

# Nanutarra Munjina Road Material Pits

## Biological Survey

MAIN ROADS WESTERN AUSTRALIA

NOVEMBER 2018



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**Nanutarra Munjina Road Material Pits Biological Survey**

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## EXECUTIVE SUMMARY

Main Roads Western Australia (Main Roads) is proposing to develop Strategic Material Pits (SMPs) at eight locations along the Nanutarra Munjina Road in the south-eastern Pilbara region of Western Australia. The SMPs are located in the general vicinity of the town of Tom Price, over a distance of approximately 75 kilometres (km) along Nanutarra Munjina Road, between Rocklea Road in the south-west and Hamersley Gorge Road in the south-east (Figure 1). The SMPs are collectively referred to as the Project.

To inform the environmental impact assessment (EIA) process, Main Roads commissioned Woodman Environmental Consulting Pty Ltd (Woodman Environmental) to conduct a biological survey to identify the key flora, fauna, groundwater and surface water values associated with the Project, and their potential sensitivity to impact.

For the purposes of field biological surveys, Main Roads has provided the Project Study Area (the Study Area), as shown on Figure 1. The Study Area is approximately 1169.5 hectares (ha) in size. This is comprised of eight discrete areas, which are referred to Survey Areas. These Survey Areas are outlined below:

- Survey Area A – 99.6 ha;
- Survey Area B – 34.7 ha;
- Survey Area C – 14.3 ha;
- Survey Area D – 27.1 ha;
- Survey Area E – 37.5 ha;
- Survey Area F – 418.3 ha;
- Survey Area G – 192.8 ha; and
- Survey Area H – 345.2 ha.

The flora and vegetation component of the biological survey of the Study Area involved a Desktop Study, followed by a Reconnaissance Survey and Targeted Survey as defined in Sections 4.1 and 4.2 of the 'Technical Guidance for Flora and Vegetation Surveys for Environmental Impact Assessment' (EPA 2016a). However, the sampling techniques employed and intensity of the survey exceeded the requirements of a Reconnaissance Survey, being consistent with the requirements of a Detailed Survey. The Study Area was initially visited from the 4<sup>th</sup> – 6<sup>th</sup> June 2018 to conduct the field survey, however, a significant rainfall event that commenced on the 6<sup>th</sup> June forced the survey to be abandoned. A second visit to complete the field survey was conducted from the 23<sup>rd</sup> – 30<sup>th</sup> July 2018. A total of 50 non-permanent flora survey quadrats with an area of 2500 m<sup>2</sup> were surveyed in the Study Area. Targeted survey was also undertaken for significant vegetation and significant flora taxa.

A total of 366 discrete vascular flora taxa and two known hybrids were recorded in the Study Area. The taxa and hybrids represent 51 families and 161 genera. The most well-represented families were Poaceae (72 taxa), Fabaceae (56 taxa and two known hybrids), Malvaceae (37 taxa) and Amaranthaceae..

Taxon totals for each of the Survey Areas of the Study Area are:

- Survey Area A: 135 taxa, one known hybrid;
- Survey Area B: 71 taxa, one known hybrid;
- Survey Area C: 68 taxa, one known hybrid;
- Survey Area D: 90 taxa;
- Survey Area E: 149 taxa, one known hybrid;
- Survey Area F: 194 taxa, one known hybrid;
- Survey Area G: 176 taxa, two known hybrids; and
- Survey Area H: 101 taxa.

Seven significant flora taxa were recorded in the Study Area, as outlined below:

- *Euphorbia inappendiculata* var. *queenslandica* (P1) – Survey Area G;
- *Goodenia pedicellata* (P1) – Survey Areas A, B and C;
- *Aristida jerichoensis* var. *subspinulifera* (P3) – Survey Area G;
- *Astrebla lappacea* (P3) – Survey Areas C, E and G;
- *Oldenlandia* sp. Hamersley Station (A.A. Mitchell PRP 1479) (P3) – Survey Area C;
- *Swainsona thompsoniana* (P3) – Survey Areas E and F; and
- *Goodenia nuda* (P4) – Survey Areas D, E and G.

Eighteen vegetation units (VUs) were described in the Study Area, which comprise four broad vegetation groups:

- Low Eucalypt woodlands and/or tall to mid mixed Acacia shrublands over spinifex grasslands on rocky hills and rises (VUs 1, 2, 3, 5, 9, 11, 12, 14, 15, 16, 17, 18);
- Tall Mulga shrublands over spinifex grasslands on low rises and plains (VUs 8 and 10);
- Tall to mid Snakewood shrublands over chenopod shrublands over spinifex or tussock grasslands on flats and in drainage lines (VUs 6, 7, 13); and
- Low Eucalypt woodlands and tall to mid Acacia shrublands over mixed spinifex and tussock grasslands in drainage lines (VU 4).

VUs mapped in each of the Survey Areas of the Study Area are:

- Survey Area A – Five VUs (1, 2, 3, 4, 5);
- Survey Area B – Four VUs (1, 2, 3, 4);
- Survey Area C – Four VUs (2, 3, 4, 7);
- Survey Area D – Four VUs (6, 7, 8, 9);
- Survey Area E – Three VUs (7, 8, 10);
- Survey Area F – Five VUs (6, 7, 8, 17, 18);
- Survey Area G – Seven VUs (6, 7, 8, 13, 14, 15, 16); and
- Survey Area H – Two VUs (11, 12).

No formally listed significant vegetation (Threatened or Priority Ecological Communities) was recorded in the Study Area, with none of the VUs described and mapped in the Study Area considered to represent any formally listed significant vegetation. VUs 2, 3 and 7 may be of some significance, as they occur on either calcrete (VUs 2 and 3) or basaltic cracking clays (VU 7), both of which are somewhat restricted in occurrence in the region. Based on field observations and aerial photograph interpretation, all VUs are considered to extend outside the Study Area, and most are expected to occur over relatively extensive areas in the immediate vicinity of the Study Area.

The fauna component of the biological survey of the Study Area involved a Level 1 fauna survey (including both a Desktop Study and Reconnaissance Survey), as defined in Appendix 2 of the 'Technical Guidance - Terrestrial Fauna Surveys' (EPA 2016c). As part of the Reconnaissance Survey, additional targeted surveys for significant fauna and/or their habitats were undertaken. This was deemed an appropriate level of survey given that the vertebrate fauna of the Pilbara has been relatively well surveyed in recent years (e.g. the Pilbara Biological Survey undertaken by DBCA 2002 – 2013).

Seven fauna habitats were identified and mapped in the Study Area; being Calcrete Rises, Stony Hills, Shrubland on Low Stony Rises, Stony Spinifex Plains, Acacia Flats, Creek-line and Stony Outwash Plain. These are widely represented in the region. Habitats that may be refugia for vertebrates in this bioregion (e.g. gorges, mountain tops or permanent waters) were absent from the Study Area.

A total of 274 vertebrate fauna species potentially occur in the Study Area, including eight frogs, 107 reptiles, 116 birds and 43 mammals. Of these, 68 were observed in the Study Area during the field survey, either directly, or via other signs such as tracks or scats.

Twenty formally listed (i.e. under the EPBC Act, WC Act or by DBCA) species potentially occur in the Study Area. These are:

- **Pilbara Olive Python** (*Liasis olivaceous barroni*) – this python is listed as Vulnerable under the EPBC Act and under Schedule 3 (Vulnerable) of the WC Act;
- **Gane's Blind Snake** (*Anilius ganei*) – Priority 1;
- **Black-lined Skink** (*Ctenotus nigrilineatus*) – Priority 1;
- **Pilbara Barking Gecko** (*Underwoodisaurus seorsus*) – Priority 2;
- **Spotted Skink** (*Ctenotus uber johnstonei*) – Priority 2;
- **Lined Soil-crevice Skink** (*Notoscincus butleri*) – Priority 4;
- **Night Parrot** (*Pezoporus occidentalis*) – this species is listed as Endangered under the EPBC Act and under Schedule 1 (Critically Endangered) of the WC Act;
- **Grey Falcon** (*Falco hypoleucos*) – this falcon is listed under Schedule 3 (Vulnerable) of the WC Act;
- **Peregrine Falcon** (*Falco peregrinus*) – this falcon is listed under Schedule 7 (Other Specially Protected Fauna) of the WC Act;
- **Fork-tailed Swift** (*Apus pacificus*) – this species is listed as Migratory under the EPBC Act and under Schedule 5 (Migratory Birds Protected under an International Agreement) of the WC Act;
- **Oriental Plover** (*Charadrius veredus*) – this species is listed as Migratory under the EPBC Act and under Schedule 5 (Migratory Birds Protected under an International Agreement) of the WC Act;
- **Northern Quoll** (*Dasyurus hallucatus*) – this species is listed as Endangered under the EPBC Act and under Schedule 2 (Endangered) of the WC Act;
- **Bilby** (*Macrotis lagotis*) – this species is listed as Vulnerable under the EPBC Act and under Schedule 3 (Vulnerable) of the WC Act;

