygophyllum ovatum	0.1	0.1

PHOTO

Site Name:	A05
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	22/09/2016
GPS Location:	GDA94 Zone 51 327531E 6663759N
Community:	3
Landform Type:	Other, M - Mid slope, S - Simple slope (other)
Slope Class:	Very Gently Inclined (1 degree)
Aspect:	NE
Soil Type:	Clay Loam
Soil Colour:	Red
Rock Outcrop:	No bedrock exposed
CF Abundance:	<2%
CF Sizes:	2-6mm
CF Types:	Calcrete (other)
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	Pig/Animal Disturbance - Rabbit poo, (other) - Exploration
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Casuarina pauper*
Upper Stratum 2:	*Acacia oswaldii*
Mid Stratum 1:	*Maireana sedifolia*, *Scaevola spinescens*, *Senna artemisioides* subsp. *filifolia*
Lower Stratum 1:	*Ptilotus obovatus*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia aneura	3	
Acacia burkittii	2	
Acacia hemiteles	1	
Acacia jennerae	2	
Acacia nyssophylla	1	
Acacia oswaldii	6	3
Acacia tetragonophylla	2	
Alectryon oleifolius subsp. *canescens*	5	2
Casuarina pauper	12	5
Dodonaea lobulata	1	0.3
Dodonaea ?viscosa subsp. *angustissima*	1	
Eremophila decipiens subsp. *decipiens*	1	1
Eremophila oldfieldii subsp. *angustifolia*	1	
Eriochiton sclerolaenoides	0.1	0.1
Maireana sedifolia	1	0.5
Maireana trichoptera	0.1	0.1
Olearia muelleri	0.5	0.2
Ptilotus obovatus	0.3	0.5
Rhagodia preissii subsp. *preissii*	1	0.3
Scaevola spinescens	1	2
Senna artemisioides subsp. *filifolia*	1.5	3
Solanum nummularium	0.3	
Zygophyllum ovatum	0.1	0.1

PHOTO

Site Name:	A06
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	23/09/2016
GPS Location:	GDA94 Zone 51 328756E 6664798N
Community:	5
Landform Type:	Other, M - Mid slope, S - Simple slope (other)
Slope Class:	Very Gently Inclined (1 degree)
Aspect:	W
Soil Type:	Sandy clay loam (other)
Soil Colour:	Red
Rock Outcrop:	No bedrock exposed
CF Abundance:	<2%
CF Sizes:	2-6mm
CF Types:	Calcrete (other)
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	Pig/Animal Disturbance - Cow tracks, rabbits
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Eucalyptus horistes*
Mid Stratum 1:	*Acacia hemiteles*, *Eremophila scoparia*
Mid Stratum 2:	*Maireana sedifolia*, *Senna artemisioides* subsp. *filifolia*
Lower Stratum 1:	*Ptilotus obovatus*
Lower Stratum 2:	*Maireana trichoptera*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia hemiteles	2	3
Acacia nyssophylla	0.5	1
Austrostipa elegantissima	1	0.1
Austrostipa scabra subsp. *scabra*	0.3	0.1
Casuarina pauper	8	
Chenopodium curvispicatum	0.4	0.1
Crassula colorata var. *acuminata*	0.1	0.1
Dodonaea lobulata	0.5	
Dodonaea ?viscosa subsp. *angustissima*	2	0.4
Eremophila decipiens subsp. *decipiens*	1	0.3
Eremophila scoparia	2	2
Eremophila sp. Mt Jackson (G.J. Keighery 4372)	0.5	0.2
Eriochiton sclerolaenoides	0.1	0.1
Eucalyptus horistes	7	2
Lepidium phlebopetalum	0.1	0.1
Maireana georgei	0.4	0.2
Maireana sedifolia	1.5	2
Maireana trichoptera	0.1	0.1
Maireana triptera	0.3	0.2
Ptilotus obovatus	0.4	3
Rhagodia preissii subsp. *preissii*	1	
Salsola australis	0.1	0.1
Scaevola spinescens	0.3	0.1
Sclerolaena diacantha	0.1	0.1
Sclerolaena patenticuspis	0.1	0.1
Senna artemisioides subsp. *filifolia*	1.5	2
Senna artemisioides subsp. *x artemisioides*	0.3	0.1
Solanum cleistogamum	0.2	0.1

Solanum nummularium	0.3	0.2
Zygophyllum ovatum	0.1	0.1

PHOTO

Site Name: A07
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 23/09/2016
GPS Location: GDA94 Zone 51 328414E 6664699N
Community: 5
Landform Type: Drainage Line
Slope Class: Level (0 degrees)
Soil Type: Clay Loam
Soil Colour: Red
Rock Outcrop: No bedrock exposed
CF Abundance: 2-10%
Vegetation Condition: Northern Vegetation Condition - VG - Very Good
Disturbance: Pig/Animal Disturbance - Cattle tracks
Fire: >5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Eucalyptus salmonophloia*
Upper Stratum 2: *Eucalyptus concinna*
Mid Stratum 1: *Acacia hemiteles*, *Senna* sp.
Lower Stratum 1: *Ptilotus obovatus*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia hemiteles	2	5
Acacia nyssophylla	2	5
Acacia tetragonophylla	1	0.1
Alyxia buxifolia	0.4	0.1
Atriplex ?nummularia	1	0.2
Eremophila decipiens subsp. *decipiens*	1.5	0.3
Eremophila granitica	1.5	0.5
Eremophila ionantha	1	1.2
Eremophila scoparia	1	0.2
Eucalyptus concinna	8	10
Eucalyptus salmonophloia	20	10
Maireana georgei	0.5	0.2
Maireana sedifolia	0.5	0.2
Marsdenia australis	0.1	0.1
Poaceae sp.	0.1	0.1
Ptilotus nobilis subsp. *nobilis*	0.2	0.1
Ptilotus obovatus	0.5	0.5
Rhagodia drummondii	0.3	0.1
Rhagodia spinescens	0.4	0.1
Rhyncharrhena linearis	0.1	0.1
Scaevola spinescens	0.5	0.2
Sclerolaena diacantha	0.1	0.1
Senna artemisioides subsp. *filifolia*	1.5	2
Senna sp.	2	2

PHOTO

Site Name:	A08
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	23/09/2016
GPS Location:	GDA94 Zone 51 328611E 6663924N
Community:	3
Landform Type:	Other, S - Simple slope, L - Lower slope (other)
Slope Class:	Very Gently Inclined (1 degree)
Aspect:	E
Soil Type:	Clay Loam
Soil Colour:	Red
Rock Outcrop:	No bedrock exposed
CF Abundance:	0%
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	Pig/Animal Disturbance - Cow poo, old tracks
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Eucalyptus salmonophloia*
Upper Stratum 2:	*Casuarina pauper*
Mid Stratum 1:	*Acacia hemiteles*, *Eremophila scoparia*, *Senna artemisioides* subsp. *filifolia*
Mid Stratum 2:	*Maireana sedifolia*
Lower Stratum 1:	*Ptilotus obovatus*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia hemiteles	1.5	10
Acacia nyssophylla	0.5	0.2
Acacia tetragonophylla	1	0.1
Austrostipa elegantissima	0.5	
Casuarina pauper	8	1
Dodonaea lobulata	1	1
Eremophila parvifolia subsp. *auricampa*	1	0.3
Eremophila scoparia	2	0.5
Eucalyptus salmonophloia	20	4
Maireana georgei	0.3	
Maireana sedifolia	1	3
Ptilotus obovatus	0.3	0.5
Rhagodia ulicina	1	
Scaevola spinescens	1	1
Senna artemisioides subsp. *filifolia*	1.5	15
Templetonia incrassata	2	
Zygophyllum eremaeum	0.1	0.1

PHOTO

Site Name: A09
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 23/09/2016
GPS Location: GDA94 Zone 51 326593E 6662895N
Community: 4
Landform Type: Flat
Slope Class: Level (0 degrees)
Soil Type: Sandy Loam
Soil Colour: Red
Rock Outcrop: No bedrock exposed
CF Abundance: 0%
Vegetation Condition: Northern Vegetation Condition - VG - Very Good
Disturbance: Pig/Animal Disturbance - Cattle tracks, (other) - Exploration - old lines
Fire: >5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Eucalyptus concinna*
Mid Stratum 1: *Eremophila interstans*
Mid Stratum 2: *Acacia hemiteles*, *Dodonaea lobulata*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia hemiteles	1.5	2
Acacia jennerae	1	
Acacia nyssophylla	1	1
Dodonaea lobulata	1.5	10
Eremophila decipiens subsp. *decipiens*	1	0.2
Eremophila interstans	4	2
Eucalyptus concinna	10	10
Eucalyptus oleosa subsp. *oleosa*	10	
Ptilotus obovatus	0.3	0.3
Rhagodia preissii subsp. *preissii*	1	0.5
Scaevola spinescens	0.1	0.1
Senna artemisioides subsp. *filifolia*	1.5	1

PHOTO

Site Name: A10
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 23/09/2016
GPS Location: GDA94 Zone 51 329366E 6662407N
Community: 5
Landform Type: Flat
Slope Class: Level (0 degrees)
Soil Type: Sandy clay loam (other)
Soil Colour: Red
Rock Outcrop: No bedrock exposed
CF Abundance: <2%
CF Sizes: 2-6mm
CF Types: Ironstone, Calcrete (other)
Vegetation Condition: Northern Vegetation Condition - VG - Very Good
Disturbance: Pig/Animal Disturbance - Cattle tracks, poo, Old tracks (other)
Fire: >5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Eucalyptus salmonophloia*
Upper Stratum 2: *Casuarina pauper*
Mid Stratum 1: *Eremophila scoparia*
Mid Stratum 2: *Maireana sedifolia*, *Senna artemisioides* subsp. *filifolia*
Lower Stratum 1: *Ptilotus obovatus*
Lower Stratum 2: *Maireana georgei*, *Maireana glomerifolia*, *Maireana triptera*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Aristida contorta	0.1	
Atriplex ?vesicaria	0.5	1
Austrostipa scabra subsp. *scabra*	0.2	0.1
Casuarina pauper	6	1
Cratystylis subspinescens	1	3
Dodonaea lobulata	1.5	
Enchylaena tomentosa var. *tomentosa*	0.3	0.2
Enneapogon avenaceus	0.1	
Eremophila glabra subsp. *glabra*	1.5	1
Eremophila oldfieldii subsp. *angustifolia*	3	
Eremophila scoparia	2	2
Eriochiton sclerolaenoides	0.1	0.1
Eucalyptus salmonophloia	20	2
Lawrencia repens	0.1	0.1
Maireana georgei	0.2	0.3
Maireana glomerifolia	0.2	0.2
Maireana sedifolia	1	5
Maireana tomentosa subsp. *tomentosa*	0.2	
Maireana trichoptera	0.1	0.1
Maireana triptera	0.3	0.3
Paspalidium gracile	0.2	0.2
Pittosporum angustifolium	0.3	0.1
Ptilotus nobilis subsp. *nobilis*	0.3	0.1
Ptilotus obovatus	0.3	1
Scaevola spinescens	1	0.2
Sclerolaena densiflora	0.1	
Sclerolaena diacantha	0.1	0.2
Senna artemisioides subsp. *filifolia*	1	3

Senna artemisioides subsp. *x artemisioides*	1	0.3
Solanum cleistogamum	0.2	0.1
Solanum nummularium	0.3	0.1
Streptoglossa liatroides	0.1	
Vittadinia eremaea	0.1	

PHOTO

Site Name:	A11
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	23/09/2016
GPS Location:	GDA94 Zone 51 329036E 6662342N
Community:	3
Landform Type:	Other, S - Simple slope, L - Lower slope (other)
Slope Class:	Very Gently Inclined (1 degree)
Aspect:	W
Soil Type:	Clay Loam
Soil Colour:	Red
Rock Outcrop:	No bedrock exposed
CF Abundance:	2-10%
CF Sizes:	2-6mm, 6-20mm
CF Types:	Quartz, Ironstone (other)
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	(other) - Old exploration tracks
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Acacia burkittii*
Upper Stratum 2:	*Dodonaea lobulata*
Mid Stratum 1:	*Scaevola spinescens*, *Senna artemisioides* subsp. *filifolia*
Lower Stratum 1:	*Ptilotus obovatus*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia burkittii	4	10
Aristida contorta	0.1	0.1
Austrostipa elegantissima	0.5	0.1
Austrostipa scabra subsp. *scabra*	0.2	0.1
Crassula colorata var. *acuminata*	0.1	0.1
Dodonaea lobulata	2.5	2
Enchylaena tomentosa var. *tomentosa*	0.3	0.1
Eremophila alternifolia	1	0.2
Eremophila granitica	1	0.5
Eremophila oldfieldii subsp. *angustifolia*	1.5	0.3
Goodenia havilandii	0.1	0.1
Maireana georgei	0.3	0.1
Maireana sedifolia	1	0.3
Ptilotus aervoides	0.1	0.1
Ptilotus nobilis subsp. *nobilis*	0.2	0.1
Ptilotus obovatus	0.3	0.2
Scaevola spinescens	1	1
Senna artemisioides subsp. *filifolia*	1	0.3
Senna artemisioides subsp. *x artemisioides*	0.7	1
Solanum cleistogamum	0.1	0.1
Velleia rosea	0.1	0.1

PHOTO

Site Name:	A12
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	24/09/2016
GPS Location:	GDA94 Zone 51 327868E 6662144N
Community:	2
Landform Type:	Other, S - Simple slope, U - Upper slope (other)
Slope Class:	Gently Inclined (3 degrees)
Aspect:	S
Soil Type:	Clay Loam
Soil Colour:	White, Pink (other)
Rock Outcrop:	No bedrock exposed
CF Abundance:	20-50%
CF Sizes:	2-6mm, 6-20mm, 20-60mm, 60-200mm
CF Types:	Quartz, eroded Granite (other)
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	(other) - Old exploration
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Eucalyptus clelandii*
Mid Stratum 1:	*Eremophila* sp. Mt Jackson (G.J. Keighery 4372), *Santalum spicatum*
Mid Stratum 2:	*Acacia erinacea*, *Maireana sedifolia*
Lower Stratum 1:	*Eremophila parvifolia* subsp. *auricampa*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia erinacea	1	0.5
Casuarina pauper	0.2	0.1
Dodonaea lobulata	0.4	0.1
Eremophila glabra subsp. *glabra*	0.5	0.1
Eremophila parvifolia subsp. *auricampa*	0.3	0.5
Eremophila sp. Mt Jackson (G.J. Keighery 4372)	2	1
Eriochiton sclerolaenoides	0.1	0.1
Eucalyptus celastroides subsp. *celastroides*	8	2
Eucalyptus clelandii	8	10
Maireana sedifolia	0.5	0.2
Maireana trichoptera	0.1	0.1
Olearia muelleri	0.3	0.2
Santalum spicatum	1.5	0.3
Scaevola spinescens	0.2	0.4
Senna artemisioides subsp. *filifolia*	0.5	0.5
Zygophyllum ovatum	0.1	0.1

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Site Name:	A13
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	24/09/2016
GPS Location:	GDA94 Zone 51 326474E 6661698N
Community:	3
Landform Type:	Other, S - Simple slope, M - Mid slope (other)
Slope Class:	Very Gently Inclined (1 degree)
Aspect:	W
Soil Type:	Clay Loam
Soil Colour:	Red
Rock Outcrop:	No bedrock exposed
CF Abundance:	2-10%
CF Sizes:	2-6mm, 6-20mm
CF Types:	Granite, Calcrete (other)
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	(other) - Old exploration
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Casuarina pauper*

Mid Stratum 1: *Acacia burkittii*

Mid Stratum 2: *Dodonaea lobulata*, *Eremophila oldfieldii* subsp. *angustifolia*, *Senna artemisioides* subsp. *filifolia*

Lower Stratum 1: *Maireana sedifolia*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia burkittii	3	2
Acacia hemiteles	2	
Acacia oswaldii	1	0.4
Acacia tetragonophylla	2	0.5
Atriplex nummularia subsp. *spathulata*	2	
Atriplex ?vesicaria	0.5	0.2
Casuarina pauper	8	3
Dodonaea lobulata	1.5	5
Eremophila granitica	1	0.5
Eremophila oldfieldii subsp. *angustifolia*	2	1.3
Eremophila sp. Mt Jackson (G.J. Keighery 4372)	2.5	
Maireana sedifolia	1	3
Olearia muelleri	0.5	0.4
Ptilotus obovatus	0.3	0.2
Scaevola spinescens	1	2
Senna artemisioides subsp. *filifolia*	1.5	5

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Site Name:	A14
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	24/09/2016
GPS Location:	GDA94 Zone 51 325654E 6660935N
Community:	3
Landform Type:	Other, S - Simple slope, M - Mid slope (other)
Slope Class:	Very Gently Inclined (1 degree)
Soil Type:	Sandy clay loam (other)
Soil Colour:	Red
Rock Outcrop:	No bedrock exposed
CF Abundance:	50-90%
CF Sizes:	2-6mm, 6-20mm
CF Types:	Ironstone
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	Pig/Animal Disturbance - Cattle tracks, (other) - Old exploration tracks
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Casuarina pauper*
Upper Stratum 2:	*Acacia burkittii*, *Eremophila oldfieldii* subsp. *angustifolia*, *Santalum spicatum*
Mid Stratum 1:	*Dodonaea lobulata*, *Eremophila oppositifolia* subsp. *angustifolia*, *Scaevola spinescens*
Lower Stratum 1:	*Ptilotus obovatus*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia burkittii	4	6
Acacia erinacea	1	0.5
Acacia tetragonophylla	2.5	1
Casuarina pauper	10	3
Dodonaea lobulata	1.5	1.5
Eremophila clarkei	1.5	
Eremophila oldfieldii subsp. *angustifolia*	4	1
Eremophila oppositifolia subsp. *angustifolia*	1.5	0.3
Eucalyptus longissima	10	
Grevillea nematophylla subsp. *nematophylla*	6	
Olearia muelleri	0.5	0.5
Pimelea microcephala subsp. *microcephala*	0.5	0.1
Ptilotus obovatus	0.4	0.3
Santalum spicatum	3	0.3
Scaevola spinescens	1.5	2
Senna artemisioides subsp. *filifolia*	1.5	1
Templetonia incrassata	1	0.2
Triodia ?irritans	0.2	

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Site Name: A15
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 24/09/2016
GPS Location: GDA94 Zone 51 327573E 6661341N
Community: 6
Landform Type: Open Depression
Slope Class: Very Gently Inclined (1 degree)
Aspect: SE
Soil Type: Sandy clay loam (other)
Soil Colour: Red
Rock Outcrop: No bedrock exposed
CF Abundance: <2%
CF Sizes: 2-6mm
CF Types: Quartz, Ironstone (other)
Vegetation Condition: Northern Vegetation Condition - VG - Very Good
Disturbance: Pig/Animal Disturbance - Cattle tracks and poo, (other) - Old exploration
Fire: >5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Casuarina pauper*
Mid Stratum 1: *Eremophila glabra* subsp. *glabra*, *Eremophila scoparia*, *Senna artemisioides* subsp. *filifolia*
Mid Stratum 2: *Maireana sedifolia*
Lower Stratum 1: *Maireana trichoptera*, *Sclerolaena diacantha*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Aristida contorta	0.1	0.1
Atriplex codonocarpa	0.1	0.1
Atriplex nummularia subsp. *spathulata*	0.5	0.2
Atriplex ?vesicaria	0.3	0.3
Austrostipa elegantissima	0.3	0.1
Austrostipa scabra subsp. *scabra*	0.1	0.2
Bulbine semibarbata	0.1	0.1
Casuarina pauper	10	2
?Didymanthus roei	0.1	0.1
Dodonaea lobulata	0.5	0.2
Enchylaena tomentosa var. *tomentosa*	0.4	0.1
Enneapogon avenaceus	0.1	0.1
Eremophila glabra subsp. *glabra*	1.5	0.7
Eremophila oldfieldii subsp. *angustifolia*	2	0.5
Eremophila scoparia	2	1
Erodium cygnorum	0.1	0.1
Eucalyptus salmonophloia	20	
Euphorbia philochalix	0.1	0.1
Frankenia interioris var. *interioris*	0.3	0.5
Frankenia ?laxiflora	0.1	0.1
Frankenia setosa	0.2	0.1
Gnephosis brevifolia	0.1	0.1
Lawrencia repens	0.1	0.1
Lycium australe	0.3	0.1
Maireana georgei	0.2	0.1
Maireana glomerifolia	0.3	0.3
Maireana sedifolia	1	4
Maireana tomentosa subsp. *tomentosa*	0.1	0.2

Maireana trichoptera	0.1	0.2
Maireana triptera	0.4	0.1
Minuria cunninghamii	0.3	0.1
Pimelea microcephala subsp. *microcephala*	0.5	0.1
Plantago drummondii	0.1	0.1
Ptilotus holosericeus	0.1	0.1
Ptilotus obovatus	0.3	0.5
Rhagodia ulicina	0.5	0.3
Rytidosperma caespitosum	0.1	0.1
Scaevola spinescens	1	0.2
Sclerolaena cuneata	0.1	0.1
Sclerolaena diacantha	0.1	0.3
Senna artemisioides subsp. *filifolia*	1.5	1
Sida calyxhymenia	0.3	0.1
Solanum cleistogamum	0.3	0.1
**Sonchus oleraceus*	0.1	0.1
Streptoglossa liatroides	0.1	0.1
Swainsona kingii	0.1	0.1
Tecticornia disarticulata	1	1
Thysanotus manglesianus	0.1	0.1

PHOTO

Site Name:	A16
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	24/09/2016
GPS Location:	GDA94 Zone 51 328398E 6661103N
Community:	5
Landform Type:	Flat
Slope Class:	Level (0 degrees)
Soil Type:	Clay Loam
Soil Colour:	Red
Rock Outcrop:	No bedrock exposed
CF Abundance:	0%
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	Pig/Animal Disturbance - Cow poo, (other) - Old exploration tracks
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Eucalyptus salubris*
Mid Stratum 1:	*Eremophila glabra* subsp. *glabra*, *Eremophila interstans*
Mid Stratum 2:	*Maireana sedifolia*
Lower Stratum 1:	*Atriplex ?vesicaria*, *Ptilotus obovatus*, *Tecticornia disarticulata*
Lower Stratum 2:	*Chenopodium curvispicatum*, *Maireana georgei*, *Maireana triptera*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Atriplex codonocarpa	0.1	
Atriplex ?vesicaria	0.5	2
Austrostipa elegantissima	0.3	0.1
Austrostipa scabra subsp. *scabra*	0.2	0.1
Cephalipterum drummondii	0.1	
Chenopodium curvispicatum	0.3	0.2
Enchylaena tomentosa var. *tomentosa*	0.3	0.1
Enneapogon avenaceus	0.1	
Eremophila glabra subsp. *glabra*	2	0.3
Eremophila interstans	2.5	0.3
Eriochiton sclerolaenoides	0.1	0.1
Eucalyptus salmonophloia	20	
Eucalyptus salubris	10	10
Frankenia interioris var. *interioris*	0.3	0.1
Lycium australe	0.5	0.1
Maireana georgei	0.2	0.2
Maireana pyramidata	0.5	
Maireana sedifolia	1	3
Maireana tomentosa subsp. *tomentosa*	0.1	0.1
Maireana trichoptera	0.1	0.1
Maireana triptera	0.3	0.5
Pimelea microcephala subsp. *microcephala*	0.4	0.1
Ptilotus nobilis subsp. *nobilis*	0.2	0.1
Ptilotus obovatus	0.3	0.3
Rhagodia ulicina	0.5	0.5
Scaevola spinescens	0.3	0.1
Sclerolaena diacantha	0.1	0.1
Senna artemisioides subsp. *filifolia*	0.3	0.1
Senna artemisioides subsp. *x artemisioides*	1	
Sida calyxhymenia	0.3	
Solanum cleistogamum	0.2	0.1

Tecticornia disarticulata	0.5	3
Templetonia incrassata	2	
Zygophyllum ovatum	0.1	0.1

PHOTO

Site Name:	A17
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	24/09/2016
GPS Location:	GDA94 Zone 51 328895E 6661023N
Community:	3
Landform Type:	Hillock
Slope Class:	Gently Inclined (3 degrees)
Aspect:	S
Soil Type:	Clay Loam
Soil Colour:	Red
Rock Outcrop:	No bedrock exposed
CF Abundance:	>90%
CF Sizes:	2-6mm, 6-20mm, 20-60mm, 60-200mm
CF Types:	Laterite, Calcrete (other)
Vegetation Condition:	Northern Vegetation Condition - G - Good
Disturbance:	Limited Clearing - Clearing for exploration
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Casuarina pauper*
Upper Stratum 2:	*Alectryon oleifolius* subsp. *canescens*, *Santalum spicatum*
Mid Stratum 1:	*Eremophila oldfieldii* subsp. *angustifolia*, *Senna artemisioides* subsp. *filifolia*
Mid Stratum 2:	*Dodonaea lobulata*, *Scaevola spinescens*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia erinacea	1	
Acacia oswaldii	4	
Acacia tetragonophylla	0.5	0.1
Alectryon oleifolius subsp. *canescens*	3	1
Austrostipa scabra subsp. *scabra*	0.1	0.1
Casuarina pauper	8	6
Dodonaea lobulata	1	1
Eremophila oldfieldii subsp. *angustifolia*	3	1
Eremophila oppositifolia subsp. *angustifolia*	2	
Eremophila sp. Mt Jackson (G.J. Keighery 4372)	2	
Olearia muelleri	0.3	1
Ptilotus helipteroides	0.1	0.1
Ptilotus obovatus	0.3	0.2
Santalum spicatum	3	0.3
Scaevola spinescens	1.5	1.5
Senna artemisioides subsp. *filifolia*	1.5	0.5
Templetonia incrassata	2.5	1
Zygophyllum ovatum	0.1	0.1

PHOTO

Site Name:	A18
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	24/09/2016
GPS Location:	GDA94 Zone 51 328968E 6661204N
Community:	2
Landform Type:	Other, S - Simple slope, M - Mid slope (other)
Slope Class:	Gently Inclined (3 degrees)
Aspect:	N
Soil Type:	Light Clay
Soil Colour:	Pink (other)
Rock Outcrop:	No bedrock exposed
CF Abundance:	2-10%
CF Sizes:	2-6mm, 6-20mm, 20-60mm
CF Types:	Calcrete (other)
Vegetation Condition:	Northern Vegetation Condition - G - Good
Disturbance:	Limited Clearing - Clearing for exploration
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Eucalyptus clelandii*
Upper Stratum 2:	*Eucalyptus celastroides* subsp. *celastroides*
Mid Stratum 1:	*Maireana sedifolia*
Lower Stratum 1:	*Olearia muelleri*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia erinacea	0.3	0.1
Atriplex ?vesicaria	0.5	0.2
Casuarina pauper	1	0.1
Eremophila parvifolia subsp. *auricampa*	0.4	1
Eremophila scoparia	1	0.5
Eremophila sp. Mt Jackson (G.J. Keighery 4372)	5	1
Eucalyptus celastroides subsp. *celastroides*	7	10
Eucalyptus clelandii	10	5
Maireana sedifolia	1	4
Maireana trichoptera	0.1	0.1
Olearia muelleri	0.3	0.5
Ptilotus obovatus	0.3	0.1
Scaevola spinescens	0.5	0.2
Sclerolaena diacantha	0.1	0.1
Senna artemisioides subsp. *filifolia*	0.4	0.1

PHOTO

Site Name: A19
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 24/09/2016
GPS Location: GDA94 Zone 51 328543E 6660754N
Community: 5
Landform Type: Open Depression
Slope Class: Very Gently Inclined (1 degree)
Aspect: SW
Soil Type: Sandy clay loam (other)
Soil Colour: Red
Rock Outcrop: No bedrock exposed
CF Abundance: <2%
CF Sizes: 2-6mm
CF Types: Quartz, Ironstone (other)
Vegetation Condition: Northern Vegetation Condition - VG - Very Good
Disturbance: (other) - Old exploration tracks
Fire: >5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Eucalyptus horistes*
Upper Stratum 2: *Casuarina pauper*
Mid Stratum 1: *Eremophila scoparia*
Mid Stratum 2: *Maireana sedifolia*, *Senna artemisioides* subsp. *filifolia*
Lower Stratum 1: *Maireana trichoptera*, *Sclerolaena diacantha*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Alectryon oleifolius subsp. *canescens*	3	
Angianthus tomentosus	0.1	0.2
Austrostipa elegantissima	0.3	0.1
Austrostipa scabra subsp. *scabra*	0.1	0.1
Casuarina pauper	7	2
Cratystylis subspinescens	0.5	0.2
Eremophila parvifolia subsp. *auricampa*	0.4	0.2
Eremophila scoparia	1.5	0.5
Eriochiton sclerolaenoides	0.1	0.1
Eucalyptus horistes	14	1
Eucalyptus salmonophloia	20	
Gnephosis brevifolia	0.1	0.1
Lawrencia repens	0.1	0.1
Lepidium phlebopetalum	0.1	0.1
Lycium australe	1.5	0.5
Maireana sedifolia	1	5
Maireana trichoptera	0.1	0.1
Maireana triptera	0.3	0.1
Minuria cunninghamii	0.3	0.2
Ptilotus nobilis subsp. *nobilis*	0.2	0.1
Ptilotus obovatus	0.2	0.1
Scaevola spinescens	1	0.3
Sclerolaena diacantha	0.1	0.1
Senna artemisioides subsp. *filifolia*	1	1
Zygophyllum aurantiacum	0.1	0.1
Zygophyllum ovatum	0.1	0.1

PHOTO

Site Name:	A20
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	24/09/2016
GPS Location:	GDA94 Zone 51 326270E 6661846N
Community:	3
Landform Type:	Open Depression
Slope Class:	Very Gently Inclined (1 degree)
Soil Type:	Clay Loam
Soil Colour:	Red
Rock Outcrop:	No bedrock exposed
CF Abundance:	0%
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	Pig/Animal Disturbance - Cattle tracks, (other) - Old exploration tracks
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Acacia burkittii*
Mid Stratum 1:	*Atriplex nummularia* subsp. *spathulata*
Mid Stratum 2:	*Dodonaea lobulata*, *Maireana sedifolia*, *Senna artemisioides* subsp. *filifolia*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia burkittii	3.5	25
Alyxia buxifolia	0.3	0.2
Atriplex nummularia subsp. *spathulata*	2	2
Austrostipa scabra subsp. *scabra*	0.2	0.1
Casuarina pauper	8	
Cephalipterum drummondii	0.1	0.1
Dodonaea lobulata	1.5	4
Enchylaena tomentosa var. *tomentosa*	0.1	0.1
Eremophila oldfieldii subsp. *angustifolia*	4	
Eremophila oppositifolia subsp. *angustifolia*	1.5	0.2
Goodenia berardiana	0.1	0.1
Maireana georgei	0.2	0.1
Maireana sedifolia	0.5	0.5
Marsdenia australis		
Ptilotus obovatus	0.2	0.2
Scaevola spinescens	1.5	0.5
Senna artemisioides subsp. *filifolia*	1.5	1.5
Solanum cleistogamum	0.2	0.1

PHOTO

Site Name:	A21
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	24/09/2016
GPS Location:	GDA94 Zone 51 330310E 6659385N
Community:	5
Landform Type:	Lower Slope
Slope Class:	Very Gently Inclined (1 degree)
Aspect:	N
Soil Type:	Clay Loam
Soil Colour:	Red
Rock Outcrop:	No bedrock exposed
CF Abundance:	20-50%
CF Sizes:	2-6mm
CF Types:	Quartz, Ironstone (other)
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	Grazing - Cattle grazing
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Eucalyptus salmonophloia*
Upper Stratum 2:	*Casuarina pauper*
Mid Stratum 1:	*Alectryon oleifolius* subsp. *canescens*
Mid Stratum 2:	*Eremophila scoparia*
Lower Stratum 1:	*Maireana sedifolia*, *Senna artemisioides* subsp. *filifolia*
Lower Stratum 2:	*Maireana georgei*, *Maireana trichoptera*, *Ptilotus obovatus*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia hemiteles	0.5	0.2
Alectryon oleifolius subsp. *canescens*	3	1
Austrostipa elegantissima	0.3	0.1
Austrostipa scabra subsp. *scabra*	0.3	0.1
Casuarina pauper	8	
Eremophila oppositifolia subsp. *angustifolia*	1	
Eremophila scoparia	2	2
Eriochiton sclerolaenoides	0.1	0.1
Eucalyptus salmonophloia	20	10
Lycium australe	1	0.2
Maireana georgei	0.2	0.1
Maireana pyramidata	0.3	
Maireana sedifolia	1	2
Maireana trichoptera	0.1	0.1
Maireana triptera	0.3	0.1
Marsdenia australis	0.1	0.1
Pimelea microcephala subsp. *microcephala*	1	0.2
Ptilotus nobilis subsp. *nobilis*	0.2	0.1
Ptilotus obovatus	0.2	0.1
Rhagodia ulicina	1	0.2
Scaevola spinescens	0.5	1
Sclerolaena diacantha	0.1	0.1
Senna artemisioides subsp. *filifolia*	1	3
Senna artemisioides subsp. *x artemisioides*	1	0.2
Zygophyllum ovatum	0.1	

PHOTO

Site Name:	A22
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	25/09/2016
GPS Location:	GDA94 Zone 51 330132E 6659667N
Community:	6
Landform Type:	Lower Slope
Slope Class:	Very Gently Inclined (1 degree)
Aspect:	SSE
Soil Type:	Clay Loam
Soil Colour:	Red
Rock Outcrop:	No bedrock exposed
CF Abundance:	20-50%
CF Sizes:	2-6mm
CF Types:	Quartz, Ironstone (other)
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	Pig/Animal Disturbance - Cow poo

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Casuarina pauper*
Upper Stratum 2:	*Eremophila oldfieldii* subsp. *angustifolia*
Mid Stratum 1:	*Dodonaea lobulata*, *Scaevola spinescens*
Mid Stratum 2:	*Maireana sedifolia*, *Senna artemisioides* subsp. *filifolia*
Lower Stratum 1:	*Ptilotus obovatus*
Lower Stratum 2:	*Maireana trichoptera*, *Maireana triptera*, *Sclerolaena diacantha*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia erinacea	0.5	0.5
Acacia hemiteles	0.5	0.3
Acacia oswaldii	0.5	0.2
Acacia tetragonophylla	0.5	0.2
Angianthus tomentosus	0.1	0.1
Aristida contorta	0.1	0.1
Atriplex codonocarpa	0.2	0.1
Atriplex ?vesicaria	0.5	0.5
Austrostipa elegantissima	0.3	0.1
Austrostipa scabra subsp. *scabra*	0.2	0.1
Brachyscome ciliaris	0.1	0.1
Bulbine semibarbata	0.1	0.1
Casuarina pauper	7	2
Cephalipterum drummondii	0.1	0.1
Crassula colorata var. *acuminata*	0.1	0.1
Dodonaea lobulata	1.5	2
Dodonaea ?viscosa subsp. *angustissima*	1.5	1
Enneapogon avenaceus	0.1	0.1
Enteropogon ramosus	0.2	0.1
Eragrostis xerophila	0.1	0.1
Eremophila decipiens subsp. *decipiens*	1.5	1
Eremophila granitica	1	0.2
Eremophila oldfieldii subsp. *angustifolia*	2.5	1
Eriochiton sclerolaenoides	0.1	0.1
Euphorbia philochalix	0.1	0.1
Gnephosis brevifolia	0.1	0.1
Lawrencia repens	0.1	0.1
Maireana glomerifolia	0.3	0.1

Maireana pyramidata	1.5	1.5
Maireana sedifolia	1	3
Maireana tomentosa subsp. *tomentosa*	0.1	0.1
Maireana trichoptera	0.1	0.3
Maireana triptera	0.2	0.1
Pittosporum angustifolium	0.3	0.1
Poaceae sp.	0.1	0.1
Ptilotus holosericeus	0.1	0.1
Ptilotus obovatus	0.3	1
Rhagodia ulicina	1	0.3
Scaevola spinescens	1	4
Sclerolaena cuneata	0.1	0.1
Sclerolaena diacantha	0.1	0.1
Senna artemisioides subsp. *filifolia*	1	1
Sida calyxhymenia	0.5	0.1
Solanum cleistogamum	0.2	0.1
Sporobolus caroli	0.1	0.1
Templetonia incrassata	0.3	0.1
Vittadinia cervicularis var. *cervicularis*	0.1	0.1
Vittadinia eremaea	0.1	0.1

PHOTO

Site Name: A23
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 25/09/2016
GPS Location: GDA94 Zone 51 329782E 6659369N
Community: 6
Landform Type: Drainage Line
Slope Class: Very Gently Inclined (1 degree)
Aspect: S
Soil Type: Clayey sand (other)
Soil Colour: Red
Rock Outcrop: No bedrock exposed
CF Abundance: <2%
CF Sizes: 2-6mm
CF Types: Ironstone
Vegetation Condition: Northern Vegetation Condition - VG - Very Good
Disturbance: Pig/Animal Disturbance - Cow poo
Fire: >5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Casuarina pauper*
Upper Stratum 2: *Eremophila oldfieldii* subsp. *angustifolia*, *Templetonia incrassata*
Mid Stratum 1: *Dodonaea lobulata*, *Eremophila scoparia*
Mid Stratum 2: *Eremophila decipiens* subsp. *decipiens*, *Maireana sedifolia*, *Senna artemisioides* subsp. *filifolia*
Lower Stratum 1: *Ptilotus obovatus*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia burkittii	1.5	0.3
Acacia erinacea	0.5	0.2
Acacia oswaldii	4	1
Acacia tetragonophylla	1.5	0.3
Atriplex ?vesicaria	0.3	0.2
Austrostipa elegantissima	0.3	0.1
Austrostipa scabra subsp. *scabra*	0.1	0.1
Casuarina pauper	10	8
Crassula colorata var. *acuminata*	0.1	0.1
Dodonaea lobulata	2	10
Eremophila decipiens subsp. *decipiens*	1	1.5
Eremophila granitica	1	2
Eremophila oldfieldii subsp. *angustifolia*	4	3
Eremophila oppositifolia subsp. *angustifolia*	1	1
Eremophila scoparia	1	1
Grevillea acuaria	2	2
Hakea preissii	1.5	0.2
Maireana georgei	0.2	0.1
Maireana sedifolia	0.5	2
Maireana tomentosa subsp. *tomentosa*	0.1	0.1
Marsdenia australis	0.1	0.1
Olearia muelleri	0.5	0.5
Olearia pimeleoides	1	1
Pimelea microcephala subsp. *microcephala*	1	0.5
Pittosporum angustifolium	4	0.5
Poaceae sp.	0.1	0.1
Ptilotus obovatus	0.2	0.5

Rhagodia ulicina	1	2
Rytidosperma caespitosum	0.3	0.1
Scaevola spinescens	1.5	1
Sclerolaena densiflora	0.1	0.1
Sclerolaena diacantha	0.1	0.1
Senna artemisioides subsp. *filifolia*	1	2
Senna artemisioides subsp. *x artemisioides*	0.5	0.5
Sida calyxhymenia	0.5	0.2
Templetonia incrassata	4	6

PHOTO

Site Name: A24
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 25/09/2016
GPS Location: GDA94 Zone 51 329324E 6659164N
Community: 2
Landform Type: Other, H - Hillock, U - Upper slope (other)
Slope Class: Gently Inclined (3 degrees)
Aspect: S
Soil Type: Sandy clay loam (other)
Soil Colour: Red, Brown (other)
Rock Outcrop: No bedrock exposed
CF Abundance: 50-90%
CF Sizes: 2-6mm
CF Types: Ironstone, Calcrete (other)
Vegetation Condition: Northern Vegetation Condition - VG - Very Good
Disturbance: Pig/Animal Disturbance - Cattle tracks and poo, (other) - Logging, Old exploration
Fire: >5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Eucalyptus hypolaena*
Mid Stratum 1: *Eremophila oppositifolia* subsp. *angustifolia*, *Eremophila* sp. Mt Jackson (G.J. Keighery 4372)
Mid Stratum 2: *Scaevola spinescens*, *Senna artemisioides* subsp. *filifolia*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia erinacea	1	0.3
Acacia hemiteles	0.3	0.1
Acacia merrallii	2	
Casuarina pauper	0.5	0.1
Eremophila glabra subsp. *glabra*	1.5	0.5
Eremophila oppositifolia subsp. *angustifolia*	1.5	0.3
Eremophila parvifolia subsp. *auricampa*	0.1	0.1
Eremophila scoparia	1	
Eremophila sp. Mt Jackson (G.J. Keighery 4372)	1.5	0.5
Eucalyptus clelandii	12	
Eucalyptus hypolaena	12	15
Maireana sedifolia	0.5	0.5
Scaevola spinescens	1	2
Senna artemisioides subsp. *filifolia*	1	0.5