- **Ghost Bat** (*Macroderma gigas*) – this species is listed as Vulnerable under the EPBC Act and under Schedule 3 (Vulnerable) of the WC Act;
- **Pilbara Leaf-nosed Bat** (*Rhinonicteris aurantia* (Pilbara form)) – this species is listed as Vulnerable under the EPBC Act and under Schedule 3 (Vulnerable) of the WC Act;
- **Spectacled Hare-wallaby, mainland** (*Lagorchestes conspicillatus leichardti*) – Priority 3;
- **Western Pebble-mound Mouse** (*Pseudomys chapmani*) –Priority 4;
- **Long-tailed Dunnart** (*Sminthopsis longicaudata*) –Priority 4;
- **Brush-tailed Mulgara** (*Dasycercus blythii*) –Priority 4; and
- **Lakeland Downs Mouse** (*Leggadina lakedownensis*) – Priority 4.

Of these, the field survey confirmed the occurrence of the Western Pebble-mound Mouse (*Pseudomys chapmani*) (Priority 4) in all Survey Areas except E and H.

The Acacia flats habitat, which occurs in all Survey Areas except A, B and H, may support the Night Parrot (particularly at Survey Area G) as well as the Stony Outwash Plain that occurs across much of Survey Area F, and the Low Stony Rises habitat in Survey Area H.

Suitable shelter habitat for the Northern Quoll was mapped within 1 km of Survey Area H, and there is a high likelihood that this species shelters within 1 km of Survey Area H, and may forage or disperse through this Survey Area. Shelter habitat was also mapped within and adjacent to Survey Area A, however the rocky areas that potentially represent shelter habitat appeared smaller, more isolated and of low suitability; there is a moderate likelihood that this species occurs in this Survey Area. The Northern Quoll is unlikely to occur in the remaining Survey Areas as there is little or no rocky habitat present and there are no records of this species in the surrounding area.

# 1. INTRODUCTION

## 1.1 Project Overview

Main Roads Western Australia (Main Roads) is proposing to develop Strategic Material Pits (SMPs) at eight locations along the Nanutarra Munjina Road in the south-eastern Pilbara region of Western Australia. The SMPs are located in the general vicinity of the town of Tom Price, over a distance of approximately 75 kilometres (km) along Nanutarra Munjina Road, between Rocklea Road in the south-west and Hamersley Gorge Road in the south-east (Figure 1). The SMPs are collectively referred to as the Project.

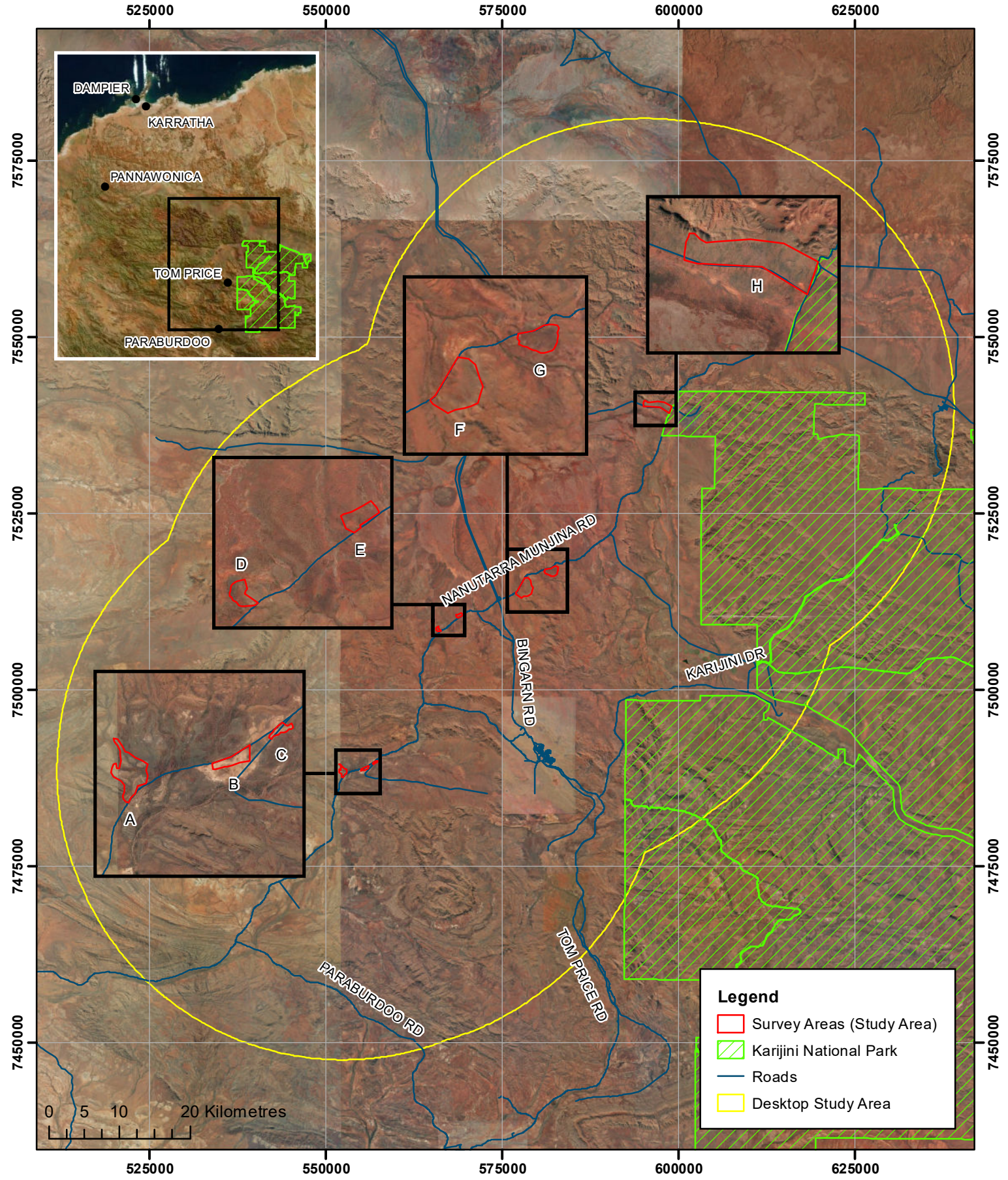
To inform the environmental impact assessment (EIA) process, Main Roads commissioned Woodman Environmental Consulting Pty Ltd (Woodman Environmental) to conduct a biological survey to identify the key flora, fauna, groundwater and surface water values associated with the Project, and their potential sensitivity to impact.



## 1.2 Study Area Definition

For the purposes of field biological surveys, Main Roads has provided the Project Study Area (the Study Area), as shown on Figure 1. This is comprised of eight discrete areas, which are referred to as the Survey Areas. These Survey Areas have been named as A through to H in a south-west to north-east direction, as shown in Figure 1. The Study Area is approximately 1169.5 hectares (ha) in size, with the following areas for each Survey Area listed below:

- Survey Area A – 99.6 ha;
- Survey Area B – 34.7 ha;
- Survey Area C – 14.3 ha;
- Survey Area D – 27.1 ha;
- Survey Area E – 37.5 ha;
- Survey Area F – 418.3 ha;
- Survey Area G – 192.8 ha; and
- Survey Area H – 345.2 ha.

For the purposes of elements of the Desktop Study for the Project, including interrogation of databases and searches for relevant literature, a Desktop Study Area has also been defined; as per Main Roads requirements, the Desktop Study Area considers the Study Area with a 40 km buffer, as shown on Figure 1.



<b>Study Area and Desktop Study Area Location</b>	Author: David Coultas	
	WEC Ref: MR18-34-01	
 <b>WOODMAN</b> ENVIRONMENTAL	Filename: MR18-34-01-f01.mxd	<b>Figure</b>  <b>1</b>
	Scale: 1:700,000 (A4)	
	Projection: GDA 1994 MGA Zone 50	
	Revision: 0 - 21 November 2018	
<small>This map should only be used in conjunction with WEC report MR18-34-01.</small>		

### 1.3 Aim and Objectives

The aim of the survey is to provide relevant biological information to support the approvals process for the Project. The biological survey of the Study Area was conducted as per the Scope of Works (SoW) as provided by Main Roads (Appendix A).