PHOTO

Site Name:	A25
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	25/09/2016
GPS Location:	GDA94 Zone 51 329090E 6659247N
Community:	5
Landform Type:	Other, S - Simple slope, L - Lower slope (other)
Slope Class:	Very Gently Inclined (1 degree)
Aspect:	SW
Soil Type:	Sandy clay loam (other)
Soil Colour:	Red
Rock Outcrop:	No bedrock exposed
CF Abundance:	<2%
CF Sizes:	2-6mm
CF Types:	Ironstone
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	Pig/Animal Disturbance - Cattle tracks and poo, (other) - Old exploration
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Eucalyptus salubris*
Mid Stratum 1:	*Tecticornia disarticulata*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Austrostipa scabra subsp. *scabra*	0.3	0.2
Enchylaena tomentosa var. *tomentosa*	0.3	0.1
Eriochiton sclerolaenoides	0.1	0.1
Eucalyptus salmonophloia	20	
Eucalyptus salubris	15	10
Gnephosis brevifolia	0.1	0.1
Maireana pyramidata	0.5	0.5
Maireana sedifolia	1	0.4
Maireana tomentosa subsp. *tomentosa*	0.1	0.1
Maireana trichoptera	0.1	0.1
Minuria cunninghamii	0.1	0.1
Pimelea microcephala subsp. *microcephala*	1	0.2
Ptilotus nobilis subsp. *nobilis*	0.2	0.5
Ptilotus obovatus	0.3	0.1
Rhagodia ulicina	1	1
Scaevola spinescens	1	0.2
Sclerolaena cuneata	0.1	0.1
Sclerolaena diacantha	0.1	0.1
Senna artemisioides subsp. *filifolia*	1	0.3
Solanum cleistogamum	0.3	0.1
Tecticornia disarticulata	1	10
Templetonia incrassata	1	0.2
Zygophyllum ovatum	0.1	0.1

PHOTO

Site Name: A26
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 25/09/2016
GPS Location: GDA94 Zone 51 328945E 6659273N
Community: 5
Landform Type: Drainage Line
Slope Class: Very Gently Inclined (1 degree)
Aspect: S
Soil Type: Clay (other)
Soil Colour: Red
Rock Outcrop: No bedrock exposed
CF Abundance: 0%
Vegetation Condition: Northern Vegetation Condition - VG - Very Good
Disturbance: Pig/Animal Disturbance - Cattle tracks and poo, (other) - Logging, Old exploration
Fire: >5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Eucalyptus salubris*
Mid Stratum 1: *Maireana pyramidata*, *Senna artemisioides* subsp. *filifolia*
Mid Stratum 2: *Acacia merrallii*, *Atriplex ?vesicaria*
Lower Stratum 1: *Enchylaena tomentosa* var. *tomentosa*, *Ptilotus obovatus*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia merrallii	0.5	2
Atriplex ?vesicaria	0.5	0.5
Austrostipa elegantissima	0.3	0.1
Austrostipa scabra subsp. *scabra*	0.2	0.1
Chenopodium curvispicatum	0.3	0.2
Enchylaena tomentosa var. *tomentosa*	0.5	2
Eremophila decipiens subsp. *decipiens*	1	1.3
Eremophila glabra subsp. *glabra*	1.5	0.3
Eremophila scoparia	2	0.5
Eucalyptus clelandii	10	
Eucalyptus salubris	10	60
Lycium australe	1	0.2
Maireana georgei	0.3	0.2
Maireana pyramidata	1.5	5
Pimelea microcephala subsp. *microcephala*	1	0.5
Pittosporum angustifolium	1	0.1
Ptilotus obovatus	0.3	0.3
Rhagodia preissii subsp. *preissii*	1	0.2
Rhagodia ulicina	0.5	3
Scaevola spinescens	1	0.3
Sclerolaena diacantha	0.1	0.1
Senna artemisioides subsp. *filifolia*	1.5	1
Solanum cleistogamum	0.2	0.1

PHOTO

Site Name: A27
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 25/09/2016
GPS Location: GDA94 Zone 51 328828E 6659630N
Community: 6
Landform Type: Drainage Line
Slope Class: Very Gently Inclined (1 degree)
Aspect: S
Soil Type: Clay (other)
Soil Colour: Red
Rock Outcrop: No bedrock exposed
CF Abundance: 0%
Vegetation Condition: Northern Vegetation Condition - G - Good
Disturbance: Exotic Weeds - Appears weedy, Grazing - Cattle grazing
Fire: >5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Casuarina pauper*
Upper Stratum 2: *Templetonia incrassata*
Mid Stratum 1: *Atriplex nummularia* subsp. *spathulata*, *Pimelea microcephala* subsp. *microcephala*
Mid Stratum 2: *Senna artemisioides* subsp. *filifolia*
Lower Stratum 1: *Ptilotus obovatus*
Lower Stratum 2: **Centaurea melitensis*, **Lysimachia arvensis*, *Paspalidium gracile*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia tetragonophylla	1	2
Angianthus tomentosus	0.1	0.1
Atriplex nummularia subsp. *spathulata*	1.5	0.5
Austrostipa elegantissima	0.3	0.1
Brachyscome ciliaris	0.1	0.1
Bulbine semibarbata	0.1	0.1
Calandrinia eremaea	0.1	0.1
Casuarina pauper	8	4
**Centaurea melitensis*	0.2	5
Convolvulus remotus	0.1	0.1
Crassula colorata var. *acuminata*	0.1	0.1
Cullen cinereum	0.1	0.1
Daucus glochidiatus	0.1	0.1
Dodonaea lobulata	0.5	0.1
Dodonaea ?viscosa subsp. *angustissima*	0.3	0.1
Enneapogon avenaceus	0.1	0.1
Enteropogon ramosus	0.1	0.3
Eragrostis xerophila	0.1	0.1
Eremophila glabra subsp. *glabra*	1	0.2
Eremophila oldfieldii subsp. *angustifolia*	4	1
Eremophila scoparia	1	0.3
Eremophila sp. Mt Jackson (G.J. Keighery 4372)	4	1
Euphorbia philochalix	0.1	0.1
Lycium australe	1	1
**Lysimachia arvensis*	0.1	0.2
Maireana pyramidata	0.5	0.5
Maireana trichoptera	0.1	0.1
Marsdenia australis	0.1	0.1

**Medicago minima*	0.1	0.1
Oxalis perennans	0.1	0.1
Paspalidium gracile	0.2	0.2
Pimelea microcephala subsp. *microcephala*	1.5	5
Pittosporum angustifolium	1	0.1
Ptilotus obovatus	0.4	5
Rhagodia ulicina	0.5	0.5
**Rostraria pumila*	0.1	0.1
Rytidosperma caespitosum	0.1	0.1
**Salvia verbenaca*	0.1	0.1
Santalum acuminatum	5	1
Scaevola spinescens	0.4	0.1
Sclerolaena cuneata	0.3	0.1
Sclerolaena diacantha	0.1	0.1
Sclerolaena patenticuspis	0.1	0.1
Senna artemisioides subsp. *filifolia*	1	1
Solanum cleistogamum	0.3	0.1
Solanum nummularium	0.2	0.1
**Sonchus oleraceus*	0.3	0.1
Templetonia incrassata	5	2
Vittadinia cervicularis var. *cervicularis*	0.1	0.1

PHOTO

Site Name: A28
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 25/09/2016
GPS Location: GDA94 Zone 51 328516E 6659853N
Community: 3
Landform Type: Other, C - Crest, H - Hillock (other)
Slope Class: Gently Inclined (3 degrees)
Soil Type: Clay Loam
Soil Colour: Red
Rock Outcrop: Granite, 10-20% bedrock exposed
CF Abundance: >90%
CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm
CF Types: Granite
Vegetation Condition: Northern Vegetation Condition - VG - Very Good
Disturbance: (other) - Old exploration tracks
Fire: >5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Casuarina pauper*
Mid Stratum 1: *Acacia burkittii*, *Acacia tetragonophylla*, *Eremophila oldfieldii* subsp. *angustifolia*
Mid Stratum 2: *Dodonaea lobulata*, *Scaevola spinescens*, *Senna artemisioides* subsp. *filifolia*
Lower Stratum 1: *Ptilotus obovatus*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia burkittii	3	5
Acacia tetragonophylla	2	2
Austrostipa elegantissima	0.5	0.1
Austrostipa eremophila	0.2	0.1
Austrostipa scabra subsp. *scabra*	0.2	0.1
Casuarina pauper	6	0.1
Dodonaea lobulata	1	1
Eremophila oldfieldii subsp. *angustifolia*	3	1
Eriochiton sclerolaenoides	0.1	0.1
Goodenia havilandii	0.1	0.1
Goodenia mimuloides	0.1	0.1
Maireana georgei	0.1	0.1
Maireana sedifolia	1	0.5
Maireana trichoptera	0.1	0.1
Marsdenia australis	0.1	0.1
Ptilotus helipteroides	0.1	0.1
Ptilotus obovatus	0.3	0.5
Santalum spicatum	2	2
Scaevola spinescens	1.5	1
Senna artemisioides subsp. *filifolia*	1	0.5
Sida calyxhymenia	0.3	0.1
Solanum cleistogamum	0.2	0.1
Thysanotus manglesianus	0.1	0.1
Zygophyllum ovatum	0.1	0.1

PHOTO

Site Name:	A29
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	25/09/2016
GPS Location:	GDA94 Zone 51 329191E 6660487N
Community:	2
Landform Type:	Other, S - Simple slope, U - Upper slope (other)
Slope Class:	Gently Inclined (3 degrees)
Aspect:	NE
Soil Type:	Sandy clay loam (other)
Soil Colour:	Red
Rock Outcrop:	No bedrock exposed
CF Abundance:	20-50%
CF Sizes:	2-6mm
CF Types:	Ironstone, Calcrete (other)
Vegetation Condition:	Northern Vegetation Condition - G - Good
Disturbance:	Limited Clearing - Clearing, (other) - Extensive exploration
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Eucalyptus clelandii*, *Eucalyptus hypolaena*
Mid Stratum 1:	*Eremophila* sp. Mt Jackson (G.J. Keighery 4372)
Mid Stratum 2:	*Eremophila scoparia*
Lower Stratum 1:	*Eremophila parvifolia* subsp. *auricampa*, *Maireana sedifolia*, *Olearia muelleri*
Lower Stratum 2:	*Eriochiton sclerolaenoides*, *Maireana trichoptera*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia erinacea	0.3	0.3
Acacia hemiteles	0.3	0.2
Austrostipa scabra subsp. *scabra*	0.2	0.1
Casuarina pauper	0.1	0.1
Eremophila decipiens subsp. *decipiens*	0.4	0.1
Eremophila oppositifolia subsp. *angustifolia*	1.5	0.4
Eremophila parvifolia subsp. *auricampa*	0.4	0.5
Eremophila scoparia	1	0.5
Eremophila sp. Mt Jackson (G.J. Keighery 4372)	3	2.5
Eriochiton sclerolaenoides	0.1	0.1
Eucalyptus clelandii	10	18
Eucalyptus hypolaena	10	2
Maireana sedifolia	0.5	0.3
Maireana trichoptera	0.1	0.1
Olearia muelleri	0.5	1
Ptilotus nobilis subsp. *nobilis*	0.2	0.1
Scaevola spinescens	0.3	1
Senna artemisioides subsp. *filifolia*	0.1	0.1
Zygophyllum ovatum	0.1	0.1

PHOTO

Site Name: A30
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 25/09/2016
GPS Location: GDA94 Zone 51 328485E 6659121N
Community: 5
Landform Type: Flat
Slope Class: Level (0 degrees)
Soil Type: Sandy clay loam (other)
Soil Colour: Red
Rock Outcrop: No bedrock exposed
CF Abundance: 10-20%
CF Sizes: 2-6mm
CF Types: Quartz, Ironstone (other)
Vegetation Condition: Northern Vegetation Condition - VG - Very Good
Disturbance: Pig/Animal Disturbance - Cow poo, (other) - Old logging
Fire: >5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Eucalyptus salubris*
Mid Stratum 1: *Casuarina pauper*
Mid Stratum 2: *Eremophila scoparia*, *Maireana sedifolia*
Lower Stratum 1: *Atriplex ?vesicaria*, *Senna artemisioides* subsp. *filifolia*
Lower Stratum 2: *Enchylaena tomentosa* var. *tomentosa*, *Maireana trichoptera*, *Sclerolaena diacantha*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Atriplex codonocarpa	0.1	0.1
Atriplex ?vesicaria	0.5	3
Austrostipa elegantissima	0.3	0.1
Austrostipa scabra subsp. *scabra*	0.1	0.1
Casuarina pauper	2	0.2
Enchylaena tomentosa var. *tomentosa*	0.3	0.1
Eremophila glabra subsp. *glabra*	1	0.2
Eremophila parvifolia subsp. *auricampa*	0.3	0.1
Eremophila scoparia	1	0.4
Eriochiton sclerolaenoides	0.1	0.1
Eucalyptus salmonophloia	20	
Eucalyptus salubris	10	5
Frankenia interioris var. *interioris*	0.2	0.1
Gnephosis brevifolia	0.1	0.1
Lepidium phlebopetalum	0.1	0.1
Lycium australe	1	0.2
Maireana georgei	0.2	0.1
Maireana pyramidata	0.4	1
Maireana sedifolia	1	2
Maireana tomentosa subsp. *tomentosa*	0.1	0.1
Maireana trichoptera	0.1	0.1
Maireana triptera	0.3	0.1
Marsdenia australis	0.1	0.1
Olearia muelleri	0.5	0.5
Pittosporum angustifolium	1	0.1
Ptilotus nobilis subsp. *nobilis*	0.1	0.1
Ptilotus obovatus		
Scaevola spinescens	0.3	0.1

Sclerolaena cuneata	0.2	0.1
Sclerolaena diacantha	0.1	0.3
Senna artemisioides subsp. *filifolia*	1	0.5
Tecticornia disarticulata	0.3	1
Zygophyllum ovatum	0.1	0.1

PHOTO

Site Name:	A31
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	26/09/2016
GPS Location:	GDA94 Zone 51 331950E 6662144N
Community:	3
Landform Type:	Flat
Slope Class:	Level (0 degrees)
Soil Type:	Clay Loam
Soil Colour:	Red
Rock Outcrop:	No bedrock exposed
CF Abundance:	<2%
CF Sizes:	2-6mm
CF Types:	Ironstone, Calcrete (other)
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	(other) - Old exploration tracks
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Casuarina pauper*
Mid Stratum 1:	*Eremophila oppositifolia* subsp. *angustifolia*, *Eremophila scoparia*
Mid Stratum 2:	*Acacia hemiteles*, *Senna artemisioides* subsp. *filifolia*
Lower Stratum 1:	*Maireana sedifolia*
Lower Stratum 2:	*Ptilotus obovatus*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia hemiteles	1	3
Acacia oswaldii	2	0.3
Acacia tetragonophylla	1.5	0.5
Austrostipa elegantissima	0.5	0.1
Casuarina pauper	10	4
Dodonaea lobulata	0.5	0.3
Eremophila glabra subsp. *glabra*	1.5	0.3
Eremophila oppositifolia subsp. *angustifolia*	2.5	1
Eremophila scoparia	2.5	2
Maireana georgei	0.2	0.1
Maireana sedifolia	0.5	3
Maireana tomentosa subsp. *tomentosa*	0.1	0.1
Olearia muelleri	0.3	0.1
Pittosporum angustifolium	1	0.1
Ptilotus obovatus	0.3	0.2
Scaevola spinescens	0.5	1
Sclerolaena diacantha	0.1	0.1
Senna artemisioides subsp. *filifolia*	1	1
Senna artemisioides subsp. *x artemisioides*	1.5	0.2
Senna sp.	1	1.5
Solanum cleistogamum	0.3	0.1
Templetonia incrassata	1.5	0.2

PHOTO

Site Name:	A32
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	26/09/2016
GPS Location:	GDA94 Zone 51 332432E 6662148N
Community:	5
Landform Type:	Other, S - Simple slope, M - Mid slope (other)
Slope Class:	Gently Inclined (3 degrees)
Aspect:	SW
Soil Type:	Clay Loam
Soil Colour:	Red
Rock Outcrop:	No bedrock exposed
CF Abundance:	2-10%
CF Sizes:	2-6mm, 6-20mm
CF Types:	Calcrete (other)
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	Pig/Animal Disturbance - Cattle tracks and poo, (other) - Old logging
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Eucalyptus longissima*, *Eucalyptus salubris*
Upper Stratum 2:	*Casuarina pauper*
Mid Stratum 1:	*Dodonaea lobulata*, *Eremophila scoparia*, *Senna artemisioides* subsp. *filifolia*
Mid Stratum 2:	*Maireana sedifolia*
Lower Stratum 1:	*Ptilotus obovatus*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia erinacea	1.5	0.6
Acacia tetragonophylla		
Austrostipa elegantissima	0.2	0.1
Austrostipa scabra subsp. *scabra*	0.2	0.1
Casuarina pauper	8	1
Dodonaea lobulata	2	1.5
Eremophila glabra subsp. *glabra*	1	0.3
Eremophila interstans		
Eremophila oldfieldii subsp. *angustifolia*	1	0.3
Eremophila parvifolia subsp. *auricampa*	0.3	0.2
Eremophila scoparia		
Eremophila sp. Mt Jackson (G.J. Keighery 4372)	2.5	0.5
Eucalyptus clelandii	8	
Eucalyptus longissima	14	7
Eucalyptus salubris	10	5
Maireana sedifolia	1	3
Maireana trichoptera	0.1	0.1
Olearia muelleri	0.3	
Ptilotus obovatus	0.3	0.3
Scaevola spinescens	1	0.2
Senna artemisioides subsp. *filifolia*	1.5	2

PHOTO

Site Name:	A33
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	26/09/2016
GPS Location:	GDA94 Zone 51 332630E 6661482N
Community:	3
Landform Type:	Other, S - Simple slope, M - Mid slope (other)
Slope Class:	Very Gently Inclined (1 degree)
Aspect:	S
Soil Type:	Light Clay
Soil Colour:	Red, Brown, Orange (other)
Rock Outcrop:	No bedrock exposed
CF Abundance:	<2%
CF Sizes:	2-6mm
CF Types:	Ironstone, Calcrete (other)
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	Pig/Animal Disturbance - Cattle tracks
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Casuarina pauper*
Mid Stratum 1:	*Acacia burkittii*
Mid Stratum 2:	*Dodonaea lobulata*, *Senna artemisioides* subsp. *filifolia*
Lower Stratum 1:	*Maireana sedifolia*
Lower Stratum 2:	*Ptilotus obovatus*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia burkittii	3.5	1
Acacia caesaneura	8	2
Austrostipa eremophila	0.2	0.3
Austrostipa scabra subsp. *scabra*	0.2	0.1
Brachychiton gregorii	4	
Casuarina pauper	8	2
Cephalipterum drummondii	0.1	0.1
Dodonaea lobulata	1.5	10
Eremophila oldfieldii subsp. *angustifolia*	1	0.5
Eremophila oppositifolia subsp. *angustifolia*	2	
Erodium cygnorum	0.1	0.1
Goodenia mimuloides	0.1	0.1
Maireana sedifolia	1	1
Minuria cunninghamii	0.1	0.1
Pittosporum angustifolium	0.5	0.1
Podolepis capillaris	0.2	0.1
Ptilotus obovatus	0.3	0.5
Scaevola spinescens	1	2
Senna artemisioides subsp. *filifolia*	1.5	1.5
Templetonia incrassata	1	0.2
Zygophyllum ovatum	0.1	0.1

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Site Name:	A34
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	26/09/2016
GPS Location:	GDA94 Zone 51 330958E 6661226N
Community:	3
Landform Type:	Other, R - Ridge, M - Mid slope (other)
Slope Class:	Gently Inclined (3 degrees)
Aspect:	S
Soil Type:	Clay Loam
Soil Colour:	Red
Rock Outcrop:	No bedrock exposed
CF Abundance:	20-50%
CF Sizes:	2-6mm, 6-20mm
CF Types:	Quartz, Ironstone (other)
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	(other) - Old exploration
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Casuarina pauper*, *Eucalyptus clelandii*
Mid Stratum 1:	*Senna artemisioides* subsp. *filifolia*
Mid Stratum 2:	*Maireana sedifolia*, *Scaevola spinescens*
Lower Stratum 1:	*Ptilotus obovatus*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia nyssophylla	0.5	0.5
Austrostipa eremophila	0.2	0.1
Casuarina pauper	10	2
Chrysocephalum puteale	0.1	
Dodonaea lobulata	1	0.5
Enchylaena tomentosa var. *tomentosa*	0.3	0.1
Eremophila glabra subsp. *glabra*	1	1
Eremophila oldfieldii subsp. *angustifolia*	1	0.2
Eucalyptus clelandii	10	3
Eucalyptus longissima	10	
Maireana georgei	0.2	0.1
Maireana sedifolia	0.1	2
Maireana trichoptera	0.1	0.1
Olearia muelleri	0.3	0.5
Pittosporum angustifolium	1	0.1
Ptilotus obovatus	0.3	1
Scaevola spinescens	1	1
Senna artemisioides subsp. *filifolia*	2	1
Templetonia incrassata	1	0.2
Zygophyllum ovatum	0.1	0.1