The overall objectives of the assessment were to:

- Compile an inventory of vascular flora taxa that occur in the Study Area;
- Identify locations and determine the extent of populations of vascular flora taxa occurring within the Study Area that are one of the following (hereafter referred to as significant flora taxa), to provide context for impact assessment:
  - Listed Threatened species under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Commonwealth);
  - Threatened flora under the *Wildlife Conservation Act 1950* (WC Act) (WA);
  - Priority flora taxa as classified by the Western Australian Department of Biodiversity, Conservation and Attractions (DBCA); and
  - Other significant flora taxa as defined by the Environmental Protection Authority (EPA) (2016a; b).
- Identify locations and determine the extent of introduced vascular flora taxa, with particular focus on those that are Weeds of National Significance (WoNS), or Declared Pests under the *Biosecurity and Agriculture Management Act 2007* (BAM Act);
- Identify, map and describe Vegetation Units (VUs) that occur within the Study Area;
- Identify, map and describe vegetation that occurs within the Study Area that is one of the following (hereafter referred to as significant vegetation), to provide context for impact assessment:
  - Listed Threatened Ecological Communities (TEC) under the EPBC Act;
  - TEC as classified by DBCA and endorsed by the Western Australia (WA) Minister for the Environment;
  - Priority Ecological Communities (PEC) as classified by DBCA;
  - Area of wetland or riparian vegetation that is ground or surface water-dependent; and
  - Other significant vegetation as defined by EPA (2016a; b).
- Provide concise and relevant information regarding the likely occurrence of vertebrate fauna species in the Study Area that are one of the following:
  - Listed Threatened or Migratory species under the EPBC Act;
  - Fauna listed under Schedules 1-7 of the WC Act;
  - Priority fauna as classified by DBCA; and
  - Locally significant fauna, defined as species that are not protected under legislation, but may be locally important due to their distribution or habitat preferences.
- Identify, map and describe fauna habitats that occur within the Study Area that potentially support significant fauna, to provide context for impact assessment:
  - Habitats that potentially support listed Threatened or Migratory Species under the EPBC Act;

- Habitats that potentially support fauna listed under Schedules 1-7 of the WC Act; and
- Habitats that potentially support Priority fauna.

The survey and reporting works comply with the following documents:

- Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016a);
- Environmental Factor Guideline – Flora and Vegetation (EPA 2016b);
- Technical Guidance – Terrestrial Fauna Surveys (EPA 2016c);
- Environmental Factor Guideline – Terrestrial Fauna (EPA 2016d);
- Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA and DBCA 2010);
- EPBC Act referral guideline for the endangered northern quoll (*Dasyurus hallucatus*) (Commonwealth of Australia 2016);
- Interim guideline for preliminary surveys of night parrot (*Pezoporus occidentalis*) in Western Australia (DBCA 2017a); and
- Matters of National Environmental Significance: Significant Impact Guidelines 1.1 (Commonwealth of Australia 2013).

## 1.4 Level of Assessment

### 1.4.1 Flora and Vegetation

The flora and vegetation component of the biological survey of the Study Area involved a desktop study, followed by a Reconnaissance Survey and Targeted Survey as defined in Sections 4.1 and 4.2 of the 'Technical Guidance for Flora and Vegetation Surveys for Environmental Impact Assessment' (EPA 2016a). This is considered appropriate for the Project, as the expected impacts to flora and vegetation are considered likely to be relatively low, and the Project is located in an area (the Pilbara) that is known to support a moderate diversity of flora and vegetation relative to other areas of the state, including significant flora taxa and significant vegetation (EPA 2016a). However, as outlined in Section 3.1 of this report, the sampling techniques and intensity of the survey exceed the requirements of a Reconnaissance Survey; they are considered to be consistent with the requirements of a Detailed Survey, as outlined in Section 4.3 of the 'Technical Guidance for Flora and Vegetation Surveys for Environmental Impact Assessment' (EPA 2016a).

### 1.4.2 Fauna

A Level 1 fauna survey (including both a Desktop Study and Reconnaissance Survey), was undertaken for the Study Area, as defined in Appendix 2 of the 'Technical Guidance - Terrestrial Fauna Surveys' (EPA 2016c). Additional targeted surveys for conservation significant fauna and/or their habitats were undertaken. This was deemed an appropriate level of survey given that the vertebrate fauna of the Pilbara has been relatively well surveyed in recent years (e.g. the Pilbara Biological Survey undertaken by DBCA 2002 – 2013).



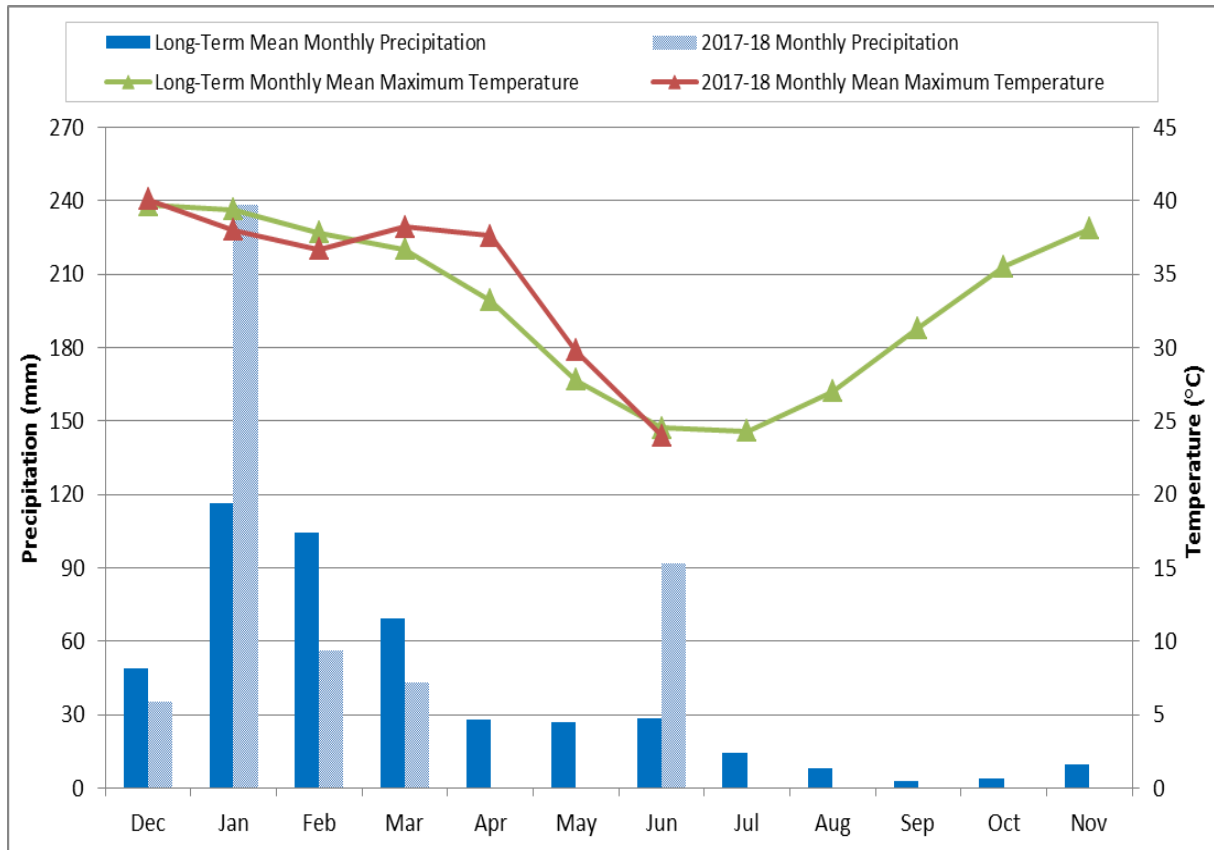
## 2. BACKGROUND

### 2.1 Climate

The Study Area is located within the Pilbara region as classified by Beard (1990). The climate is classified as arid tropical, with precipitation received mainly over the summer months. Average annual precipitation is 250-300 millimetres (mm), which is generally slightly higher than most of the Eremaean Province of Western Australia because of the influence of relatively frequent tropical cyclones that occur from November to April (Beard 1990; Bureau of Meteorology 2018a).

Figure 2 displays monthly precipitation totals and average maximum temperature for the preceding seven months up until the field survey date (December 2017-June 2018), as well as long-term average monthly maximum temperature (1996-2018) and average monthly precipitation (1949-2018) recorded for Wittenoom (all months shown), the nearest meteorological station to the Study Area (Bureau of Meteorology 2018b).

Wittenoom received significantly above-average rainfall in January, with reasonable (albeit below-average) rainfall in February and March (Figure 2). However, no rainfall was received from the 7<sup>th</sup> March to the 6<sup>th</sup> June. This was coupled with well-above average daily maximum temperatures for March to May; in April, the daily maximum temperature was more than 4°C higher than the long-term average. The 6<sup>th</sup> June, which corresponds to the timing of the initial flora and vegetation field survey (see Section 3.1.4), marked the beginning of a significant winter rainfall event, with 92 mm received across several days, well above the monthly average of 28.6 mm.



**Figure 2:** Average Daily Maximum Temperature and Total Precipitation for December 2017 – June 2018, and Long-Term Average Monthly Maximum Temperature and Precipitation, for Wittenoom (Bureau of Meteorology 2018b)

## 2.2 Geology, Landforms and Soils

The Study Area is located in the Pilbara region as defined by Beard (1975; 1990); this is equivalent to the Pilbara Interim Biogeographic Regionalisation for Australia (IBRA) region (Commonwealth of Australia 2012). The Pilbara region is formed of a basement of Archaean granite and volcanics, overlain by massive deposits of Proterozoic sediments and volcanics (Beard 1990). This region is generally mountainous, rising to 1250 metres (m), with hard alkaline red soils on plains and pediments, and shallow and skeletal soils on ranges. The Study Area traverses one physiographic unit as defined by Beard (1975), being the Hamersley physiographic unit. This is also equivalent to the Hamersley IBRA subregion (Commonwealth of Australia 2012).

The Hamersley physiographic unit is a plateau bounded by a well-marked, abrupt escarpment on its northern, western and eastern flanks; on its southern edge the escarpment is more irregular (Beard 1975). It is composed of Lower Proterozoic rocks, which are predominantly jaspilite and dolomite with some shale, siltstone and volcanics. Above the escarpment, the plateau landscape is of rounded hills and ranges rising to around 900 m above sea level, and locally to 1250 m. There is often little soil on these hills, with cap rock abundant at the surface. Where the rock is mainly jaspilite and dolomite, there are ranges, steep hills and deeply dissected pediments with narrow, winding valley plains, however wider alluvial plains occur locally. The soils of the hills are predominantly stony and shallow, with non-coherent sands on the steeper slopes, and shallow brown loams. Neutral and hard alkaline red soils occur on the lower slopes, with deep coherent loams and clays in the valleys; in the wider alluvial valleys, deep, earthy loams with small areas of neutral red earths, and deep-cracking clays and earthy clays, both occur. Where the rock is basalt, there are valley plains and dissected stony pediments with steep, stony hills. Soils are predominantly hard alkaline red soils with significant areas of hard, neutral red soils and shallow brown loams (Beard 1975).

## 2.3 Land Tenure

The Study Area is located in the Shire of Ashburton, with Survey Areas located on Hamersley pastoral station, other Crown Reserve and Unallocated Crown Land (UCL), as outlined below:

- Survey Area A – other Crown Reserve;
- Survey Area B – other Crown Reserve;
- Survey Area C – other Crown Reserve;
- Survey Area D – Hamersley pastoral station;
- Survey Area E – Hamersley pastoral station;
- Survey Area F – Hamersley pastoral station;
- Survey Area G – Hamersley pastoral station; and
- Survey Area H – UCL.

There are extensive areas of both UCL and pastoral lease that surround the Study Area (DBCA 2007-). There is one area of land reserved for conservation located in the immediate

vicinity of the Study Area, being; Karijini National Park, located immediately east of Survey Area H (Figure 1).

### 3. METHODS

#### 3.1 Flora and Vegetation

##### 3.1.1 Desktop Study Methods

Prior to commencement of the field survey, a review of all publicly available flora and vegetation data relevant to the Study Area was undertaken. This included obtaining and reviewing copies of reports of previous biological surveys carried out within the vicinity of the Study Area (where available) and interrogation of relevant databases and other sources as listed in Table 1.

**Table 1: Searches Undertaken for the Desktop Study (Flora and Vegetation) of the Study Area**

Source	Search Attributes	Search Purpose
DBCA Threatened and Priority Ecological Communities Database (data provided by Main Roads)	Database interrogated using Desktop Study Area boundary	Obtain records of DBCA-classified TECs and/or DBCA-classified PECs within the Desktop Study Area
DBCA TEC and PEC lists	Review of current DBCA TEC and PEC lists (DBCA 2016, 2017b)	Identify whether there are any additional DBCA listed TECs or PECs which could occur within the Desktop Study Area
DBCA Significant Flora Databases (WA Herbarium specimen database and Threatened and Priority Flora (TPFL) database) (data provided by Main Roads)	Database interrogated using Desktop Study Area boundary	Obtain records of listed significant flora within the Desktop Study Area
DoEE Species Profile and Threats (SPRAT) Database (interrogated using the Protected Matters Search Tool (DoEE 2018))	Database interrogated using approximate Desktop Study Area boundary (exact boundary cannot be used); search performed prior to survey, updated 11/06/2018	Identify Matters of National Environmental Significance (MNES), including Threatened flora and TECs, listed under the EPBC Act, that occur or have the potential to occur within the Desktop Study Area
DBCA NatureMap (WA Herbarium and TPFL records) (DBCA 2007-)	Database interrogated using approximate Desktop Study Area boundary (exact boundary cannot be used); search performed prior to survey, updated 11/06/2018	Obtain records of listed significant flora and introduced flora within the Desktop Study Area
2017 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Government of Western Australia 2018)	Study Area	Identify extent of Vegetation System Associations within the Study Area
Land Systems of the Pilbara (Van Vreeswyk <i>et al.</i> 2004)	Study Area	Identify extent of Land Systems within the Study Area

### 3.1.2 Personnel and Licensing

Table 2 lists the personnel involved in both fieldwork and plant identifications for the survey. The lead field surveyor, who also undertook plant identifications, has had extensive previous experience (>10 years) in conducting flora surveys and plant identifications in the Pilbara bioregion. All plant material was collected under the scientific licences pursuant to the WC Act Section 23C as listed in Table 2.

**Table 2: Personnel and Licensing Information (Flora and Vegetation)**

Personnel	Role	Flora Collecting Permit (WC Act)
David Coultas	Field survey (lead), plant identifications	SL012319 144-1718
Marlee Starcevich	Field survey	SL012321

### 3.1.3 Aerial Photography Interpretation and Survey Design

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 major discernible vegetation pattern where possible; for smaller patterns, fewer quadrats were allocated based on the size of the pattern.

### 3.1.4 Field Survey Methods

The Study Area was initially visited from the 4<sup>th</sup> – 6<sup>th</sup> June 2018 to conduct the field survey, however, a significant rainfall event that commenced on the 6<sup>th</sup> June (see Section 2.1, 4.1) forced the survey to be abandoned. A second visit to complete the field survey was conducted from the 23<sup>rd</sup> – 30<sup>th</sup> July 2018 (see Section 4.1).

The Study Area was accessed by vehicle using existing access tracks, and via foot transects. A total of 50 non-permanent flora survey quadrats with an area of 2500 m<sup>2</sup> were surveyed in the Study Area, measuring 50 m x 50 m. The following numbers of quadrats were surveyed in each individual Survey Area:

- Survey Area A – 11 quadrats;
- Survey Area B – 3 quadrats;
- Survey Area C – 2 quadrats;
- Survey Area D – 4 quadrats;
- Survey Area E – 5 quadrats;
- Survey Area F – 9 quadrats, 1 relevé;
- Survey Area G – 10 quadrats, 1 relevé; and
- Survey Area H – 6 quadrats.

The quadrat size used is the indicative size for flora and vegetation surveys in the Pilbara bioregion, as outlined in Table 1 of the Technical Guidance for Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016a). Quadrat locations were selected to

ensure that at least three quadrats were surveyed within each vegetation pattern initially identified from aerial photography interpretation (as per Section 3.1.3).