PHOTO

Site Name:	A35
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	26/09/2016
GPS Location:	GDA94 Zone 51 331382E 6661114N
Community:	5
Landform Type:	Other, S - Simple slope, M - Mid slope (other)
Slope Class:	Very Gently Inclined (1 degree)
Aspect:	S
Soil Type:	Clay (other)
Soil Colour:	Brown, White (other)
Rock Outcrop:	No bedrock exposed
CF Abundance:	2-10%
CF Sizes:	2-6mm
CF Types:	Quartz (other)
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	Pig/Animal Disturbance - Cattle tracks
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Casuarina pauper*
Mid Stratum 1:	*Acacia tetragonophylla*, *Eremophila oldfieldii* subsp. *angustifolia*
Mid Stratum 2:	*Maireana sedifolia*
Lower Stratum 1:	*Ptilotus obovatus*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia burkittii	4	
Acacia caesaneura	0.1	0.1
Acacia hemiteles	1	
Acacia tetragonophylla	4	1.5
Angianthus tomentosus	0.1	0.1
Austrostipa elegantissima	0.5	0.1
Austrostipa scabra subsp. *scabra*	0.2	0.1
Casuarina pauper	8	2
Dodonaea lobulata	0.3	0.3
Eremophila oldfieldii subsp. *angustifolia*	4	2
Eremophila oppositifolia subsp. *angustifolia*	3	
Eriochiton sclerolaenoides	0.1	0.1
Gnephosis brevifolia	0.1	0.1
Maireana sedifolia	1	14
Maireana trichoptera	0.1	0.1
Maireana triptera	0.3	0.1
Marsdenia australis	0.1	0.1
Minuria cunninghamii	0.1	0.1
Pimelea microcephala subsp. *microcephala*	1	0.2
Poaceae sp.	0.1	0.2
Podolepis capillaris	0.1	0.1
Ptilotus obovatus	0.3	1
Rhagodia ulicina	0.3	0.1
Sclerolaena diacantha	0.1	0.1
Senna artemisioides subsp. *filifolia*	1	1
Solanum cleistogamum	0.3	0.1
Vittadinia eremaea	0.1	0.1
Zygophyllum ovatum	0.1	0.1

PHOTO

Site Name: A36
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 26/09/2016
GPS Location: GDA94 Zone 51 331602E 6661150N
Community: 6
Landform Type: Drainage Line
Slope Class: Very Gently Inclined (1 degree)
Aspect: SW
Soil Type: Clay (other)
Soil Colour: Red
Rock Outcrop: No bedrock exposed
CF Abundance: 0%
Vegetation Condition: Northern Vegetation Condition - VG - Very Good
Fire: >5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Casuarina pauper*
Upper Stratum 2: *Alectryon oleifolius* subsp. *canescens*, *Eremophila oldfieldii* subsp. *angustifolia*
Mid Stratum 1: *Acacia oswaldii*, *Eremophila scoparia*
Mid Stratum 2: *Maireana sedifolia*, *Pimelea microcephala* subsp. *microcephala*, *Rhagodia ulicina*, *Senna artemisioides* subsp. *filifolia*
Lower Stratum 1: *Maireana pyramidata*, *Scaevola spinescens*
Lower Stratum 2: *Ptilotus obovatus*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia caesaneura	8	
Acacia oswaldii	2	0.5
Acacia tetragonophylla	2	1.5
Alectryon oleifolius subsp. *canescens*	5	5
Aristida contorta	0.1	0.1
Austrostipa elegantissima	0.3	0.1
Austrostipa scabra subsp. *scabra*	0.1	0.1
Brachyscome ciliaris	0.1	0.1
Bulbine semibarbata	0.1	0.1
Casuarina pauper	10	5
**Centaurea melitensis*	0.1	0.1
Crassula colorata var. *acuminata*	0.1	0.1
Daucus glochidiatus	0.1	0.1
Dodonaea lobulata	1.5	0.2
Enchylaena tomentosa var. *tomentosa*	0.3	0.1
Eragrostis dielsii	0.1	0.1
Eremophila decipiens subsp. *decipiens*	1	0.3
Eremophila granitica	1.5	0.7
Eremophila oldfieldii subsp. *angustifolia*	5	2
Eremophila scoparia	1.5	1
Eucalyptus salubris	18	
**Lysimachia arvensis*	0.1	0.1
Maireana georgei	0.1	0.1
Maireana pyramidata	0.5	1
Maireana sedifolia	0.5	2
Olearia muelleri	1	0.3
Pimelea microcephala subsp. *microcephala*	1	0.5
Pittosporum angustifolium	1	0.2
Plantago drummondii	0.1	0.1

Plantago turrifera		
Ptilotus obovatus	0.2	0.5
Rhagodia ulicina	1	1.5
Rhodanthe stricta	0.1	0.1
**Rostraria pumila*	0.1	0.1
Rytidosperma caespitosum	0.1	0.1
**Salvia verbenaca*	0.1	0.1
Scaevola spinescens	1.5	0.5
Senna artemisioides subsp. *filifolia*	1.5	2
Senna artemisioides subsp. *x artemisioides*	1.5	0.2
Sida intricata	0.1	0.1
Vittadinia cervicularis var. *cervicularis*	0.1	0.1

PHOTO

Site Name: A37
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 26/09/2016
GPS Location: GDA94 Zone 51 332853E 6659706N
Community: 5
Landform Type: Flat
Slope Class: Level (0 degrees)
Soil Type: Light Clay
Soil Colour: Red
Rock Outcrop: No bedrock exposed
CF Abundance: <2%
CF Sizes: 2-6mm
CF Types: Ironstone
Vegetation Condition: Northern Vegetation Condition - G - Good
Disturbance: Grazing - Heavily grazed, Pig/Animal Disturbance - Cow poo
Fire: >5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Casuarina pauper*
Mid Stratum 1: *Maireana sedifolia*
Lower Stratum 1: *Maireana tomentosa* subsp. *tomentosa*, *Maireana trichoptera*, *Sclerolaena cuneata*, *Sclerolaena densiflora*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Austrostipa scabra subsp. *scabra*	0.1	0.1
Calotis multicaulis	0.1	0.1
Casuarina pauper	8	1
Cephalipterum drummondii	0.1	0.1
Daucus glochidiatus	0.1	0.1
Enchylaena tomentosa var. *tomentosa*	0.3	0.1
Eremophila scoparia	1.5	0.4
Eriochiton sclerolaenoides	0.1	0.1
Gnephosis brevifolia	0.1	0.1
Goodenia pinnatifida	0.1	0.1
Lawrencia repens	0.1	0.1
Maireana georgei	0.1	0.1
Maireana pyramidata	1	1
Maireana sedifolia	1	5
Maireana tomentosa subsp. *tomentosa*	0.1	0.1
Maireana trichoptera	0.1	0.1
Pimelea microcephala subsp. *microcephala*	0.5	0.1
Pittosporum angustifolium	0.5	0.1
Ptilotus holosericeus	0.1	0.1
Ptilotus nobilis subsp. *nobilis*	0.2	0.1
Ptilotus obovatus	0.2	0.1
Rhagodia ulicina	0.4	0.2
**Salvia verbenaca*	0.1	0.1
Scaevola spinescens	0.5	0.2
Sclerolaena cuneata	0.1	0.1
Sclerolaena densiflora	0.1	0.1
Sclerolaena diacantha	0.1	0.1
Sclerolaena patenticuspis	0.1	0.1
Senna artemisioides subsp. *filifolia*	1	0.3
Stenopetalum lineare var. *lineare*	0.1	0.1

Tetragonia eremaea	0.1	0.1

PHOTO

Site Name: A38
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 26/09/2016
GPS Location: GDA94 Zone 51 332303E 6659994N
Community: 6
Landform Type: Flat
Slope Class: Level (0 degrees)
Soil Type: Clay Loam
Soil Colour: Red
Rock Outcrop: No bedrock exposed
CF Abundance: 20-50%
CF Sizes: 2-6mm
CF Types: Quartz, Ironstone (other)
Vegetation Condition: Northern Vegetation Condition - G - Good
Disturbance: Grazing - Cattle grazing
Fire: >5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Acacia caesaneura*, *Casuarina pauper*
Upper Stratum 2: *Eremophila oldfieldii* subsp. *angustifolia*
Mid Stratum 1: *Maireana pyramidata*, *Maireana sedifolia*
Lower Stratum 1: *Ptilotus obovatus*
Lower Stratum 2: *Maireana trichoptera*, *Sclerolaena cuneata*, *Sclerolaena densiflora*, *Sclerolaena diacantha*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia caesaneura	8	2
Acacia tetragonophylla	0.5	0.3
Aristida contorta	0.1	0.1
Atriplex nummularia subsp. *spathulata*	0.3	0.1
Austrostipa elegantissima	0.3	0.1
Austrostipa scabra subsp. *scabra*	0.1	0.1
Brachyscome ciliaris	0.1	0.1
Bulbine semibarbata	0.1	0.1
Calandrinia eremaea	0.2	0.1
Casuarina pauper	8	1
Dodonaea lobulata	1	0.5
Enneapogon avenaceus	0.1	0.1
Eragrostis xerophila	0.1	0.3
Eremophila oldfieldii subsp. *angustifolia*	5	1
Eriochiton sclerolaenoides	0.1	0.1
Euphorbia philochalix	0.1	0.1
Gnephosis brevifolia	0.1	0.1
Goodenia havilandii	0.1	0.1
Gunniopsis propinqua (P3)	0.1	0.1
Hakea preissii	0.5	0.2
Lawrencia repens	0.1	0.1
Lycium australe	1	0.2
Maireana carnosa	0.1	0.1
Maireana glomerifolia	0.3	0.5
Maireana pyramidata	1	3
Maireana sedifolia	1	4
Maireana tomentosa subsp. *tomentosa*	0.1	0.1
Maireana trichoptera	0.1	0.1

Maireana triptera	0.1	0.1
Minuria cunninghamii	0.1	0.1
Ptilotus holosericeus	0.1	0.1
Ptilotus nobilis subsp. *nobilis*	0.2	0.1
Ptilotus obovatus	0.3	0.5
Rhagodia ulicina	0.8	0.3
Scaevola spinescens	0.5	0.5
Sclerolaena cuneata	0.1	0.1
Sclerolaena densiflora	0.1	0.1
Sclerolaena diacantha	0.1	0.1
Sclerolaena patenticuspis	0.1	0.1
Sida intricata	0.1	0.1
Solanum cleistogamum	0.3	0.2
Sporobolus caroli	0.2	0.1
Streptoglossa liatroides	0.1	0.1
Thysanotus manglesianus	0.1	0.1
Vittadinia cervicularis var. *cervicularis*	0.1	0.1

PHOTO

Site Name: A39
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 26/09/2016
GPS Location: GDA94 Zone 51 331533E 6660164N
Community: 5
Landform Type: Other, S - Simple slope, L - Lower slope (other)
Slope Class: Very Gently Inclined (1 degree)
Aspect: S
Soil Type: Light Clay
Soil Colour: Pink (other)
Rock Outcrop: No bedrock exposed
CF Abundance: 0%
Vegetation Condition: Northern Vegetation Condition - VG - Very Good
Disturbance: Pig/Animal Disturbance - Cattle tracks, (other) - Old logging
Fire: >5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Eucalyptus salubris*
Mid Stratum 1: *Maireana sedifolia*
Lower Stratum 1: *Ptilotus obovatus*
Lower Stratum 2: *Maireana tomentosa* subsp. *tomentosa*, *Maireana trichoptera*, *Sclerolaena diacantha*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia tetragonophylla	1.5	1
Atriplex ?acutibractea	0.2	0.1
Austrostipa elegantissima	0.3	0.1
Austrostipa scabra subsp. *scabra*	0.1	0.1
Casuarina pauper	0.3	0.1
Enchylaena tomentosa var. *tomentosa*	0.3	0.2
Eremophila decipiens subsp. *decipiens*	1	
Eremophila parvifolia subsp. *auricampa*	0.3	0.2
Eucalyptus salubris	15	25
Maireana sedifolia	1.5	8
Maireana tomentosa subsp. *tomentosa*	0.1	0.1
Maireana trichoptera	0.1	0.1
Paspalidium gracile	0.3	0.1
Pimelea microcephala subsp. *microcephala*	0.3	0.1
Ptilotus nobilis subsp. *nobilis*	0.2	0.1
Ptilotus obovatus	0.3	0.5
Rhagodia ulicina	0.3	0.5
Sclerolaena diacantha	0.1	1
Senna artemisioides subsp. *filifolia*	1.5	0.5
Solanum cleistogamum	0.3	0.1
Solanum nummularium	0.3	0.3
Zygophyllum ovatum	0.1	0.1

PHOTO

Site Name: A40
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 27/09/2016
GPS Location: GDA94 Zone 51 330827E 6658856N
Community: 7
Landform Type: Flat
Slope Class: Level (0 degrees)
Soil Type: Light Clay
Soil Colour: Red
Rock Outcrop: No bedrock exposed
CF Abundance: 20-50%
CF Sizes: 2-6mm
CF Types: Quartz, Ironstone (other)
Vegetation Condition: Northern Vegetation Condition - G - Good
Disturbance: Limited Clearing - Potential historical clearing, Pig/Animal Disturbance - Cattle tracks
Fire: >5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Mid Stratum 1: *Maireana pyramidata*, *Maireana sedifolia*
Lower Stratum 1: *Calotis multicaulis*, *Maireana georgei*, *Maireana trichoptera*, *Ptilotus aervoides*, *Sclerolaena patenticuspis*, *Solanum cleistogamum*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Austrostipa elegantissima	0.3	0.1
Austrostipa scabra subsp. *scabra*	0.1	0.1
Bulbine semibarbata	0.1	0.1
Calotis multicaulis	0.1	0.2
Casuarina pauper	5	
**Centaurea melitensis*	0.1	0.1
Cephalipterum drummondii	0.1	0.1
Convolvulus remotus	0.1	0.1
Crassula colorata var. *acuminata*	0.1	0.1
Enchylaena tomentosa var. *tomentosa*	0.2	0.1
Enneapogon avenaceus	0.1	0.1
Eragrostis australasica	1	
Eragrostis xerophila	0.1	1
Eremophila miniata	2	
Eriochiton sclerolaenoides	0.1	0.1
Erodium cygnorum	0.1	0.1
Frankenia interioris var. *interioris*	0.3	0.2
Gnephosis brevifolia	0.1	0.1
Goodenia pinnatifida	0.1	0.1
Gunniopsis propinqua (P3)	0.1	
Ixiochlamys nana	0.1	0.1
Lawrencia repens	0.1	0.1
Lotus cruentus	0.1	
Maireana georgei	0.2	0.1
Maireana pyramidata	1	4
Maireana sedifolia	1	1
Maireana trichoptera	0.1	0.3
Minuria cunninghamii	0.3	0.1
Plantago drummondii	0.1	0.1
Ptilotus aervoides	0.1	0.1

Ptilotus holosericeus	0.1	0.1
Rhagodia ulicina	0.4	0.2
Rhodanthe floribunda	0.1	0.1
Rhodanthe uniflora	0.1	
Sclerolaena diacantha	0.1	0.1
Sclerolaena patenticuspis	0.1	0.1
Senna artemisioides subsp. *filifolia*	1	
Sida intricata	0.1	0.1
Solanum cleistogamum	0.2	0.2
Stenopetalum lineare var. *lineare*	0.1	0.1
Streptoglossa liatroides	0.1	0.1
Templetonia incrassata	1	
Vittadinia eremaea	0.1	0.1
Zygophyllum ovatum	0.1	

PHOTO

Site Name: A41
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 27/09/2016
GPS Location: GDA94 Zone 51 331187E 6658902N
Community: 6
Landform Type: Flat
Slope Class: Level (0 degrees)
Soil Type: Clay (other)
Soil Colour: Red
Rock Outcrop: No bedrock exposed
CF Abundance: 0%
Vegetation Condition: Northern Vegetation Condition - VG - Very Good
Disturbance: Pig/Animal Disturbance - Cattle tracks
Fire: >5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Acacia aptaneura*
Mid Stratum 1: *Maireana pyramidata*, *Rhagodia ulicina*, *Senna artemisioides* subsp. *x artemisioides*
Lower Stratum 1: *Ptilotus obovatus*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia aptaneura	5	10
Acacia tetragonophylla	1	0.5
Angianthus tomentosus	0.1	0.1
Aristida contorta	0.1	0.1
Austrostipa elegantissima	0.3	0.1
Austrostipa scabra subsp. *scabra*	0.1	0.1
Brachyscome ciliaris	0.1	0.1
Calandrinia eremaea	0.1	0.1
Cephalipterum drummondii	0.1	0.1
Crassula colorata var. *acuminata*	0.1	0.1
Enneapogon avenaceus	0.1	0.1
Eragrostis xerophila	0.1	0.1
Eremophila decipiens subsp. *decipiens*	1	0.5
Eremophila sp. Mt Jackson (G.J. Keighery 4372)	1	0.2
Erodium cygnorum	0.1	0.1
Euphorbia philochalix	0.1	0.1
Frankenia ?laxiflora	0.2	0.1
Gnephosis brevifolia	0.1	0.1
Goodenia havilandii	0.1	0.1
Goodenia pinnatifida	0.1	0.1
Maireana georgei	0.2	0.1
Maireana pyramidata	1	20
Maireana sedifolia	1	1
Maireana triptera	0.1	0.1
Marsdenia australis	0.1	0.1
Minuria cunninghamii	0.3	0.1
Pimelea microcephala subsp. *microcephala*	1	0.1
Pittosporum angustifolium	1	0.1
Poaceae sp.	0.1	0.1
Podolepis capillaris	0.3	0.1
Ptilotus holosericeus	0.1	0.1
Ptilotus obovatus	0.4	3

Rhagodia ulicina	1	15
Rhodanthe stricta	0.1	0.1
Scaevola spinescens	0.5	0.3
Schoenia cassiniana	0.1	0.1
Sclerolaena diacantha	0.1	0.1
Senna artemisioides subsp. *filifolia*	1	0.1
Senna artemisioides subsp. *x artemisioides*	1.5	2
Sida intricata	0.1	0.1
Solanum cleistogamum	0.3	0.1
Sporobolus caroli	0.1	0.1
Templetonia incrassata	1	1.5
Zygophyllum ovatum	0.1	0.1

PHOTO

Site Name:	A42
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	27/09/2016
GPS Location:	GDA94 Zone 51 333077E 6655596N
Community:	5
Landform Type:	Other, S - Simple slope, L - Lower slope (other)
Slope Class:	Very Gently Inclined (1 degree)
Aspect:	NW
Soil Type:	Sandy clay loam (other)
Soil Colour:	Red
Rock Outcrop:	No bedrock exposed
CF Abundance:	50-90%
CF Sizes:	2-6mm
CF Types:	Quartz, Ironstone (other)
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	Pig/Animal Disturbance - Cattle tracks
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Eucalyptus salmonophloia*
Mid Stratum 1:	*Acacia oswaldii*
Mid Stratum 2:	*Maireana sedifolia*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia oswaldii	2.5	0.2
Alectryon oleifolius subsp. *canescens*	2.5	0.2
Austrostipa scabra subsp. *scabra*	0.1	0.1
Casuarina pauper	0.3	0.1
Enteropogon ramosus	0.1	0.1
Eremophila parvifolia subsp. *auricampa*	0.3	0.2
Eremophila scoparia	1	0.3
Eremophila sp. Mt Jackson (G.J. Keighery 4372)	1	
Eucalyptus salmonophloia	20	50
Eucalyptus salubris	14	
Lycium australe	1	0.3
Maireana georgei	0.3	0.1
Maireana sedifolia	1	5
Maireana trichoptera	0.1	0.1
Marsdenia australis	0.1	0.1
Olearia muelleri	0.3	0.5
Pittosporum angustifolium	0.3	0.1
Ptilotus obovatus	0.3	0.1
Sclerolaena diacantha	0.1	0.1
Senna artemisioides subsp. *filifolia*	1	0.3
Sida spodochroma	0.1	0.1
Solanum cleistogamum	0.3	0.1
Solanum nummularium	0.3	0.1
Templetonia incrassata	3	

PHOTO

Site Name: A43
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 27/09/2016
GPS Location: GDA94 Zone 51 336035E 6653265N
Community: 6
Landform Type: Drainage Line
Soil Type: Clay (other)
Soil Colour: Red
Rock Outcrop: No bedrock exposed
CF Abundance: 0%
Vegetation Condition: Northern Vegetation Condition - G - Good
Disturbance: Pig/Animal Disturbance - Cattle trampling
Fire: >5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Casuarina pauper*
Upper Stratum 2: *Acacia burkittii*, *Acacia ramulosa* var. *ramulosa*
Mid Stratum 1: *Acacia tetragonophylla*, *Eremophila granitica*
Lower Stratum 1: *Ptilotus obovatus*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia burkittii	5	10
Acacia ramulosa var. *ramulosa*	5	50
Acacia tetragonophylla	2	1.5
Austrostipa ?scabra	0.3	0.1
Calandrinia eremaea	0.1	0.1
Calandrinia ptychosperma	0.1	0.1
Casuarina pauper	8	1
Cheilanthes sieberi subsp. *sieberi*	0.1	0.1
Crassula colorata var. *acuminata*	0.1	0.1
Enchylaena tomentosa var. *tomentosa*	0.3	0.1
Eragrostis dielsii	0.1	0.1
Eremophila decipiens subsp. *decipiens*	1	0.5
Eremophila granitica	2	7
Eremophila interstans		
Eremophila oldfieldii subsp. *angustifolia*		
Erodium cygnorum	0.1	0.1
Gnephosis tenuissima	0.1	0.1
Goodenia havilandii	0.1	0.3
**Lysimachia arvensis*	0.1	0.1
Marsdenia australis	0.1	0.1
Pimelea microcephala subsp. *microcephala*	2	0.3
Poaceae sp.	0.1	0.1
Podolepis lessonii	0.1	0.2
Ptilotus gaudichaudii subsp. *eremita*	0.1	0.1
Ptilotus obovatus	0.3	0.5
Rhagodia ulicina	1.5	0.5
Santalum spicatum	2	1.5
Scaevola spinescens	1	0.5
Senna artemisioides subsp. *filifolia*	1	1
Senna artemisioides subsp. *x artemisioides*	0.1	0.1
Sida intricata	0.1	0.1
Solanum cleistogamum	0.3	0.1
Solanum nummularium	0.3	0.5

Templetonia incrassata	2	0.4
Wahlenbergia gracilenta	0.1	0.1
Wahlenbergia tumidifructa	0.2	0.1

PHOTO

Site Name: A44
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 27/09/2016
GPS Location: GDA94 Zone 51 335069E 6652823N
Community: 5
Landform Type: Flat
Slope Class: Level (0 degrees)
Soil Type: Clay Loam
Soil Colour: Red
Rock Outcrop: No bedrock exposed
CF Abundance: 10-20%
CF Sizes: 2-6mm
CF Types: Quartz, Ironstone (other)
Vegetation Condition: Northern Vegetation Condition - VG - Very Good
Disturbance: Grazing - Cattle grazing
Fire: >5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Eucalyptus salmonophloia*
Mid Stratum 1: *Alectryon oleifolius* subsp. *canescens*
Mid Stratum 2: *Maireana pyramidata*, *Maireana sedifolia*, *Rhagodia ulicina*
Lower Stratum 1: *Eriochiton sclerolaenoides*, *Maireana georgei*, *Maireana tomentosa* subsp. *tomentosa*, *Sclerolaena diacantha*, *Sclerolaena patenticuspis*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Alectryon oleifolius subsp. *canescens*	4	2
Angianthus tomentosus	0.1	0.1
Austrostipa elegantissima	1	0.1
Austrostipa scabra subsp. *scabra*	0.3	0.1
Dissocarpus paradoxus	0.1	0.1
Dodonaea lobulata	1	0.2
Enchylaena tomentosa var. *tomentosa*	0.3	0.1
Enneapogon avenaceus	0.1	0.1
Eremophila scoparia	1	0.3
Eriochiton sclerolaenoides	0.1	0.1
Eucalyptus salmonophloia	20	5
Gnephosis brevifolia	0.1	0.1
Lycium australe	1	0.3
Maireana georgei	0.2	0.2
Maireana pyramidata	1	6
Maireana sedifolia	1	1
Maireana tomentosa subsp. *tomentosa*	0.1	0.1
Maireana trichoptera	0.1	0.1
Maireana triptera	0.3	0.1
Pimelea microcephala subsp. *microcephala*	1	0.2
Pittosporum angustifolium	1	0.1
Poaceae sp.	0.2	0.1
Ptilotus nobilis subsp. *nobilis*	0.3	0.2
Ptilotus obovatus	0.2	0.2
Rhagodia ulicina	1	10
Scaevola spinescens	1	0.1
Sclerolaena cuneata	0.1	0.1
Sclerolaena diacantha	0.1	0.1
Sclerolaena patenticuspis	0.1	0.1

Senna artemisioides subsp. *filifolia*	0.5	0.3
Senna artemisioides subsp. *x artemisioides*	0.5	0.2
Templetonia incrassata	1	0.5
Zygophyllum ovatum	0.1	0.1

PHOTO

Site Name: A45
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 27/09/2016
GPS Location: GDA94 Zone 51 336056E 6653608N
Community: 6
Landform Type: Flat
Soil Type: Sandy clay loam (other)
Soil Colour: Red
Rock Outcrop: No bedrock exposed
CF Abundance: 2-10%
CF Sizes: 2-6mm
CF Types: Quartz, Ironstone (other)
Vegetation Condition: Northern Vegetation Condition - G - Good
Disturbance: Grazing - Cattle grazing, Pig/Animal Disturbance - Cattle trampling, Cattle tracks
Fire: >5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Casuarina pauper*
Mid Stratum 1: *Alectryon oleifolius* subsp. *canescens*, *Templetonia incrassata*
Mid Stratum 2: *Maireana pyramidata*, *Maireana sedifolia*
Lower Stratum 1: *Ptilotus obovatus*
Lower Stratum 2: *Eragrostis xerophila*, *Maireana trichoptera*, *Sclerolaena diacantha*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia erinacea	1	0.5
Acacia tetragonophylla	1	0.2
Alectryon oleifolius subsp. *canescens*	5	1
Angianthus tomentosus	0.1	0.1
Aristida contorta	0.1	0.1
Austrostipa elegantissima	0.3	0.1
Brachyscome ciliaris	0.1	0.1
Bulbine semibarbata	0.1	0.1
Calandrinia eremaea	0.1	0.1
Casuarina pauper	8	2
Cephalipterum drummondii	0.1	0.1
Crassula colorata var. *acuminata*	0.1	0.1
Enteropogon ramosus	0.1	0.1
Eragrostis xerophila	0.1	0.2
Eremophila scoparia	1	0.5
Eriochiton sclerolaenoides	0.1	0.1
Gnephosis brevifolia	0.1	0.1
Hakea preissii	0.5	0.2
Lawrencia repens	0.1	0.1
Lycium australe	1	1
Maireana carnosa	0.1	0.1
Maireana georgei	0.1	0.1
Maireana glomerifolia	0.3	0.2
Maireana pyramidata	1	3
Maireana sedifolia	1	3
Maireana tomentosa subsp. *tomentosa*	0.1	0.1
Maireana trichoptera	0.1	0.1
Maireana triptera	0.3	0.1
Minuria cunninghamii	0.3	0.1
Pimelea microcephala subsp. *microcephala*	1	0.1

Pittosporum angustifolium	0.3	0.1
Pogonolepis muelleriana	0.1	0.1
Ptilotus holosericeus	0.1	0.1
Ptilotus nobilis subsp. *nobilis*	0.3	0.1
Ptilotus obovatus	0.3	1
Rhagodia ulicina	0.5	2
Rhodanthe chlorocephala subsp. *splendida*	0.2	0.1
Santalum spicatum		
Scaevola spinescens	0.5	0.1
Sclerolaena densiflora	0.1	0.1
Sclerolaena diacantha	0.1	0.2
Sclerolaena patenticuspis	0.1	0.1
Senna artemisioides subsp. *filifolia*	1	0.3
Senna artemisioides subsp. *x artemisioides*	1	0.1
Solanum cleistogamum	0.3	0.2
Sporobolus caroli	0.1	0.1
Stenopetalum lineare var. *lineare*	0.2	0.1
Streptoglossa liatroides	0.1	0.1
Templetonia incrassata	5	1

PHOTO

Site Name:	A46
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	27/09/2016
GPS Location:	GDA94 Zone 51 335957E 6654346N
Community:	5
Landform Type:	Other, S - Simple slope, L - Lower slope (other)
Slope Class:	Very Gently Inclined (1 degree)
Aspect:	E
Soil Type:	Light Clay
Soil Colour:	Pink (other)
Rock Outcrop:	No bedrock exposed
CF Abundance:	10-20%
CF Sizes:	2-6mm, 6-20mm
CF Types:	Quartz, Ironstone, Calcrete (other)
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	Limited Clearing - Historical clearing?, Pig/Animal Disturbance - Cattle tracks,
(other) - Fire?	
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Casuarina pauper*
Mid Stratum 1:	*Maireana sedifolia*, *Senna artemisioides* subsp. *filifolia*
Lower Stratum 1:	*Ptilotus obovatus*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia aptaneura	8	
Acacia hemiteles	0.5	0.3
Aristida contorta	0.1	0.1
Austrostipa elegantissima	1	0.1
Austrostipa ?scabra	0.3	0.1
Austrostipa scabra subsp. *scabra*	0.1	0.1
Casuarina pauper	6	
Cephalipterum drummondii	0.1	0.1
Dodonaea lobulata	0.5	0.5
Eragrostis xerophila	0.1	0.3
Eremophila oppositifolia subsp. *angustifolia*	2	0.3
Eriochiton sclerolaenoides	0.1	0.1
Erodium cygnorum	0.1	0.1
Lepidium phlebopetalum	0.1	0.1
Lycium australe	0.5	0.2
Maireana sedifolia	1	20
Maireana tomentosa subsp. *tomentosa*	0.1	0.1
Maireana trichoptera	0.1	0.1
**Medicago minima*	0.1	0.1
Pittosporum angustifolium	0.2	0.1
Ptilotus obovatus	0.3	0.3
Rhagodia ulicina	0.5	0.3
Scaevola spinescens	0.5	0.2
Senna artemisioides subsp. *filifolia*	1.5	30
Senna artemisioides subsp. *x artemisioides*	0.5	0.1
Sida spodochroma	0.1	0.1
Solanum cleistogamum	0.3	0.1
Solanum nummularium	0.3	0.2
Trichanthodium skirrophorum	0.1	0.1

Vittadinia eremaea	0.1	0.1
Zygophyllum ovatum	0.1	0.1

PHOTO

Site Name:	A47
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	27/09/2016
GPS Location:	GDA94 Zone 51 332608E 6655085N
Community:	3
Landform Type:	Other, S - Simple slope, M - Mid slope (other)
Slope Class:	Very Gently Inclined (1 degree)
Aspect:	E
Soil Type:	Clay Loam
Soil Colour:	Red
Rock Outcrop:	No bedrock exposed
CF Abundance:	50-90%
CF Sizes:	2-6mm, 6-20mm
CF Types:	Quartz, Ironstone (other)
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	Grazing - Cattle grazing
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Casuarina pauper*, *Eucalyptus hypolaena*
Mid Stratum 1:	*Acacia burkittii*
Mid Stratum 2:	*Maireana sedifolia*, *Senna artemisioides* subsp. *filifolia*
Lower Stratum 1:	*Ptilotus obovatus*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia burkittii	4	6
Acacia nyssophylla	1	
Austrostipa elegantissima	0.3	0.1
Austrostipa scabra subsp. *scabra*	0.1	0.1
Casuarina pauper	12	2
Eremophila granitica	1	0.5
Eremophila oppositifolia subsp. *angustifolia*	1	
Eremophila sp. Mt Jackson (G.J. Keighery 4372)	3	0.3
Erodium cygnorum	0.1	0.1
Eucalyptus hypolaena	12	2
Euphorbia philochalix	0.1	0.1
Maireana georgei	0.1	0.1
Maireana sedifolia	1	3
Maireana trichoptera	0.1	0.1
Olearia muelleri	0.3	0.3
Ptilotus obovatus	0.3	3
Santalum spicatum	3	
Scaevola spinescens	1	
Sclerolaena diacantha	0.1	0.1
Senna artemisioides subsp. *filifolia*	1	0.3
Solanum cleistogamum	0.3	0.1

PHOTO

Site Name: A48
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 28/09/2016
GPS Location: GDA94 Zone 51 325941E 6660759N
Community: 3
Landform Type: Other, D - Drainage line, M - Mid slope (other)
Slope Class: Gently Inclined (3 degrees)
Aspect: W
Soil Type: Sandy clay loam (other)
Soil Colour: Red
Rock Outcrop: No bedrock exposed
CF Abundance: 20-50%
CF Sizes: 2-6mm, 6-20mm
CF Types: Quartz, Ironstone (other)
Vegetation Condition: Northern Vegetation Condition - VG - Very Good
Disturbance: Pig/Animal Disturbance - Cow poo, Old exploration
Fire: >5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Casuarina pauper*
Mid Stratum 1: *Acacia burkittii*
Mid Stratum 2: *Acacia hemiteles*, *Acacia tetragonophylla*, *Eremophila* sp. Mt Jackson (G.J. Keighery 4372)
Lower Stratum 1: *Atriplex ?vesicaria*, *Maireana sedifolia*
Lower Stratum 2: *Maireana tomentosa* subsp. *tomentosa*, *Maireana triptera*, *Ptilotus obovatus*, *Sclerolaena diacantha*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia burkittii	4	2
Acacia hemiteles	2	1.5
Acacia tetragonophylla	2	0.5
Alectryon oleifolius subsp. *canescens*	3	
Atriplex nummularia subsp. *spathulata*	1.5	0.2
Atriplex ?vesicaria	0.5	4
Austrostipa scabra subsp. *scabra*	0.1	0.1
Casuarina pauper	8	4
Cephalipterum drummondii	0.1	0.1
Dodonaea lobulata	1	0.5
Eremophila decipiens subsp. *decipiens*	1	0.8
Eremophila granitica	1	0.2
Eremophila scoparia	1	0.4
Eremophila sp. Mt Jackson (G.J. Keighery 4372)	2	0.4
Eucalyptus longissima	10	
Maireana georgei	0.3	0.1
Maireana sedifolia	1	1
Maireana tomentosa subsp. *tomentosa*	0.1	0.1
Maireana trichoptera	0.2	0.1
Maireana triptera	0.2	0.1
Marsdenia australis	0.1	1
Olearia muelleri	0.3	0.2
Ptilotus holosericeus	0.1	0.1
Ptilotus nobilis subsp. *nobilis*	0.2	0.2
Ptilotus obovatus	0.2	0.3
Santalum spicatum	3	

Scaevola spinescens	1	0.3
Schoenia cassiniana	0.1	0.1
Sclerolaena diacantha	0.1	0.1
Senna artemisioides subsp. *filifolia*	0.5	0.2
Templetonia incrassata	3	

PHOTO

Site Name:	A49
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	28/09/2016
GPS Location:	GDA94 Zone 51 326374E 6660771N
Community:	1
Landform Type:	Upper Slope
Slope Class:	Very Gently Inclined (1 degree)
Aspect:	W
Soil Type:	Clay Loam
Soil Colour:	Brown
Rock Outcrop:	No bedrock exposed
CF Abundance:	50-90%
CF Sizes:	2-6mm, 6-20mm, 20-60mm
CF Types:	Ironstone, Calcrete (other)
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	Pig/Animal Disturbance - Cattle tracks and poo, (other) - Old exploration tracks
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Casuarina pauper*
Mid Stratum 1:	*Acacia oswaldii*, *Dodonaea lobulata*, *Eremophila* sp. Mt Jackson (G.J. Keighery 4372)
Mid Stratum 2:	*Atriplex nummularia* subsp. *spathulata*, *Scaevola spinescens*, *Senna artemisioides* subsp. *filifolia*
Lower Stratum 1:	*Ptilotus obovatus*
Lower Stratum 2:	*Maireana trichoptera*, *Sclerolaena patenticuspis*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia erinacea	0.5	0.3
Acacia hemiteles	2	0.3
Acacia oswaldii	2	0.5
Acacia xerophila var. *xerophila*	0.5	0.2
Atriplex nummularia subsp. *spathulata*	1.5	1
Atriplex ?vesicaria	0.5	0.2
Austrostipa elegantissima	0.5	0.1
Casuarina pauper	8	4
Dodonaea lobulata	2	1.5
Eremophila decipiens subsp. *decipiens*	1	0.5
Eremophila glabra subsp. *glabra*	1.5	0.4
Eremophila oldfieldii subsp. *angustifolia*	1	0.2
Eremophila sp. Mt Jackson (G.J. Keighery 4372)	1.5	1.5
Maireana georgei	0.3	0.2
Maireana sedifolia	1	0.3
Maireana trichoptera	0.1	0.1
Olearia muelleri	0.3	0.2
Pittosporum angustifolium	0.5	0.1
Ptilotus obovatus	0.3	0.5
Rhagodia ulicina		
Santalum spicatum	2	0.3
Scaevola spinescens	1	3
Sclerolaena patenticuspis	0.1	0.1
Senna artemisioides subsp. *filifolia*	1	2
Zygophyllum aurantiacum	0.1	0.1

PHOTO

Site Name: A50
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 28/09/2016
GPS Location: GDA94 Zone 51 326366E 6659780N
Community: 6
Landform Type: Drainage Line
Slope Class: Very Gently Inclined (1 degree)
Aspect: SW
Soil Type: Clay (other)
Soil Colour: Red
Rock Outcrop: No bedrock exposed
CF Abundance: 0%
Vegetation Condition: Northern Vegetation Condition - G - Good
Disturbance: Grazing - Cattle grazing, Exotic Weeds, Pig/Animal Disturbance - Cattle trampling

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Santalum acuminatum*
Mid Stratum 1: *Acacia burkittii*
Lower Stratum 1: *Atriplex ?vesicaria*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia burkittii	3	90
Acacia tetragonophylla	1	0.3
Atriplex ?vesicaria		
Bulbine semibarbata	0.1	0.1
**Centaurea melitensis*	0.2	2
Daucus glochidiatus	0.1	0.1
Dichanthium sericeum subsp. *humilius*	0.1	0.1
Dodonaea lobulata	0.5	0.2
Dodonaea ?viscosa subsp. *angustissima*	1	0.2
Enneapogon avenaceus	0.1	0.1
Eragrostis dielsii	0.1	0.1
Eremophila alternifolia	3	1
Eremophila scoparia	1.5	0.2
Eremophila sp. Mt Jackson (G.J. Keighery 4372)	0.5	0.1
Haloragis trigonocarpa	0.1	0.1
**Lysimachia arvensis*	0.1	0.1
Maireana pyramidata	1	0.5
Maireana sedifolia	1	0.3
**Medicago minima*	0.1	0.1
Oxalis perennans	0.1	0.1
Pimelea microcephala subsp. *microcephala*	1	0.3
Plantago drummondii	0.1	0.1
Poaceae sp.	0.2	0.1
Podolepis lessonii	0.1	0.1
Ptilotus obovatus	0.3	0.2
Rhagodia ulicina	1	0.2
Rhodanthe uniflora	0.1	0.1
**Rostraria pumila*	0.1	0.1
Rytidosperma caespitosum	0.3	0.1
**Salvia verbenaca*	0.2	0.1
Santalum acuminatum	5	2
Santalum spicatum	2	0.5

Scaevola spinescens	1	0.1
Senna artemisioides subsp. *filifolia*	1	0.2
Senna artemisioides subsp. *x artemisioides*	1.5	0.5
Sida intricata	0.1	0.1
Solanum cleistogamum	0.3	0.3
Solanum nummularium	0.3	0.2
**Sonchus oleraceus*	0.1	0.2
Spartothamnella canescens	1	0.2
Streptoglossa liatroides	0.1	0.1
Vittadinia cervicularis var. *cervicularis*	0.1	0.1
Wahlenbergia tumidifructa	0.2	0.1

PHOTO

Site Name:	A51
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	28/09/2016
GPS Location:	GDA94 Zone 51 326005E 6659713N
Community:	1
Landform Type:	Other, S - Simple slope, L - Lower slope (other)
Slope Class:	Gently Inclined (3 degrees)
Aspect:	S
Soil Type:	Sandy clay loam (other)
Soil Colour:	Red, Orange (other)
Rock Outcrop:	No bedrock exposed
CF Abundance:	50-90%
CF Sizes:	2-6mm, 6-20mm
CF Types:	Ironstone
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	Pig/Animal Disturbance - Cattle tracks, (other) - Old exploration tracks
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Eucalyptus concinna*
Upper Stratum 2:	*Casuarina pauper*
Mid Stratum 1:	*Eremophila* sp. Mt Jackson (G.J. Keighery 4372)
Mid Stratum 2:	*Acacia nyssophylla*, *Grevillea acuaria*, *Scaevola spinescens*
Lower Stratum 1:	*Ptilotus obovatus*
Lower Stratum 2:	*Maireana georgei*, *Maireana tomentosa* subsp. *tomentosa*, *Maireana trichoptera*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia burkittii	4	
Acacia erinacea	1	0.5
Acacia hemiteles	1	1
Acacia nyssophylla	1.5	2.5
Austrostipa elegantissima	1	0.3
Casuarina pauper	8	2
Eremophila decipiens subsp. *decipiens*	1	1
Eremophila glabra subsp. *glabra*	1	0.3
Eremophila sp. Mt Jackson (G.J. Keighery 4372)	3	2
Eucalyptus concinna	15	10
Grevillea acuaria	1	1
Maireana georgei	0.2	0.1
Maireana sedifolia	1	
Maireana tomentosa subsp. *tomentosa*	0.1	0.1
Maireana trichoptera	0.1	0.1
Olearia muelleri	0.3	0.3
Ptilotus obovatus	0.3	0.2
Scaevola spinescens	1	2
Senna artemisioides subsp. *filifolia*	1	0.5
Solanum cleistogamum	0.3	0.1
Templetonia incrassata	0.3	0.1