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 at start corner of quadrat;
- Site photograph, taken diagonally from start corner;
- Compass bearing for two sides of quadrat that commence at start corner of quadrat;
- Topography (including landform type and aspect);
- Soil colour and type (including the presence of any rock outcropping and surface stones);
- Vegetation condition (EPA 2016a; adapted from Trudgen (1988): scale presented in Appendix B);
- Approximate time since fire;
- Presence and type of disturbance (if any);
- Percentage foliage cover (for each taxon, including cover within the quadrat of individuals rooted outside of the quadrat);
- Height (m) (average for each taxon, excluding climbers/aerial shrubs); and
- Additional flora taxa present immediately outside of the quadrat.

Additionally, two relevés were surveyed in areas of vegetation that were not large enough to allow for a quadrat. The relevés were sampled from a central point to a radius of 25 m. All data recorded for quadrats was also recorded for the detailed recording site, however only dominant or common taxa were recorded. The relevés were not permanently marked.

Notes on vegetation pattern boundaries and distribution were also taken while traversing the Study Area on foot. These notes included a GPS location at the point that the notes were taken, and a brief description of the vegetation, including dominant and characteristic taxa. The notes were used to aid in mapping polygons of vegetation patterns that were not allocated quadrats; additional flora taxa were also recorded during this process. Not all vegetation pattern polygons received quadrats because of time constraints, however many polygons could be confidently allocated to a final VU using a combination of mapping notes and aerial photograph interpretation. Additional flora taxa were also recorded opportunistically in the Study Area during traverses on foot between quadrats, with GPS locations of such taxa recorded.

Targeted survey was also undertaken for listed significant vegetation, with a list of significant vegetation likely to be encountered compiled as part of the desktop study. If any occurrences of such significant vegetation were encountered, the boundary of the significant vegetation was recorded, either via walking the boundary and recording the GPS

track log, or by recording GPS waypoints. This allowed for the accurate calculation of the spatial areas of occurrences of significant vegetation.

Targeted survey for significant flora taxa was undertaken as part of the survey, with a list of significant flora taxa likely to be encountered compiled as part of the desktop study. Appropriate habitat for such taxa in the Study Area was specifically transected on foot. If populations of known significant flora taxa were identified, a representative collection of material was made, and the abundance and spatial distribution (using GPS coordinates) of individuals within each population was recorded.

Locations of any introduced flora taxa encountered while traversing between quadrats, and while conducting targeted searching for significant flora taxa, were also recorded using the same method as for significant flora taxa.

All traverses in the Study Area are mapped as track logs on maps in Appendix C, along with quadrat locations.

### 3.1.5 Plant Collection and Identification

Specimens of any unknown taxa that were collected were pressed for later identification at the WA Herbarium. 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 (WA Herbarium 1998-) with all names checked against the current DBCA Max Database to ensure their validity. However, in cases where names of plant taxa have been published recently in scientific literature but have not yet been adopted on FloraBase because of time constraints (WA Herbarium 1998-), 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 DBCA (Species and Communities Branch) in the case of listed significant flora (e.g. Threatened and Priority flora taxa).

### 3.1.6 Vegetation Unit Definition, Mapping and Description

VUs were defined using the structural vegetation classification technique, as outlined in EPA (2016a). This classification uses vegetation structure and dominant species to describe differences between VUs, with information provided on height of strata, folia cover and dominant species (EPA 2016a).

VU descriptions have been adapted from the National Vegetation Information System (NVIS) Australian Vegetation Attribute Manual Version 6.0 (ESCAVI 2003), as stipulated by EPA (2016a). This model follows nationally-agreed guidelines to describe and represent VUs, so that comparable and consistent data are produced nation-wide.

It should also be noted that this report describes VUs at the NVIS Sub-Association level, rather than the Association level as stipulated by EPA (2016a). This level is considered more appropriate for the vegetation of the Study Area, as often the vegetation possessed one or more additional strata to the traditional three-stratum classification system used at the Association level.

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



### 3.1.7 Vegetation Condition Mapping

Vegetation condition was described using the vegetation condition scale presented in EPA (2016a) (as adapted from Trudgen (1988)) (see Appendix B). Notes on vegetation condition were taken during the field survey via vehicle traverses along access tracks, and during foot traverses undertaken within the Study Area. Vegetation condition was also recorded at all quadrats. Vegetation condition category polygon boundaries were developed using this information, and were digitised using GIS software as for VU polygon boundaries.

### 3.1.8 Significant Flora and Vegetation

#### 3.1.8.1 Significant Flora

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

- Being identified as a Threatened or Priority species (formally listed significant taxa – includes taxa listed under both State and Commonwealth legislation, and classified as Priority by DBCA);
- 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 recorded within the Study Area are discussed in Section 5.1.2.2 with reference to the above categories. Point locations, individuals and populations known from the Study Area are discussed. It is worthy of note that a population in the context of this survey is defined as a discrete group of individuals of a taxon separated by more than 500 m from the nearest discrete group of individuals (DBCA 2017c); however, this definition can only be tentatively applied if the intervening 500 m has not been surveyed. This is discussed further in Section 5.1.2.2.

#### 3.1.8.2 Significant Vegetation

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

- Being identified as a TEC or PEC (formally listed significant vegetation – includes vegetation listed under Commonwealth legislation, endorsed as a TEC by the WA Government, or classified as a PEC by DBCA);
- 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.

With regard to TECs and PECs listed in Western Australia that occur in the Pilbara region, only broad descriptions generally are provided in the respective lists to allow for diagnosis. The vegetation of the Study Area was therefore manually compared to such descriptions to determine whether any vegetation may represent a TEC or PEC.

With regard to TECs listed under the EPBC Act, the vegetation of the Study Area was assessed against the appropriate listing and conservation advice for any TECs likely to occur in the Study Area.

The remaining significant vegetation criteria were applied to VUs mapped in the Study Area, to determine whether a VU is significant in a local or regional context. In a regional context, limited information is available for comparison with VUs in the Study Area; this is discussed further in Section 5.1.2.8.

## 3.2 Fauna

### 3.2.1 Desktop Study Methods

Prior to commencement of the field survey, a review of all publicly available fauna data relevant to the Project was undertaken. Lists of fauna expected to occur in the Study Area were produced using information from a number of sources. These included publications that provide information on general patterns of distribution of frogs (Tyler *et al.* 2000), reptiles (Storr *et al.* 1983, 1990, 1999, 2002), birds (Barrett *et al.* 2003; Johnstone and Storr 1998, 2004) and mammals (Churchill 1998, Menkhorst and Knight 2011; Van Dyck and Strahan 2008).

The databases listed in Table 3 were searched for fauna records in and around the Study Area. In all cases the extent of the database search was larger than the extent of the Study Area, in order to capture records of species in the wider area that may also occur in the Study Area. Some species may occur on database results that are not likely to be present in the Study Area, usually due to a lack of suitable habitat or the Study Area being outside the known range of the species as presented in the literature. These species are generally not included in lists of expected fauna unless some discussion is thought to be necessary.

**Table 3: Searches Undertaken for the Desktop Study (Fauna) of the Study Area**

Source	Search Attributes	Search Purpose
DBCA Threatened and Priority Fauna Database	Study Area plus a 40 km buffer (as supplied by Main Roads)	Obtain records of Threatened or Priority fauna within or in the vicinity of the Study Area
DoEE Species Profile and Threats (SPRAT) Database (interrogated using the Protected Matters Search Tool (DoEE 2018))	Database interrogated using approximate Desktop Study Area boundary (exact boundary cannot be used); search performed prior to survey, updated 11/06/2018	Identify fauna listed as Threatened or Migratory (also referred to as MNES) under the EPBC Act that have the potential to occur within or within the vicinity of the Study Area

Source	Search Attributes	Search Purpose
DBCA NatureMap (includes WA Museum, Fauna Survey Returns Database, Birds Australia Atlas Database, and Pilbara Biological Survey records) (DBCA 2007-)	Four groups of Survey Areas plus a 40km buffer around the following points: A, B and C: -22.708°S, 117.528°E D and E: -22.521°S, 117.655°E F and G: -22.464°S, 117.779°E H: -22.240°S, 117.942°E	Obtain records of vertebrate fauna within or in the vicinity of the Study Area

### 3.2.2 Personnel and Licensing

Table 4 lists the personnel involved in both fieldwork and reporting for the survey. Jenny and Brenden both have previous experience undertaking similar surveys, including targeted surveys for Threatened fauna in the Pilbara bioregion. A Regulation 17 licence was not required for the level of survey undertaken.