PHOTO

Site Name:	A52
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	28/09/2016
GPS Location:	GDA94 Zone 51 326028E 6658559N
Community:	5
Landform Type:	Other, S - Simple slope, L - Lower slope (other)
Slope Class:	Very Gently Inclined (1 degree)
Aspect:	SW
Soil Type:	Sandy clay loam (other)
Soil Colour:	Red, Orange (other)
Rock Outcrop:	No bedrock exposed
CF Abundance:	>90%
CF Sizes:	2-6mm, 6-20mm
CF Types:	Quartz, Ironstone (other)
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	Pig/Animal Disturbance - Cattle tracks, (other) - Old exploration
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Eucalyptus salmonophloia*
Upper Stratum 2:	*Casuarina pauper*
Mid Stratum 1:	*Eremophila scoparia*, *Eremophila* sp. Mt Jackson (G.J. Keighery 4372)
Mid Stratum 2:	*Maireana sedifolia*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia erinacea	1	0.5
Casuarina pauper	6	0.5
Eremophila decipiens subsp. *decipiens*	1.5	0.5
Eremophila glabra subsp. *glabra*	2	0.4
Eremophila parvifolia subsp. *auricampa*	0.5	0.5
Eremophila scoparia	2	4
Eremophila sp. Mt Jackson (G.J. Keighery 4372)	2	1.5
Eucalyptus celastroides subsp. *celastroides*	15	
Eucalyptus salmonophloia	20	5
Frankenia interioris var. *interioris*	0.3	0.1
Maireana sedifolia	1	2
Olearia muelleri	0.3	1
Ptilotus obovatus	0.3	0.1
Rhagodia ulicina	0.5	0.3
Scaevola spinescens	0.5	0.5
Sclerolaena diacantha	0.1	0.1
Senna artemisioides subsp. *filifolia*	0.3	0.1
Templetonia incrassata	1.5	1

PHOTO

Site Name:	A53
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	28/09/2016
GPS Location:	GDA94 Zone 51 326552E 6657068N
Community:	1
Landform Type:	Other, S - Simple slope, L - Lower slope (other)
Slope Class:	Gently Inclined (3 degrees)
Aspect:	N
Soil Type:	Clayey sand (other)
Soil Colour:	Red
Rock Outcrop:	No bedrock exposed
CF Abundance:	<2%
CF Sizes:	2-6mm
CF Types:	Ironstone
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	Pig/Animal Disturbance - Cattle tracks and poo, (other) - Old exploration
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Eucalyptus concinna*
Upper Stratum 2:	*Casuarina pauper*
Mid Stratum 1:	*Acacia tetragonophylla*, *Eremophila scoparia*, *Senna artemisioides* subsp. *filifolia*
Lower Stratum 1:	*Ptilotus obovatus*
Lower Stratum 2:	*Maireana trichoptera*, *Maireana triptera*, *Sclerolaena diacantha*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia hemiteles	0.4	0.3
Acacia nyssophylla	0.3	0.2
Acacia tetragonophylla	2	0.5
Austrostipa elegantissima	0.3	0.1
Austrostipa scabra subsp. *scabra*	0.1	0.1
Casuarina pauper	8	1
Dodonaea ?viscosa subsp. *angustissima*	0.5	0.3
Eremophila decipiens subsp. *decipiens*	1.5	0.4
Eremophila granitica	1	0.2
Eremophila parvifolia subsp. *auricampa*	0.3	0.1
Eremophila scoparia	1.5	0.5
Eucalyptus concinna	15	3
Grevillea acuaria	0.3	1
Maireana trichoptera	0.1	0.1
Maireana triptera	0.1	0.1
Paspalidium gracile	0.2	0.1
Pimelea microcephala subsp. *microcephala*	1	0.2
Ptilotus obovatus	0.3	0.5
Rhagodia ulicina	0.5	0.2
Santalum spicatum	3	0.5
Scaevola spinescens	1	0.4
Sclerolaena diacantha	0.1	0.1
Senna artemisioides subsp. *filifolia*	1.5	2.5
Solanum nummularium	0.4	0.1
Templetonia incrassata	1	0.2

PHOTO

Site Name:	A54
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	28/09/2016
GPS Location:	GDA94 Zone 51 326717E 6658802N
Community:	3
Landform Type:	Upper Slope
Slope Class:	Gently Inclined (3 degrees)
Aspect:	SW
Soil Type:	Light Clay
Soil Colour:	Brown, White (other)
Rock Outcrop:	No bedrock exposed
CF Abundance:	50-90%
CF Sizes:	2-6mm, 6-20mm
CF Types:	Basalt, Calcrete (other)
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	Pig/Animal Disturbance - Cattle tracks, (other) - Old exploration
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Casuarina pauper*
Mid Stratum 1:	*Acacia oswaldii*, *Alectryon oleifolius* subsp. *canescens*
Mid Stratum 2:	*Dodonaea lobulata*, *Eremophila oppositifolia* subsp. *angustifolia*, *Senna artemisioides* subsp. *filifolia*
Lower Stratum 1:	*Ptilotus obovatus*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia burkittii	3	0.4
Acacia oswaldii	3	0.4
Alectryon oleifolius subsp. *canescens*	3	0.4
Austrostipa scabra subsp. *scabra*	0.2	0.1
Casuarina pauper	8	3
Dodonaea lobulata	2	1
Eremophila glabra subsp. *glabra*	1.5	0.3
Eremophila oldfieldii subsp. *angustifolia*	1.5	0.3
Eremophila oppositifolia subsp. *angustifolia*	1.5	0.5
Maireana sedifolia	1	0.5
Olearia muelleri	0.3	0.2
Pimelea microcephala subsp. *microcephala*	0.5	0.2
Ptilotus obovatus	0.3	0.5
Rhagodia ulicina	0.5	0.2
Scaevola spinescens	1	1
Senna artemisioides subsp. *filifolia*	1.5	0.5
Templetonia incrassata	2	1

PHOTO

Site Name:	A55
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	28/09/2016
GPS Location:	GDA94 Zone 51 328230E 6655947N
Community:	1
Landform Type:	Lower Slope
Slope Class:	Gently Inclined (3 degrees)
Aspect:	NW
Soil Type:	Clay (other)
Soil Colour:	Red
Rock Outcrop:	No bedrock exposed
CF Abundance:	10-20%
CF Sizes:	2-6mm, 6-20mm
CF Types:	Basalt, Calcrete (other)
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Eucalyptus longissima*
Mid Stratum 1:	*Acacia burkittii*, *Acacia hemiteles*
Mid Stratum 2:	*Scaevola spinescens*, *Senna artemisioides* subsp. *filifolia*
Lower Stratum 1:	*Olearia muelleri*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia burkittii	1.5	2
Acacia erinacea	0.5	2
Acacia hemiteles	1.5	3
Acacia oswaldii	2	0.3
Austrostipa elegantissima	0.3	0.1
Austrostipa scabra subsp. *scabra*	0.2	0.1
Casuarina pauper	2	0.1
Dodonaea lobulata	1	0.2
Eremophila glabra subsp. *glabra*	1	0.1
Eremophila parvifolia subsp. *auricampa*	0.5	0.3
Eremophila scoparia	2	0.3
Eucalyptus longissima	15	5
Grevillea acuaria	1.5	1
Maireana georgei	0.2	0.1
Maireana trichoptera	0.1	0.1
Olearia muelleri	0.3	0.5
Pimelea microcephala subsp. *microcephala*	1	0.2
Pittosporum angustifolium	0.5	0.1
Ptilotus nobilis subsp. *nobilis*	0.3	0.1
Ptilotus obovatus	0.3	0.1
Rhodanthe floribunda	0.1	0.1
Santalum acuminatum	1.5	0.3
Santalum spicatum	3	0.5
Scaevola spinescens	0.5	1
Senna artemisioides subsp. *filifolia*	1.5	1
Solanum cleistogamum	0.3	0.1

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Site Name:	A56
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	28/09/2016
GPS Location:	GDA94 Zone 51 327818E 6655274N
Community:	4
Landform Type:	Mid Slope
Slope Class:	Gently Inclined (3 degrees)
Aspect:	NE
Soil Type:	Light Clay
Soil Colour:	Brown
Rock Outcrop:	No bedrock exposed
CF Abundance:	50-90%
CF Sizes:	2-6mm, 6-20mm
CF Types:	Basalt, Calcrete (other)
Vegetation Condition:	Northern Vegetation Condition - G - Good
Disturbance:	(other) - Road disturbance, drains etc
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Eucalyptus concinna*

Mid Stratum 1: *Acacia burkittii*, *Scaevola spinescens*, *Senna artemisioides* subsp. *filifolia*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia burkittii	1.5	0.2
Acacia hemiteles	0.5	0.5
Acacia xerophila var. *xerophila*	0.5	0.2
Casuarina pauper	1	2
Dodonaea lobulata	1	0.2
Eremophila parvifolia subsp. *auricampa*	1	0.8
Eucalyptus concinna	8	4
Scaevola spinescens	1	0.3
Senna artemisioides subsp. *filifolia*	1	0.5

PHOTO

Site Name: A57
Site Type: QUADRAT
Dimensions: 20m x 20m
Survey Date: 29/09/2016
GPS Location: GDA94 Zone 51 329512E 6658267N
Community: 7
Landform Type: Other, D - Drainage line, F - Flat (other)
Slope Class: Level (0 degrees)
Soil Type: Clay (other)
Soil Colour: Red
Rock Outcrop: No bedrock exposed
CF Abundance: 20-50%
CF Sizes: 2-6mm
CF Types: Ironstone
Vegetation Condition: Northern Vegetation Condition - G - Good
Disturbance: Grazing - Cattle grazing, Pig/Animal Disturbance - Cattle trampling, (other) -
Historic clearing?
Fire: >5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1: *Acacia aptaneura*
Mid Stratum 1: *Atriplex ?vesicaria*, *Maireana pyramidata*
Lower Stratum 1: *Maireana georgei*, *Ptilotus obovatus*, *Sclerolaena diacantha*
Lower Stratum 2: *Calotis multicaulis*, *Crassula colorata* var. *acuminata*, **Salvia verbenaca*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia aptaneura	4	1
Actinobole uliginosum	0.1	0.1
Aristida contorta	0.1	0.1
Atriplex ?vesicaria	0.5	0.3
Brachyscome ciliaris	0.1	0.1
Bulbine semibarbata	0.1	0.1
Calandrinia eremaea	0.1	0.1
Calandrinia ptychosperma	0.1	0.1
Calotis multicaulis	0.1	0.1
Crassula colorata var. *acuminata*	0.1	0.1
Enneapogon avenaceus	0.1	0.1
Enteropogon ramosus	0.1	0.1
Eragrostis dielsii	0.1	0.1
Euphorbia philochalix	0.1	0.1
Gnephosis brevifolia	0.1	0.1
Goodenia havilandii	0.1	0.1
**Lysimachia arvensis*	0.1	0.1
Maireana carnosa	0.1	0.1
Maireana georgei	0.2	0.1
Maireana glomerifolia	0.3	0.2
Maireana pyramidata	0.5	4
Maireana tomentosa subsp. *tomentosa*	0.1	0.1
Maireana triptera	0.3	0.1
Marsdenia australis	0.1	0.1
Menkea australis	0.1	0.2
Plantago drummondii	0.1	0.1
Poaceae sp.	0.1	0.1
Pogonolepis muelleriana	0.1	0.1
Ptilotus aervoides	0.1	0.1

Ptilotus obovatus	0.3	0.3
Rhodanthe charsleyae	0.1	0.1
**Salvia verbenaca*	0.1	0.2
Sclerolaena cuneata	0.1	0.1
Sclerolaena densiflora	0.1	0.1
Sclerolaena diacantha	0.1	0.2
Sclerolaena patenticuspis	0.1	0.1
Sida calyxhymenia	0.3	0.1
Sida intricata	0.1	0.1
Solanum cleistogamum	0.3	0.1
**Sonchus oleraceus*	0.1	0.1
Tetragonia eremaea	0.1	0.1

PHOTO

Site Name:	A58
Site Type:	QUADRAT
Dimensions:	20m x 20m
Survey Date:	29/09/2016
GPS Location:	GDA94 Zone 51 328951E 6658289N
Community:	2
Landform Type:	Other, H - Hillock, U - Upper slope (other)
Slope Class:	Gently Inclined (3 degrees)
Aspect:	N
Soil Type:	Sandy clay loam (other)
Soil Colour:	Red, Brown (other)
Rock Outcrop:	No bedrock exposed
CF Abundance:	>90%
CF Sizes:	2-6mm, 6-20mm
CF Types:	Ironstone, Calcrete (other)
Vegetation Condition:	Northern Vegetation Condition - VG - Very Good
Disturbance:	Pig/Animal Disturbance - Cattle tracks, (other) - Old logging
Fire:	>5 yrs

DOMINANT TAXA IN VEGETATION STRATA

Upper Stratum 1:	*Eucalyptus hypolaena*
Upper Stratum 2:	*Casuarina pauper*
Mid Stratum 1:	*Alectryon oleifolius* subsp. *canescens*
Mid Stratum 2:	*Maireana sedifolia*, *Senna artemisioides* subsp. *filifolia*
Lower Stratum 1:	*Ptilotus obovatus*

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
Acacia burkittii	3	
Acacia hemiteles	0.3	0.3
Acacia tetragonophylla	0.5	0.2
Alectryon oleifolius subsp. *canescens*	2	0.5
Austrostipa scabra subsp. *scabra*	0.1	0.1
Casuarina pauper	8	1
Dodonaea lobulata	1	
Eremophila parvifolia subsp. *auricampa*	0.5	0.2
Eremophila sp. Mt Jackson (G.J. Keighery 4372)	1.5	0.3
Eucalyptus hypolaena	12	3
Maireana sedifolia	1	1
Maireana trichoptera	0.1	0.1
Olearia muelleri	0.3	0.3
Pimelea microcephala subsp. *microcephala*	0.5	0.1
Ptilotus obovatus	0.3	0.3
Santalum spicatum	3	
Scaevola spinescens	0.5	0.1
Senna artemisioides subsp. *filifolia*	1	2
Solanum cleistogamum	0.3	0.1

PHOTO

Appendix J: Location Details of Conservation Significant Flora and Introduced Flora Recorded within the Study Area

Note: All locations are in datum GDA94, Zone 51

Taxon	Status	Easting	Northing	Record Location	Count
Gunniopsis propinqua	P3	330827	6658856	A40	-
Gunniopsis propinqua	P3	332303	6659994	A38	-
Gunniopsis propinqua	P3	332140	6661114	Opportunistic	50
Ixiochlamys nana	Significantly Disjunct Record / Limited Distribution in WA	330827	6658856	A40	-
Rhodanthe uniflora	Limited Distribution in WA	330827	6658856	A40	-
Rhodanthe uniflora	Limited Distribution in WA	326366	6659780	A50	-
**Brassica tournefortii*	Introduced	327225	6664643	Opportunistic	6
**Centaurea melitensis*	Introduced	328828	6659630	A27	-
**Centaurea melitensis*	Introduced	330827	6658856	A40	-
**Centaurea melitensis*	Introduced	331602	6661150	A36	-
**Centaurea melitensis*	Introduced	326366	6659780	A50	-
**Lysimachia arvensis*	Introduced	329512	6658267	A57	-
**Lysimachia arvensis*	Introduced	326366	6659780	A50	-
**Lysimachia arvensis*	Introduced	336035	6653265	A43	-
**Lysimachia arvensis*	Introduced	328828	6659630	A27	-
**Lysimachia arvensis*	Introduced	331602	6661150	A36	-
**Medicago minima*	Introduced	328828	6659630	A27	-
**Medicago minima*	Introduced	335957	6654346	A46	-
**Medicago minima*	Introduced	326366	6659780	A50	-
**Rostraria pumila*	Introduced	331602	6661150	A36	-
**Rostraria pumila*	Introduced	328828	6659630	A27	-
**Rostraria pumila*	Introduced	326366	6659780	A50	-
**Salvia verbenaca*	Introduced	329512	6658267	A57	-
**Salvia verbenaca*	Introduced	326366	6659780	A50	-
**Salvia verbenaca*	Introduced	328828	6659630	A27	-
**Salvia verbenaca*	Introduced	331602	6661150	A36	-
**Salvia verbenaca*	Introduced	332853	6659706	A37	-
**Sonchus oleraceus*	Introduced	326366	6659780	A50	-
**Sonchus oleraceus*	Introduced	328828	6659630	A27	-
**Sonchus oleraceus*	Introduced	327573	6661341	A15	-
**Sonchus oleraceus*	Introduced	329512	6658267	A57	-

325000 325500 326000 326500 327000 327500 328000

6665500 6665000 6664500 6664000 6663500 6663000 6662500 6662000 6661500

This map should only be used in conjunction with WEC report IntSust16-32-01.

N

Detailed Significant Flora Locations and Vegetation Type Mapping

Revision: A - 30 January 2017

Scale: 1:12,500

Author: Alison Salagari

WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-App-K.mxd

Projection: GDA 1994 MGA Zone 51

Appendix

K

Sheet 1

328000 328500 329000 329500 330000 330500 331000

6665500 6665000 6664500 6664000 6663500 6663000 6662500 6662000 6661500

WOODMAN ENVIRONMENTAL

This map should only be used in conjunction with WEC report IntSust16-32-01.

N

Detailed Significant Flora Locations and Vegetation Type Mapping

Revision: A - 30 January 2017 Scale: 1:12,500

Author: Alison Salagari

WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-App-K.mxd

Projection: GDA 1994 MGA Zone 51

Appendix K Sheet 2

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3 5 6 C

WOODMAN ENVIRONMENTAL

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N

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Revision: A - 30 January 2017 Scale: 1:12,500

Author: Alison Salagari

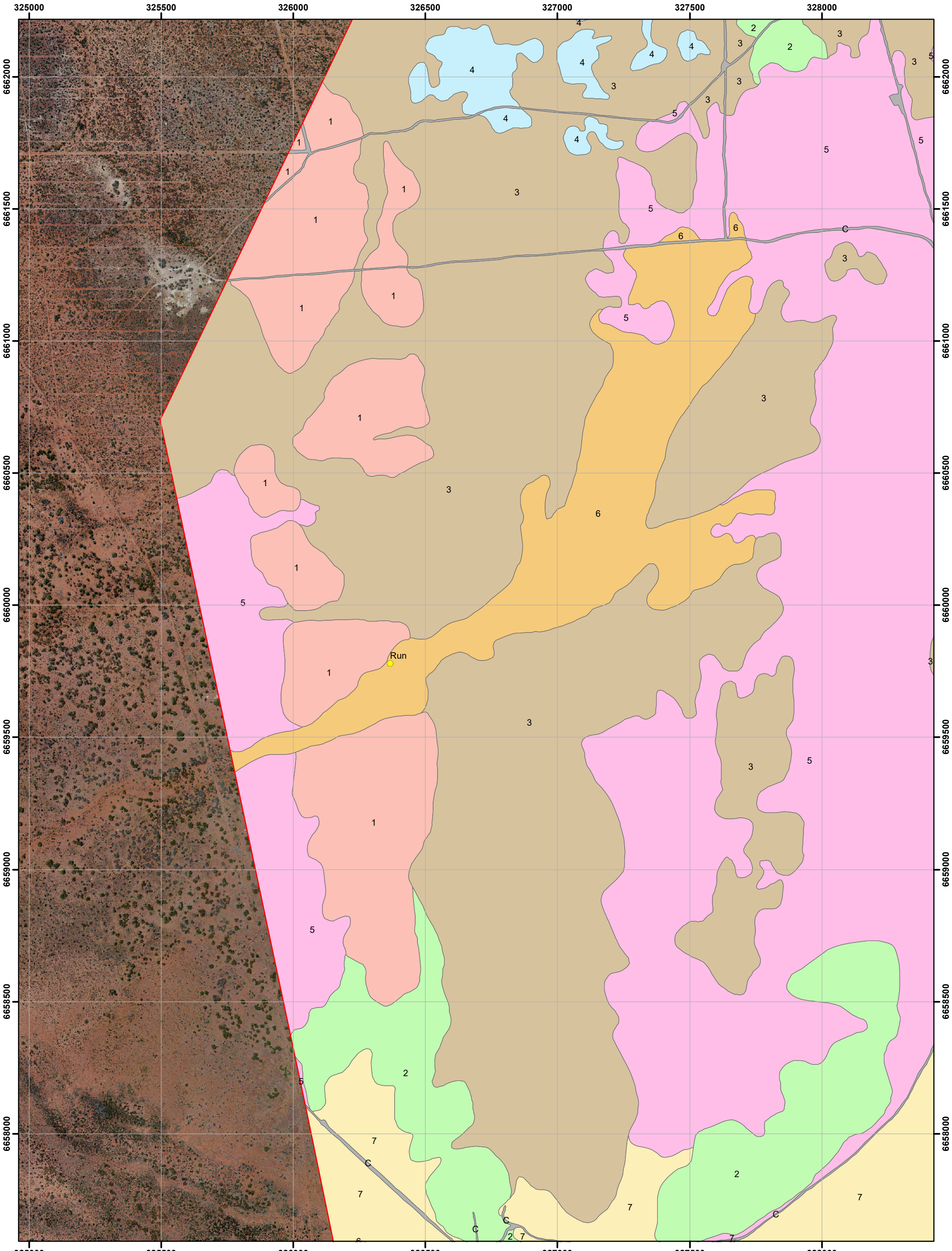
WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-App-K.mxd

Projection: GDA 1994 MGA Zone 51

Appendix K

Sheet 3



WOODMAN ENVIRONMENTAL

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Filename: IntSust16-32-01-App-K.mxd

Projection: GDA 1994 MGA Zone 51

Appendix K Sheet 4

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Ina Gpr
Run

WOODMAN ENVIRONMENTAL

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Detailed Significant Flora Locations and Vegetation Type Mapping

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Author: Alison Salagari

WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-App-K.mxd

Projection: GDA 1994 MGA Zone 51

Appendix

K

Sheet 5

330500 331000 331500 332000 332500 333000 333500

6662000 6661500 6661000 6660500 6660000 6659500 6659000 6658500 6658000

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330500 331000 331500 332000 332500 333000 333500

WOODMAN ENVIRONMENTAL

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N

Detailed Significant Flora Locations and Vegetation Type Mapping

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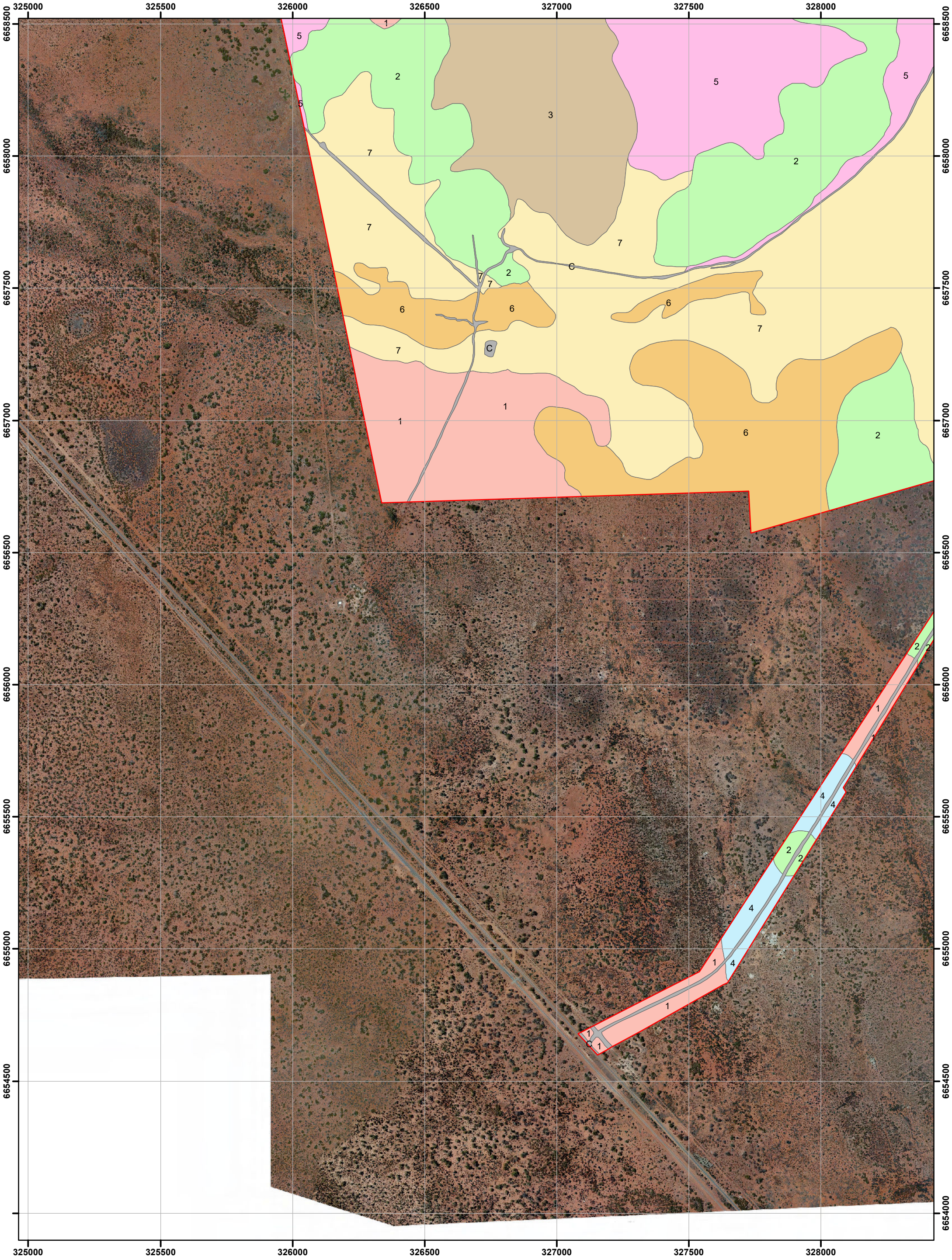
Author: Alison Salagari

WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-App-K.mxd

Projection: GDA 1994 MGA Zone 51

Appendix K Sheet 6



WOODMAN ENVIRONMENTAL

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Detailed Significant Flora Locations and Vegetation Type Mapping

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Author: Alison Salagari

WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-App-K.mxd

Projection: GDA 1994 MGA Zone 51

Appendix

K

Sheet 7

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WOODMAN ENVIRONMENTAL

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Detailed Significant Flora Locations and Vegetation Type Mapping

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Author: Alison Salagari

WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-App-K.mxd

Projection: GDA 1994 MGA Zone 51

Appendix

K

Sheet 8

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Detailed Significant Flora Locations and Vegetation Type Mapping

WOODMAN ENVIRONMENTAL

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N

Author: Alison Salagari

WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-App-K.mxd

Revision: A - 30 January 2017

Scale: 1:12,500

Projection: GDA 1994 MGA Zone 51

Appendix K

Sheet 9

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WOODMAN ENVIRONMENTAL

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Detailed Significant Flora Locations and Vegetation Type Mapping

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Author: Alison Salagari

WEC Ref: IntSust16-32-01

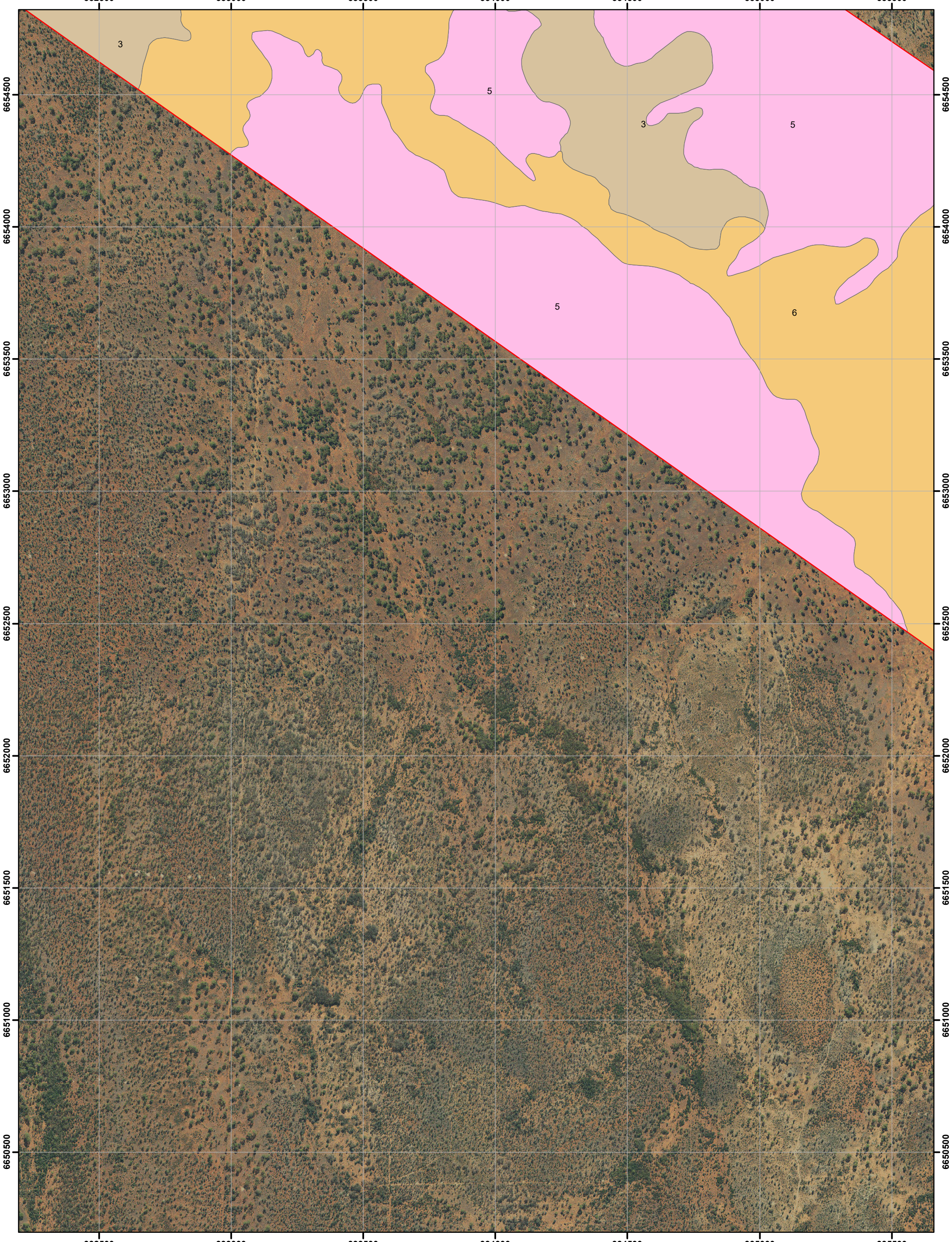
Filename: IntSust16-32-01-App-K.mxd

Projection: GDA 1994 MGA Zone 51

Appendix

K

Sheet 10



WOODMAN ENVIRONMENTAL

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N

Detailed Significant Flora Locations and Vegetation Type Mapping

Revision: A - 30 January 2017 Scale: 1:12,500

Author: Alison Salagari

WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-App-K.mxd

Projection: GDA 1994 MGA Zone 51

Appendix

K

Sheet 11

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WOODMAN ENVIRONMENTAL

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N

Detailed Significant Flora Locations and Vegetation Type Mapping

Revision: A - 30 January 2017 Scale: 1:12,500

Author: Alison Salagari

WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-App-K.mxd

Projection: GDA 1994 MGA Zone 51

Appendix

K

Sheet 12

Legend

Study Area

Vegetation Types

1 Low open woodland of *Casuarina pauper* over mid open shrubland dominated by *Acacia hemiteles*, *Eremophila* sp. Mt Jackson (G.J. Keighery 4372) and *Senna artemisioides* subsp. *filifolia* over low sparse shrubland dominated by *Ptilotus obovatus* on hill slopes and low rises on stony red loam soils.

2 Low woodland dominated by *Eucalyptus celastroides* subsp. *celastroides*, *Eucalyptus clelandii* and *Eucalyptus hypolaena* over tall sparse shrubland dominated by *Eremophila scoparia* and *Eremophila* sp. Mt Jackson (G.J. Keighery 4372) over low sparse shrubland dominated by *Eremophila parvifolia* subsp. *auricampa, Maireana sedifolia* and *Olearia muelleri* on low hills and rises on stony red to white loam soils.

3 Low open woodland of *Casuarina pauper* over tall sparse shrubland dominated by *Acacia burkittii* over mid sparse to open shrubland dominated by *Dodonaea lobulata* and *Senna artemisioides* subsp. *filifolia* over mid sparse shrubland dominated by *Maireana sedifolia* and *Scaevola spinescens* over low sparse shrubland of *Ptilotus obovatus* on slopes of low hills and on minor drainage features on stony red clay loam soils.

4 Low woodland of *Eucalyptus concinna* over mid sparse shrubland dominated by *Acacia hemiteles*, *Dodonaea lobulata* and *Senna artemisioides* subsp. *filifolia* on flats to midslopes on red to brown sandy loam and clay soils.

5 Mid open woodland to woodland dominated by *Eucalyptus salmonophloia* and *Eucalyptus salubris* over low open woodland of *Casuarina pauper* over mid sparse shrubland dominated by *Eremophila scoparia* and *Maireana sedifolia* over low sparse chenopod shrubland of mixed species including *Maireana georgei*, *Maireana triptera* and *Sclerolaena diacantha* on stony flats and lower slopes on red to brown-white clay loam and clay soils.

6 Low open woodland of *Casuarina pauper* over tall sparse shrubland dominated by *Eremophila oldfieldii* subsp. *angustifolia* and *Templetonia incrassata* over mid sparse shrubland dominated by *Maireana pyramidata* and *Maireana sedifolia* over low sparse shrubland dominated by *Ptilotus obovatus* over low sparse chenopod shrubland of mixed species including *Maireana trichoptera* and *Sclerolaena diacantha* on flats and drainage lines on red clay soils.

7 Mid sparse shrubland dominated by *Maireana pyramidata* over low sparse chenopod shrubland of mixed species including *Maireana georgei*, *Sclerolaena diacantha* and *Sclerolaena patenticuspis* on stony flats on red clay soils.

C Cleared Land

Significant Flora

- Gpr *Gunniopsis propinqua* (P3)
- Ina *Ixiochlamys nana*
- Run *Rhodanthe uniflora*

WOODMAN ENVIRONMENTAL

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N

Detailed Significant Flora Locations and Vegetation Type Mapping Legend

Revision: A - 30 January 2017 Scale: 1:10,000

Author: Alison Salagari

WEC Ref: IntSust16-32-01

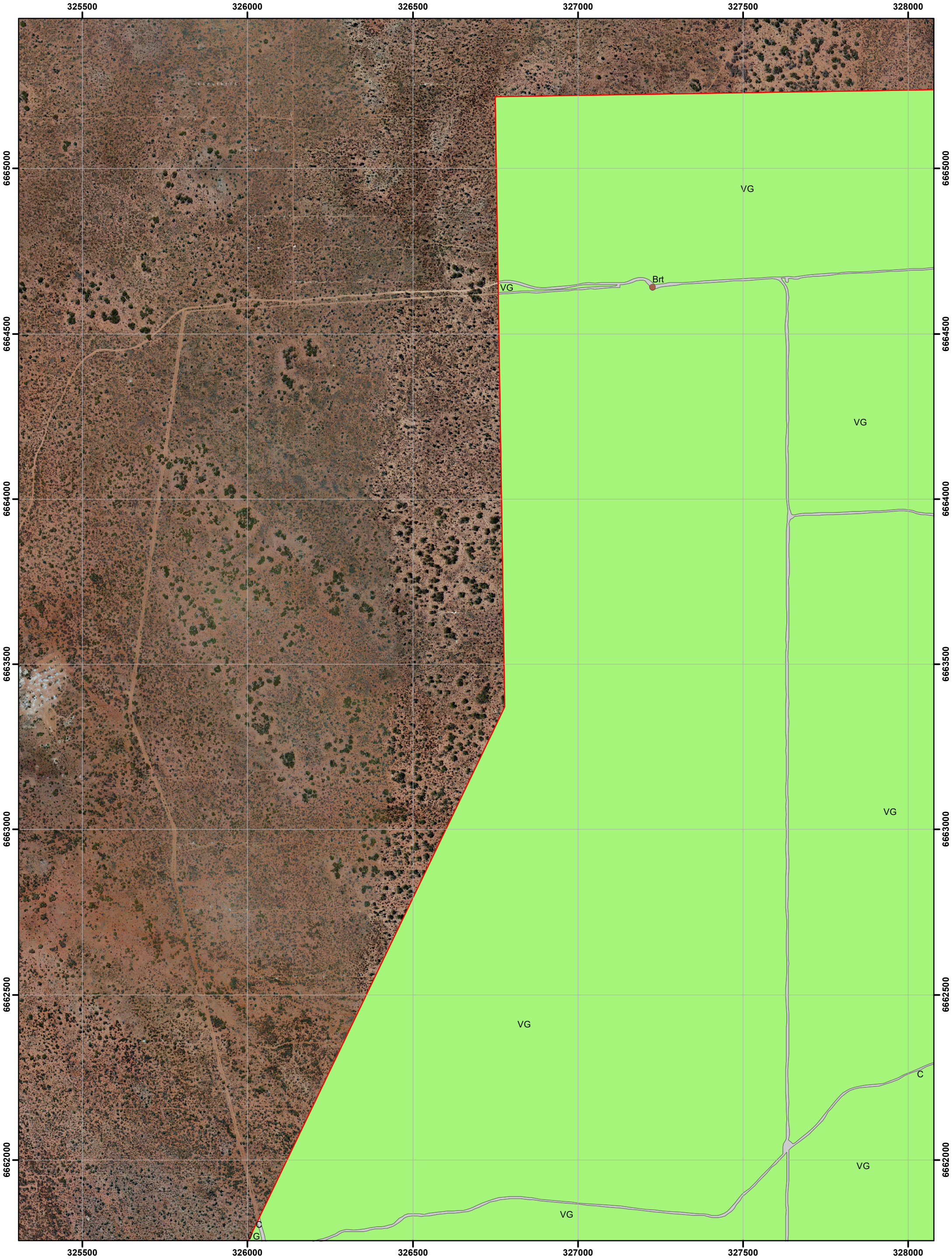
Filename: IntSust16-32-01-f06-1.mxd

Projection: GDA 1994 MGA Zone 51

Appendix

K

Sheet 0



WOODMAN ENVIRONMENTAL

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N

Detailed Introduced Flora Locations and Vegetation Condition Mapping

Revision: A - 30 January 2017 Scale: 1:10,000

Author: Alison Salagari

WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-App-L.mxd

Projection: GDA 1994 MGA Zone 51

Appendix

L

Sheet 1

328500 329000 329500 330000 330500

6665000 6664500 6664000 6663500 6663000 6662500 6662000

VG

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C

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VG

VG

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WOODMAN ENVIRONMENTAL

This map should only be used in conjunction with WEC report IntSust16-32-01.