**Table 4: Personnel and Licensing Information (Fauna)**

Personnel	Role	Regulation 17 Licence
Jenny Wilcox	Fieldwork and reporting (fauna).	NA
Brenden Metcalf	Fieldwork	NA

### 3.2.3 Field Survey Methods

The field survey was undertaken on the 21<sup>st</sup> – 25<sup>th</sup> May 2018. The field survey involved the following three components:

- Habitat assessment;
- Keeping of opportunistic fauna records; and
- Targeted surveys for conservation significant fauna

One of the primary purposes of the field survey was habitat assessment, as this allowed the Desktop Study to be placed in context. Although the vegetation mapping from this survey was used as the basis for the habitat mapping, notes were made on the presence or absence of habitat components affecting fauna, such as the presence of caves, rocky habitats, tree hollows or long-unburnt habitats. All opportunistic observations of vertebrate fauna were recorded when in the Study Area, including both direct observations and secondary signs (e.g. tracks, scats, diggings, burrows or feathers). Targeted surveys were undertaken for four key conservation significant species (Table 4). The transects walked were recorded, and are presented on maps in Appendix D.

**Table 4: Targeted Search Methods (Fauna)**

Species	Survey Type	Survey Method
Northern Quoll <i>Dasyurus hallucatus</i>	Survey for suitable habitat	Use of aerial photography to identify potential 'critical habitat' as defined in the Referral Guidelines (Commonwealth of Australia 2016). Denning habitat (rocky areas) identified within 1 km of the Study Area, then ground-truthed in the field survey. Foraging/dispersal habitat mapped as habitat within 1 km of denning habitat.
Night Parrot <i>Pezoporus occidentalis</i>	Survey for suitable habitat	Identification of old-growth spinifex habitats that may support Night Parrot roosting/breeding and foraging habitats such as alluvial areas with chenopods, herbs and grasses.
Bilby <i>Macrotis lagotis</i>	Survey for suitable habitat and secondary signs	Identification of potentially suitable Spinifex Plain habitats during the field survey. Transects to search for secondary signs such as burrows, diggings, scats and tracks. Recording any signs with a GPS co-ordinate, description and representative photograph.
Western Pebble-mound Mouse <i>Pseudomys chapmani</i>	Survey for suitable habitat and secondary signs	Identification of potentially suitable stony habitats during the field survey. Transects to search for secondary signs (pebble mounds). Recording any mounds with a GPS co-ordinate, description of activity (active, inactive, historic) and representative photograph.

### **3.2.4 Taxonomy and Nomenclature**

Taxonomy and nomenclature for fauna species used in this report follow the Western Australian Museum checklists. These were last updated in April 2018. In the text, common names are used where appropriate, and all scientific names are given in species lists. Where a species lacks a common name, they are referred to by their scientific name. Where a species in a database search result is listed under a name that is not current, effort is made to correctly assign it to the current taxonomy on the basis of distribution.

## **4. LIMITATIONS OF SURVEY**

### **4.1 Flora and Vegetation**

Table 6 presents the limitations of the flora and vegetation survey of the Study Area in accordance with EPA (2016a).

**Table 6: Limitations of the Flora and Vegetation Survey of the Study Area**

Limitation	Limitation of Survey	Comment
Effort and Extent	Potential minor	Reconnaissance and Targeted Survey undertaken across entire Study Area. Multiple quadrats were established in each vegetation pattern identified in the Study Area. The Targeted Survey involved transecting suitable habitat for significant flora in the Study Area. All significant taxa identified as potentially occurring in the Study Area were searched for as part of the Targeted Survey, however some significant taxa were cryptic and were only identified at the plant identification stage. Further searching for such taxa may be required. No constraints prevented appropriate sampling techniques (quadrat establishment, foot transects) being employed. Because of the ease of access to the Study Area, detailed VU and condition mapping could be undertaken throughout the Study Area via foot and vehicle transects; mapping reliability is therefore considered to be high.
Competency /experience of the team carrying out the survey	No	Surveyor has had extensive experience (>10 years) in conducting similar assessments in the Pilbara. Personnel conducting plant identifications have had >10 years' experience in plant identification in the Pilbara.
Proportion of flora identified, recorded and/or collected	No	All vascular groups that were present in the Study Area were sampled. A high proportion of perennial vascular taxa were recorded based on the intensity and method of survey, and almost all could be positively identified. A high proportion of ephemeral vascular taxa were recorded based on the intensity and method of survey, and adequate rainfall prior to survey (see timing/weather/season/cycle below). Unknown vascular taxa were collected, with specimens identified at the WA Herbarium.
Sources of information e.g. previously available information (whether historic or recent) as distinct from new data	No	Reasonable contextual information for the Study Area was available prior to the survey. Sources of information used included government databases (DBCA), which are known to have been extensively populated with data from numerous surveys conducted in the general vicinity of the Study Area, as well as numerous general sources pertaining to the climate, geomorphology, flora and vegetation of the Pilbara, and several surveys conducted in the local area, including some that overlapped the Study Area.

Limitation	Limitation of Survey	Comment
Timing/weather/season/cycle	No	Although the majority of the survey was not conducted within what is considered to be the usual appropriate season for survey in the Pilbara bioregion (6-8 weeks post wet season – generally March-June), a significant rainfall event in June approximately 7 weeks prior to the majority of the survey being conducted meant that the timing of this portion of the survey in mid-late July was ideal. The initial survey conducted in June was in the usual appropriate season, however, because the majority of precipitation received in the vicinity of the Study Area fell in January and February, and March – May were hotter than average, the majority of ephemeral species were in the process of senescing, and most perennial taxa were not in flower. However, as noted in Section 3.1.4, re-assessment of such areas surveyed in June during the July survey negated this issue.
Disturbances (e.g. fire, flood, accidental human intervention etc.), which affected results of survey	No	Part of Survey Area B had been recently burnt, probably within the 6 months preceding the survey. This made identification of some perennial taxa, particularly <i>Acacia</i> and <i>Triodia</i> taxa, difficult in some instances because of their juvenile state; however, this is not considered to have significantly affected the results of the survey. It also made resolution of VUs somewhat difficult in the field in some instances, however this also is not considered to have significantly affected the results of the survey, particularly given that there is aerial photography of this Survey Area from prior to the fire available for vegetation mapping purposes.
Remoteness and/or access problems	No	There were no impediments to access within the Study Area.

## 4.2 Fauna

Various factors can limit the effectiveness of a fauna survey. Pursuant to the “Technical Guidance - Terrestrial Fauna Surveys” (EPA 2016c), these factors have been identified and their potential to impact on the effectiveness of the surveys has been assessed in Table 7 below. All fauna surveys have limitations, and not all fauna species present on a site are likely to be sampled during a survey. Fauna may not be recorded because they are rare, they are difficult to trap or observe, or because they are only present on the site for part of the year. The limitations of the field survey are ameliorated by the data collected in the bioregion, as reviewed in the Desktop Study.

**Table 7: Limitations of the Fauna Survey of the Study Area**

Limitation	Limitation of Survey	Comment
Competency /experience of the team carrying out the survey	Not limiting	Both field zoologists have 18 years’ experience with fauna surveys in Western Australia, including surveys in the Pilbara bioregion.
Proportion of fauna identified, recorded and/or collected.	Not limiting	Although, except for birds, only a small proportion of the fauna were recorded, the purpose of a level 1 survey is not to inventory all vertebrate fauna, rather to place the results of the Desktop Study in context.
Sources of information e.g. previously available information (whether historic or recent) as distinct from new data	Not limiting	The Pilbara Biological Survey (2002 – 2013) undertaken by DBCA provides context for surveys in this bioregion. Many fauna surveys have been undertaken for mining and other developments in the region, and the records are available on the Fauna Survey Returns Database, as accessed through NatureMap (DBCA 2007-). This is evidenced by the large number of records
Timing/weather/season/cycle	Not limiting	Level 1 surveys and targeted surveys for habitat and secondary signs may be undertaken at any time of the year.
Disturbances (e.g. fire, flood, accidental human intervention etc.), which affected results of survey	Not limiting	No disturbances during the field survey. Some Survey Areas were recently burnt in parts, but this was unlikely to impact the outcome of a Level 1 survey.
Intensity (in retrospect, was the intensity adequate)	Not limiting	Sufficient time was allowed to survey all habitats within the Study Area.
Completeness (e.g. was relevant area fully surveyed)	Not limiting	Good coverage over entire Study Area with every habitat surveyed.
Resources (e.g. degree of expertise available in animal identification to taxon level)	Not limiting	No taxonomic issues were encountered.
Remoteness and/or access problems	Not limiting	Entire Study Area accessible on foot.
Availability of contextual (e.g. biogeographic) information on the region	Not limiting	The Pilbara Biological Survey (2002 – 2013) undertaken by DBCA provides context for surveys in this bioregion.