N

Detailed Introduced Flora Locations and Vegetation Condition Mapping

Revision: A - 30 January 2017 Scale: 1:10,000

Author: Alison Salagari

WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-App-L.mxd

Projection: GDA 1994 MGA Zone 51

Appendix

L

Sheet 2

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VG

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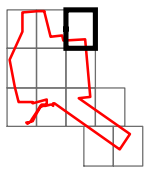
WOODMAN ENVIRONMENTAL



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Detailed Introduced Flora Locations and Vegetation Condition Mapping

Revision: A - 30 January 2017 Scale: 1:10,000

Author: Alison Salagari

WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-App-L.mxd

Projection: GDA 1994 MGA Zone 51

Appendix

L

Sheet 3

WOODMAN ENVIRONMENTAL

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N

Detailed Introduced Flora Locations and Vegetation Condition Mapping

Revision: A - 30 January 2017 Scale: 1:10,000

Author: Alison Salagari

WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-App-L.mxd

Projection: GDA 1994 MGA Zone 51

Appendix

L

Sheet 4

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328500 329000 329500 330000 330500

WOODMAN ENVIRONMENTAL

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N

Detailed Introduced Flora Locations and Vegetation Condition Mapping

Revision: A - 30 January 2017 Scale: 1:10,000

Author: Alison Salagari

WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-App-L.mxd

Projection: GDA 1994 MGA Zone 51

Appendix L Sheet 5

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6661500 6661000 6660500 6660000 6659500 6659000 6658500

Cem Sav Lya Rop

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WOODMAN ENVIRONMENTAL

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N

Detailed Introduced Flora Locations and Vegetation Condition Mapping

Revision: A - 30 January 2017 Scale: 1:10,000

Author: Alison Salagari

WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-App-L.mxd

Projection: GDA 1994 MGA Zone 51

Appendix L

Sheet 6

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VG
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WOODMAN ENVIRONMENTAL

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N

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Revision: A - 30 January 2017 Scale: 1:10,000

Author: Alison Salagari

WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-App-L.mxd

Projection: GDA 1994 MGA Zone 51

Appendix

L

Sheet 7

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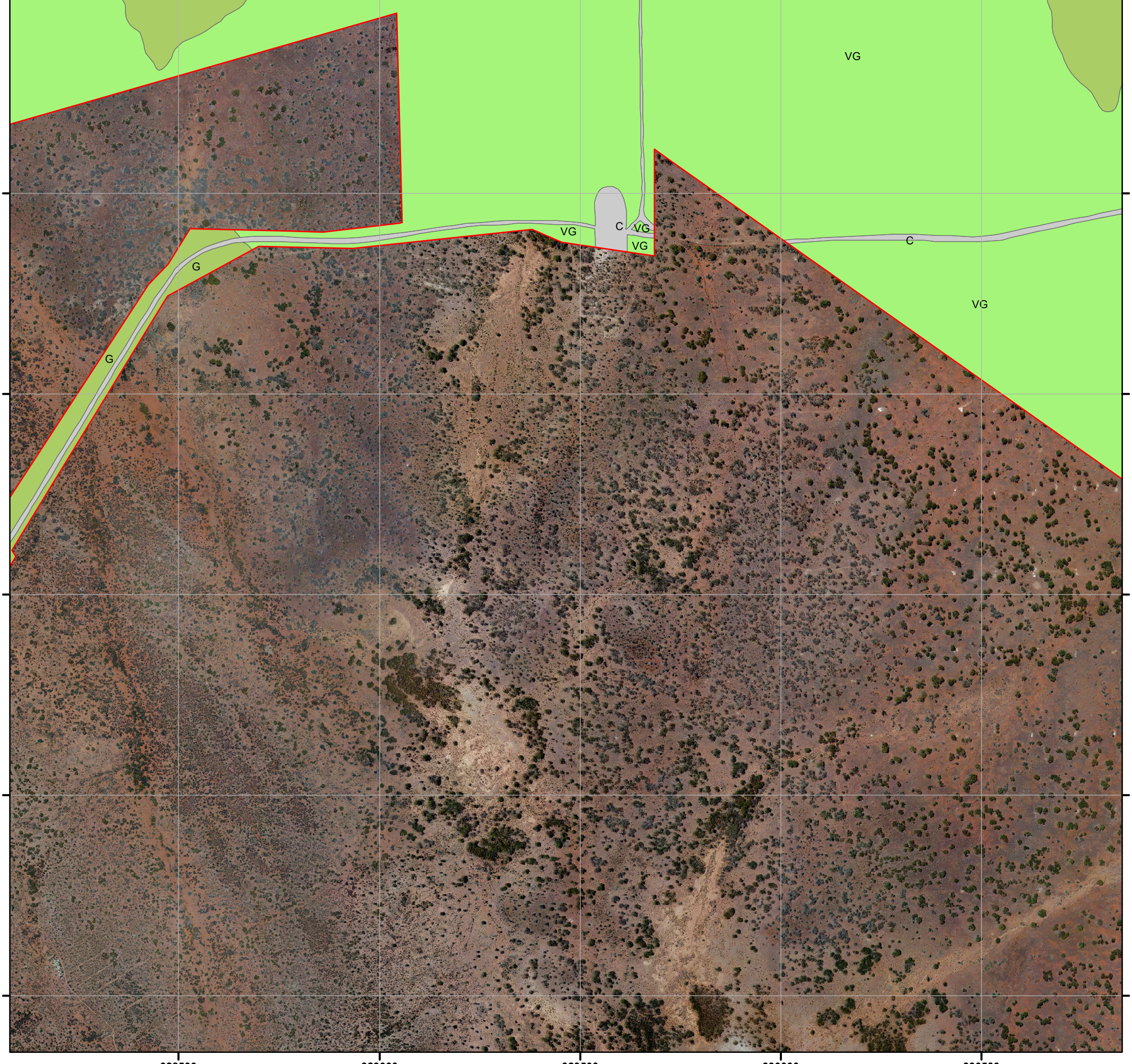

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Author: Alison Salagari

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Projection: GDA 1994 MGA Zone 51

Appendix

L

Sheet 8

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VG

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Author: Alison Salagari

WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-App-L.mxd

Projection: GDA 1994 MGA Zone 51

Appendix

L

Sheet 9

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VG

VG

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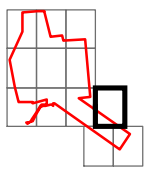
WOODMAN ENVIRONMENTAL



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Detailed Introduced Flora Locations and Vegetation Condition Mapping

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Author: Alison Salagari

WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-App-L.mxd

Projection: GDA 1994 MGA Zone 51

Appendix

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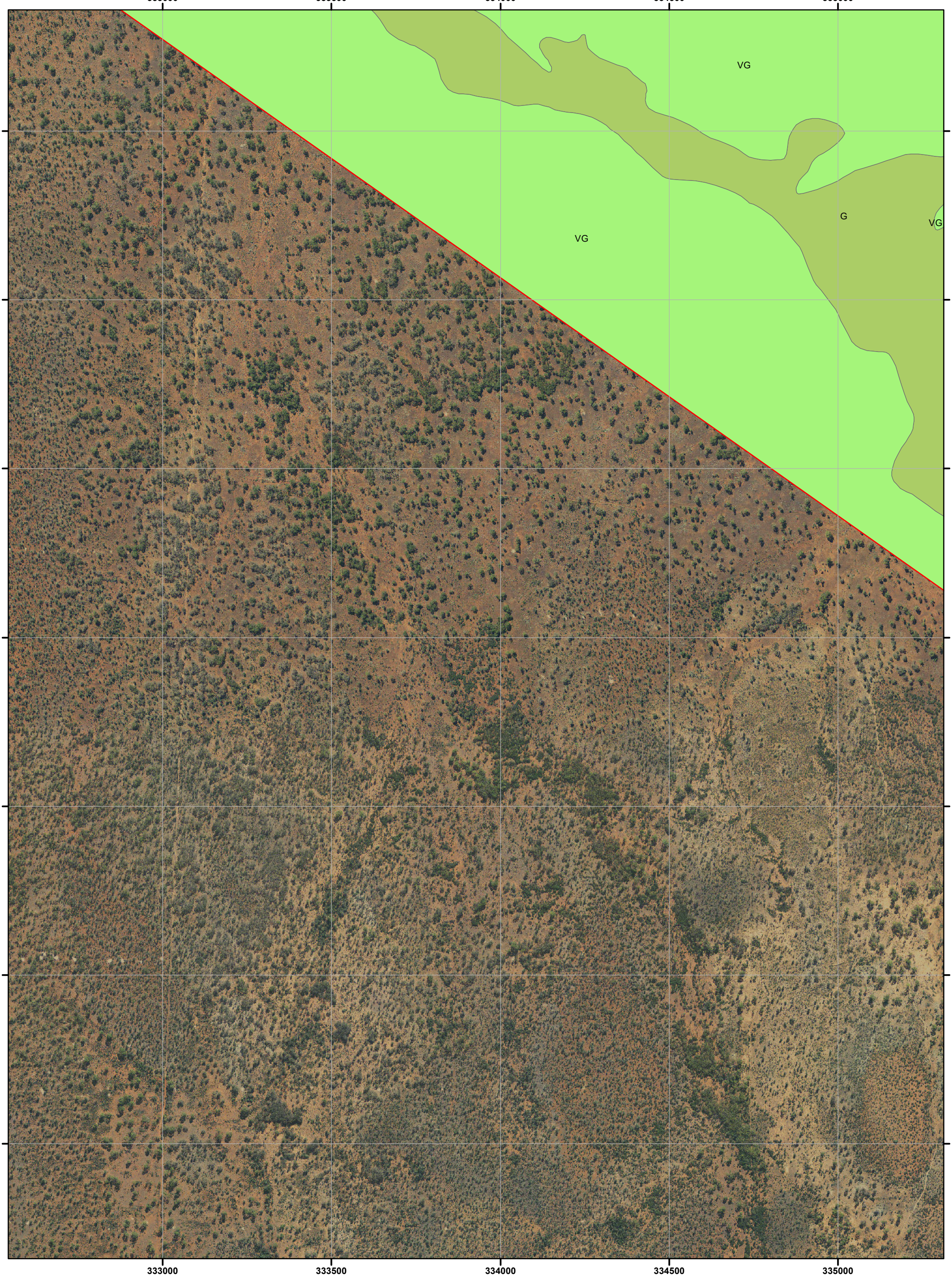
VG



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WOODMAN ENVIRONMENTAL

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Revision: A - 30 January 2017 Scale: 1:10,000

Author: Alison Salagari

WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-App-L.mxd

Projection: GDA 1994 MGA Zone 51

Appendix

L

Sheet 11

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Mem

VG

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Lya

C

VG

335500 336000 336500 337000 337500 338000

WOODMAN ENVIRONMENTAL

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N

Detailed Introduced Flora Locations and Vegetation Condition Mapping

Revision: A - 30 January 2017 Scale: 1:10,000

Author: Alison Salagari

WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-App-L.mxd

Projection: GDA 1994 MGA Zone 51

Appendix

L

Sheet 12

Legend

Project Area

Vegetation Condition

E	Excellent
VG/E	Very Good / Excellent
VG	Very Good
G/VG	Good / Very Good
G	Good
P/G	Poor / Good
P	Poor
VP/P	Very Poor / Poor
VP	Very Poor
C	Cleared Land

Introduced Flora

Brt	**Brassica tournefortii*
Cem	**Centaurea melitensis*
Lya	**Lysimachia arvensis*
Mem	**Medicago minima*
Rop	**Rostraria pumila*
Sav	**Salvia verbenaca*
Sol	**Sonchus oleraceus*

WOODMAN ENVIRONMENTAL

N

This map should only be used in conjunction with WEC report IntSust16-32-01.

Detailed Introduced Flora Locations and Vegetation Condition Mapping Legend

Revision: A - 30 January 2017 Scale: 1:10,000

Author: Alison Salagari

WEC Ref: IntSust16-32-01

Filename: IntSust16-32-01-App-L.mxd

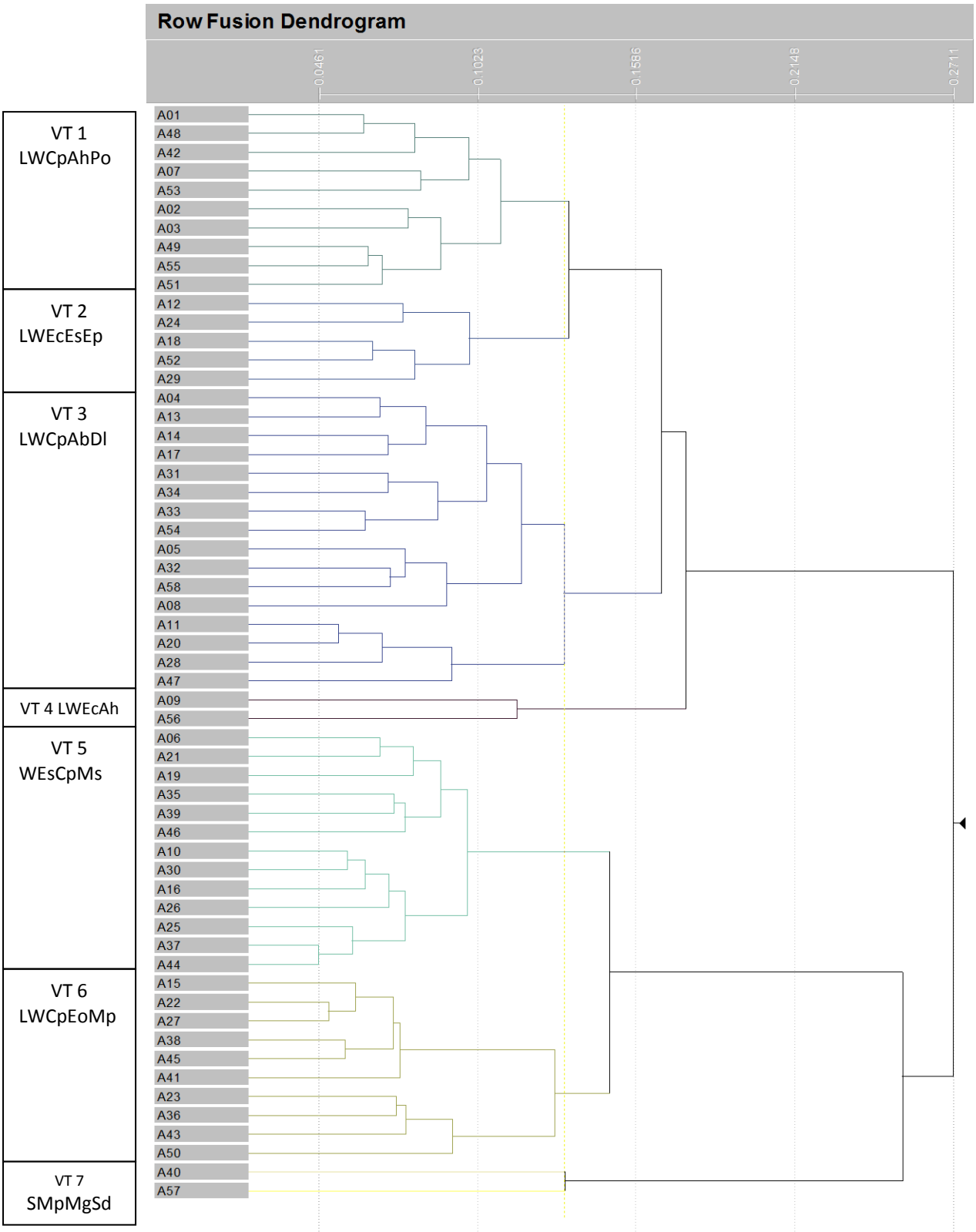
Projection: GDA 1994 MGA Zone 51

Appendix

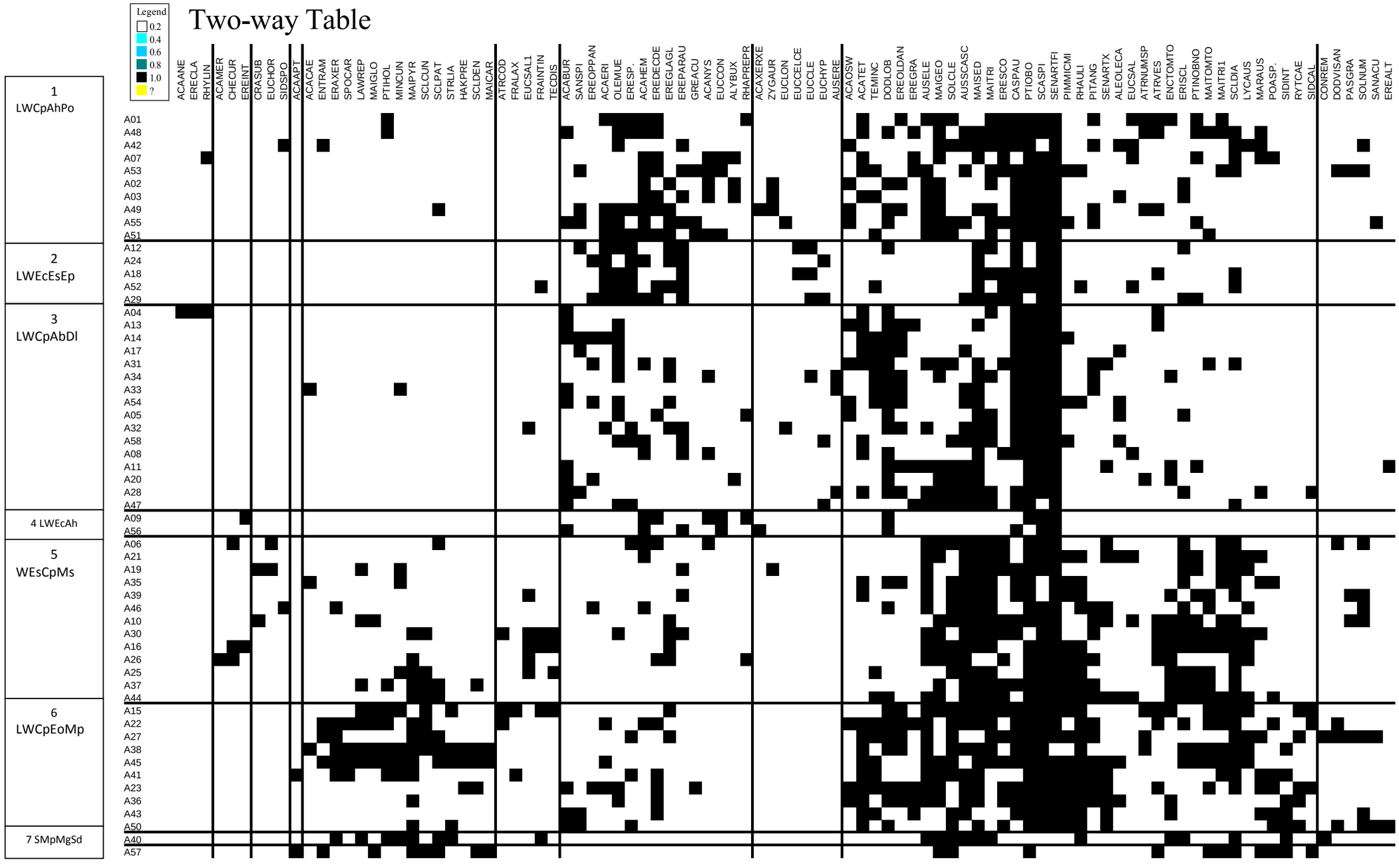
L

Sheet 0

Appendix M: Quadrat Classification Dendrogram



Appendix N: Two Way Table



Appendix O: Misclassified Quadrats Manually Reassigned within the Floristic Classification

Quadrat	Original Dendrogram VT	Reallocation VT	Reasoning
A01	VT 1	VT 5	Quadrat placed within an ecotone
A48	VT 1	VT 3	Quadrat placed within an ecotone
A42	VT 1	VT 5	Quadrat placed within an ecotone
A07	VT 1	VT 5	Quadrat placed within an ecotone
A52	VT 2	VT 5	Quadrat placed within an ecotone
A32	VT 3	VT 5	Quadrat placed within an ecotone
A58	VT 3	VT 2	Quadrat placed within an ecotone

Appendix P: Significant Indicator Taxa of Vegetation Types Mapped in the Study Area

Note: Shading denotes highest indicator values per taxon.
Indicator values (%) are shown only for taxa which were significant at P<0.05 (* = p <0.05; ** = p <0.01; *** = p <0.001)

Code	Indicator Taxa	1	2	3	4	5	6	7
AUSELE	*Austrostipa elegantissima***	31	0	8	0	21	25	15
GREACU	*Grevillea acuaria**	83	0	0	0	0	17	0
PTIOBO	*Ptilotus obovatus***	19	7	19	9	18	19	9
ZYGAUR	*Zygophyllum aurantiacum, Zygophyllum ?aurantiacum***	90	0	0	0	10	0	0
ERESP.	*Eremophila* sp. Mt Jackson (G.J. Keighery 4372)**	17	50	7	0	11	15	0
EUCCLE	*Eucalyptus clelandii***	0	90	10	0	0	0	0
EUCHYP	*Eucalyptus hypolaena***	0	90	10	0	0	0	0
MAISED	*Maireana sedifolia***	4	24	19	0	21	19	12
DODLOB	*Dodonaea lobulata**	14	6	26	28	6	20	0
EREINT	*Eremophila interstans**	0	0	0	90	10	0	0
EUCCON	*Eucalyptus concinna**	24	0	0	72	4	0	0
RHAPREPR	*Rhagodia preissii* subsp. *preissii**	0	0	10	74	16	0	0
EUCSAL	*Eucalyptus salmonophloia**	0	0	15	0	85	0	0
EUCSAL1	*Eucalyptus salubris**	0	0	0	0	100	0	0
SENARTFI	*Senna artemisioides* subsp. *filifolia***	17	17	17	17	17	15	0
ACATET	*Acacia tetragonophylla***	15	9	24	0	10	41	0
RHAULI	*Rhagodia ulicina****	7	0	3	0	24	44	22
RYTCAE	*Rytidosperma caespitosum**	0	0	0	0	0	100	0
SPOCAR	*Sporobolus caroli***	0	0	0	0	0	100	0
MAIGEO	*Maireana georgei**	24	0	14	0	18	15	29
MAIPYR	*Maireana pyramidata**	0	0	0	0	14	35	51
SCLDIA	*Sclerolaena diacantha***	5	6	6	0	27	23	32
SCLPAT	*Sclerolaena patenticuspis**	10	0	0	0	10	18	61
SIDINT	*Sida intricata**	0	0	0	0	0	33	67
SOLCLE	*Solanum cleistogamum**	10	6	10	0	17	25	31