## 5. RESULTS

### 5.1 Flora and Vegetation

#### 5.1.1 Desktop Study

##### 5.1.1.1 Regional Flora

The interrogation of the DBCA WA Herbarium specimen Database and TPFL Database (data provided by Main Roads as per Section 3.1.1) returned a total of 62 significant vascular flora taxa that have records in the Desktop Study Area. All significant flora taxa are Priority flora; no Threatened taxa were returned by the interrogation.

In addition to these taxa, *Whiteochloa capillipes* (P1) was also returned from the Main Roads Database search; however, these records have since been reassigned to non-significant taxa, with all current records for this taxon occurring within the north-east Kimberley (DBCA 2007-). Therefore this taxon will not be considered further.

A search of these databases using NatureMap (DBCA 2007-) was also undertaken as part of the Desktop Study, to check for any recently added records and confirm the records returned from the DBCA WA Herbarium specimen Database and TPFL Database search. The NatureMap search returned one additional Priority flora taxon.

A total of 62 significant flora taxa (all Priority flora), are therefore known to occur within the Desktop Study Area, based on records in DBCA's WA Herbarium specimen Database and TPFL Database. These are presented in Table 8. One taxon, *Goodenia pedicellata* (P1), is known to occur in the Study Area (see Section 5.1.1.5).

**Table 8: Significant Flora Returned from DBCA Database Searches**

Taxon	Status	Source
<i>Acacia bromilowiana</i>	P4	Main Roads; NatureMap
<i>Acacia daweara</i>	P3	Main Roads; NatureMap
<i>Acacia effusa</i>	P3	Main Roads; NatureMap
<i>Adiantum capillus-veneris</i>	P2	Main Roads; NatureMap
<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>	P3	Main Roads; NatureMap
<i>Astrebla lappacea</i>	P3	Main Roads; NatureMap
<i>Bothriochloa decipiens</i> var. <i>cloncurrrens</i>	P1	Main Roads; NatureMap
<i>Calotis latiuscula</i>	P3	Main Roads; NatureMap
<i>Calotis squamigera</i>	P1	Main Roads; NatureMap
<i>Dampiera anonyma</i>	P3	Main Roads; NatureMap
<i>Dicladantha glabra</i>	P2	Main Roads; NatureMap
<i>Eragrostis surreyana</i>	P3	Main Roads; NatureMap
<i>Eremophila magnifica</i> subsp. <i>magnifica</i>	P4	Main Roads; NatureMap
<i>Eremophila magnifica</i> subsp. <i>velutina</i>	P3	Main Roads; NatureMap
<i>Eucalyptus lucens</i>	P1	Main Roads; NatureMap
<i>Euphorbia australis</i> var. <i>glabra</i>	P2	Main Roads; NatureMap
<i>Euphorbia inappendiculata</i> var. <i>inappendiculata</i>	P2	Main Roads; NatureMap
<i>Euphorbia inappendiculata</i> var. <i>queenslandica</i>	P1	Main Roads; NatureMap
<i>Fimbristylis sieberiana</i>	P3	Main Roads; NatureMap
<i>Geijera salicifolia</i>	P3	Main Roads; NatureMap
<i>Glycine falcata</i>	P3	Main Roads; NatureMap
<i>Gompholobium karijini</i>	P2	Main Roads; NatureMap
<i>Goodenia nuda</i>	P4	Main Roads; NatureMap
<i>Goodenia pedicellata</i>	P1	Main Roads; NatureMap
<i>Goodenia</i> sp. East Pilbara (A.A. Mitchell PRP 727)	P3	Main Roads; NatureMap
<i>Grevillea saxicola</i>	P3	Main Roads; NatureMap
<i>Gymnanthera cunninghamii</i>	P3	Main Roads; NatureMap
<i>Helichrysum oligochaetum</i>	P1	Main Roads; NatureMap
<i>Hibiscus</i> sp. Gurinbiddy Range (M.E. Trudgen MET 15708)	P2	Main Roads; NatureMap
<i>Hibiscus</i> sp. Mt Brockman (E. Thoma ET 1354)	P1	Main Roads; NatureMap
<i>Indigofera ixocarpa</i>	P2	Main Roads; NatureMap
<i>Indigofera</i> sp. Bungaroo Creek (S. van Leeuwen 4301)	P3	Main Roads; NatureMap
<i>Iotasperma sessilifolium</i>	P3	Main Roads; NatureMap
<i>Isotropis parviflora</i>	P2	Main Roads; NatureMap
<i>Lepidium catapycnon</i>	P4	Main Roads; NatureMap
<i>Nicotiana umbratica</i>	P3	Main Roads; NatureMap
<i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	Main Roads; NatureMap
<i>Olearia mucronata</i>	P3	Main Roads; NatureMap
<i>Oxalis</i> sp. Pilbara (M.E. Trudgen 12725)	P2	Main Roads; NatureMap
<i>Pentalepis trichodesmoides</i> subsp. <i>hispida</i>	P2	Main Roads; NatureMap
<i>Pentalepis trichodesmoides</i> subsp. <i>incana</i>	P1	Main Roads; NatureMap
<i>Polymeria distigma</i>	P3	Main Roads; NatureMap
<i>Ptilotus mollis</i>	P4	Main Roads; NatureMap
<i>Ptilotus subspinescens</i>	P3	Main Roads; NatureMap
<i>Ptilotus trichocephalus</i>	P4	Main Roads; NatureMap
<i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794)	P3	Main Roads; NatureMap
<i>Rhynchosia bungarensis</i>	P4	Main Roads; NatureMap
<i>Rostellularia adscendens</i> var. <i>latifolia</i>	P3	Main Roads; NatureMap
<i>Scaevola</i> sp. Hamersley Range basalts (S. van Leeuwen 3675)	P2	Main Roads; NatureMap
<i>Sida</i> sp. Barlee Range (S. van Leeuwen 1642)	P3	Main Roads; NatureMap

Taxon	Status	Source
<i>Sida</i> sp. Hamersley Range (K. Newbey 10692)	P1	Main Roads; NatureMap
<i>Solanum albotellatum</i>	P3	Main Roads; NatureMap
<i>Solanum kentrocaule</i>	P3	Main Roads; NatureMap
<i>Stackhousia clementii</i>	P3	Main Roads; NatureMap
<i>Stylidium weeliwoilli</i>	P3	Main Roads; NatureMap
<i>Swainsona thompsoniana</i>	P3	Main Roads; NatureMap
<i>Tetradthea butcheriana</i>	P1	Main Roads; NatureMap
<i>Teucrium pilbaranum</i>	P2	Main Roads; NatureMap
<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431)	P3	Main Roads; NatureMap
<i>Triodia basitricha</i>	P3	Main Roads; NatureMap
<i>Triodia</i> sp. Robe River (M.E. Trudgen et al. MET 12367)	P3	Main Roads; NatureMap
<i>Triodia</i> sp. Karijini (S. van Leeuwen 4111)	P1	NatureMap

The search of the DoEE SPRAT Database (DoEE 2018) with regard to MNES listed under the EPBC Act did not identify any flora taxa listed as Threatened species, or habitat for Threatened species, that is likely to occur in the Desktop Study Area.

The search of the DoEE SPRAT Database with regard to MNES listed under the EPBC Act identified two significant invasive introduced flora taxa, or habitat for these taxa, is likely to occur within the Desktop Study Area; *Cenchrus ciliaris* (Buffel Grass) and *Parkinsonia aculeata* (Parkinsonia). *Cenchrus ciliaris* is known to be widespread and common in the Pilbara (WA Herbarium 1998-) and has records within the Desktop Study Area (DBCA 2007-). This taxon is considered by the States and Territories to pose a particularly significant threat to biodiversity, as it is known to be invasive under certain conditions (Hussey *et. al.* 2007; DoEE 2018). The nearest record of *Parkinsonia aculeata* is approximately 110 km to the north-west of the Study Area (specifically Survey Area H, which is a considerable distance from the Desktop Study Area) and is not considered further.

The full results of the DoEE Database search are presented in Appendix E.

A search of the WA Herbarium specimen Database for records of introduced taxa within the Desktop Study Area was performed using NatureMap. A total of 47 introduced taxa that have records in the Desktop Study Area were returned. These taxa are presented in Section 5.1.2.5. No Declared Pests listed under the BAM Act (Department of Primary Industries and Regional Development (DPIRD) 2018) and no listed Weeds of National Significance (WoNS) (Australian Weeds Committee (AWC) 2018) were returned by the search.

### 5.1.1.2 Regional Vegetation

As previously mentioned, the Study Area is located in the Pilbara IBRA region, and specifically within the Hamersley IBRA subregion (Commonwealth of Australia 2012). Beard (1975) mapped the vegetation of the Hamersley subregion at a scale of 1:1 000 000.

In the Hamersley subregion, Beard (1975) recognised four categories of broad plant formations, three of which are relevant to the Study Area: the Ranges, Valley Plains and Basalt Hills. The vegetation of the Ranges is characteristically tree steppe, usually with *Eucalyptus leucophloia* subsp. *leucophloia* providing the tree cover, and *Triodia wiseana*

providing the hummock grass cover. On mountain summits, trees are replaced by mallees, usually of *Eucalyptus gamophylla*, *Eucalyptus kingsmillii* and *Eucalyptus leucophloia* subsp. *leucophloia*, with a number of unusual shrubs also occurring that are not present at lower elevations. On the lower slopes, the tree steppe changes, with the addition of *Corymbia hamersleyana*, *Corymbia deserticola* and *Triodia pungens*; on volcanic rocks, these species may completely replace *Eucalyptus leucophloia* subsp. *leucophloia* and *Triodia wiseana*. Patches of mulga (*Acacia aneura* and relatives) also occur in this situation. On cliff lines and in gorges, a number of endemic or locally endemic species occur, including *Astrotricha hamptonii* and *Callitris columellaris*. In major drainage lines, including at the bottom of gorges, riverine woodland occurs, with notable species being *Eucalyptus camaldulensis*, *Eucalyptus victrix*, *Corymbia hamersleyana*, *Melaleuca argentea* and *Acacia tumida*.

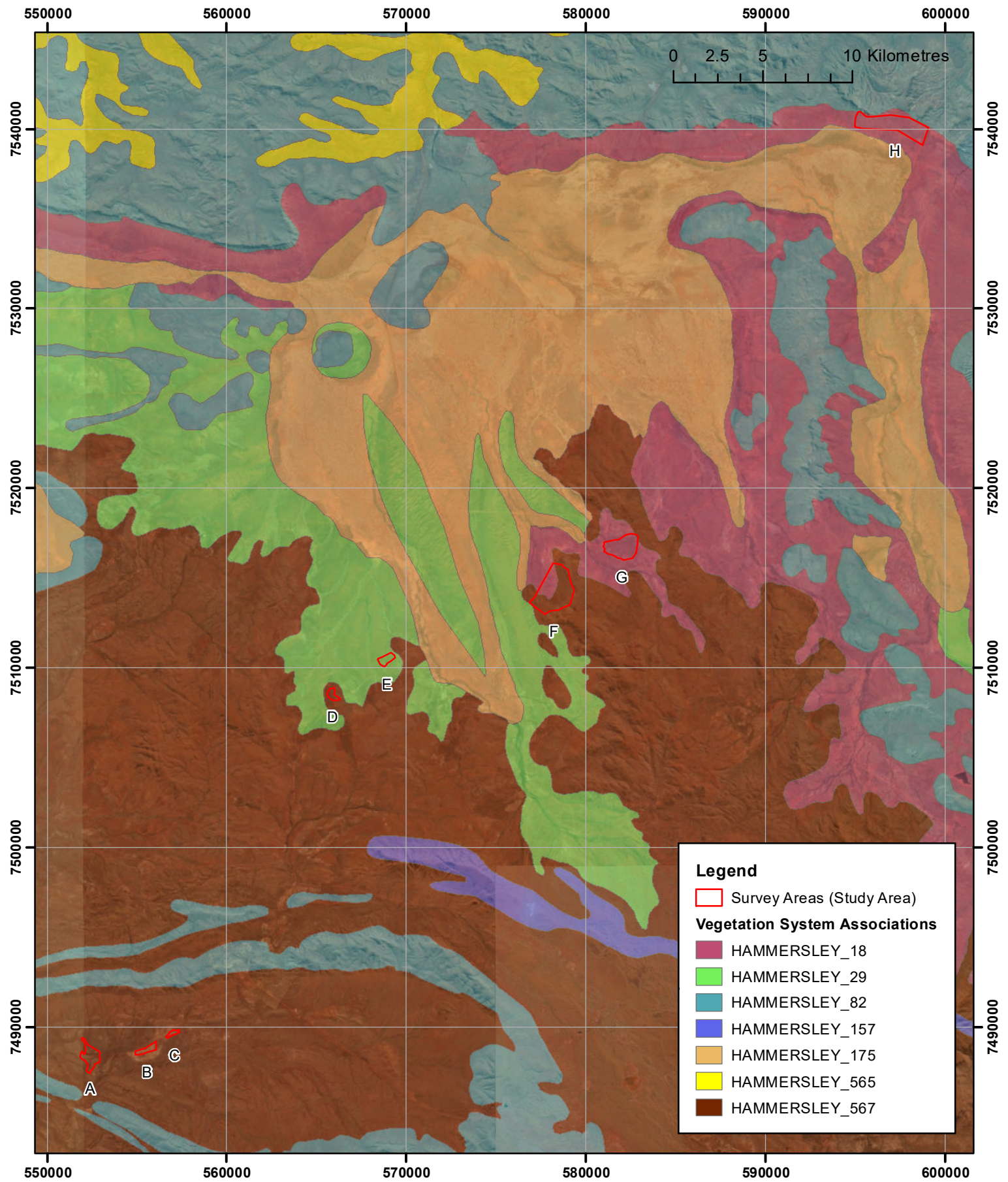
The vegetation of the Valley Plains is generally dominated by mulga low woodland, with the widest and flattest areas often possessing an open grassland. Where such grassland is on red cracking clay soils, *Astrelba pectinata* usually dominates, together with other grass species including *Chrysopogon fallax*, *Eragrostis setifolia* and *Aristida latifolia*.



The Basalt Hills contain a mosaic of mulga low woodland and *Acacia inaequilatera*-*Triodia* shrub steppe, with intermediate mixtures. On better soils on flatter ground, pure mulga woodland occurs, with *Acacia aneura* (and its relatives), *Acacia pruinocarpa*, patches of *Acacia xiphophylla*, *Senna* and *Eremophila* spp., and a ground layer of ephemerals. The occurrence of *Triodia epactia* in the ground layer is the first sign of transition to shrub steppe; as the ground becomes more stony upslope, *T. epactia* is replaced by *T. brizoides*, the mulga thins out, and *Acacia inaequilatera* appears with *Grevillea pyramidalis* and *Hakea lorea*. In some of the steepest and stoniest places, *Eucalyptus leucophloia* and *Triodia wiseana* replace the previous species.

The vegetation mapping by Beard (1975) was used by Shepherd *et al.* (2002) to describe vegetation system associations, at a scale of 1:250,000. Four vegetation system associations occur in the Study Area, as summarised in Table 9 and presented on Figure 3. Table 9 also presents the current extent of each vegetation system association in relation to its pre-European extent (Government of Western Australia 2018), and the percentage of the current extent of each vegetation system association currently protected for conservation. A total of three vegetation system associations occur within the Study Area, all of which have over 99 % of their pre-European extent remaining. All three vegetation associations have some extent protected for conservation; ranging from 12.8 % to 22.3 %.

**Table 9: Vegetation System Associations Occurring in the Study Area**

Vegetation System Association	Description	Survey Area	Current Extent (ha)	Percentage of Pre-European Extent Remaining	Percentage of Current Extent Protected for Conservation
Hammersley_18	Low woodland; mulga ( <i>Acacia aneura</i> )	F - 106 ha; G - 189.6 ha; H - 345.2 ha	576,433	99.3	19.7
Hammersley_29	Sparse low woodland; mulga, discontinuous in scattered groups	E - 37.5 ha	151,060	99.9	12.8
Hammersley_82	Hummock grasslands, low tree steppe; snappy gum over <i>Triodia wiseana</i>	H - 0.02 ha	2,157,852	99.4	12.2
Hammersley_567	Hummock grasslands, shrub steppe; mulga and kanji over soft spinifex and <i>Triodia basedowii</i>	A - 99.6 ha; B - 34.7 ha; C - 14.3 ha; D - 27.1 ha; F - 312.3 ha; G - 3.2 ha	774,577	99.7	22.3

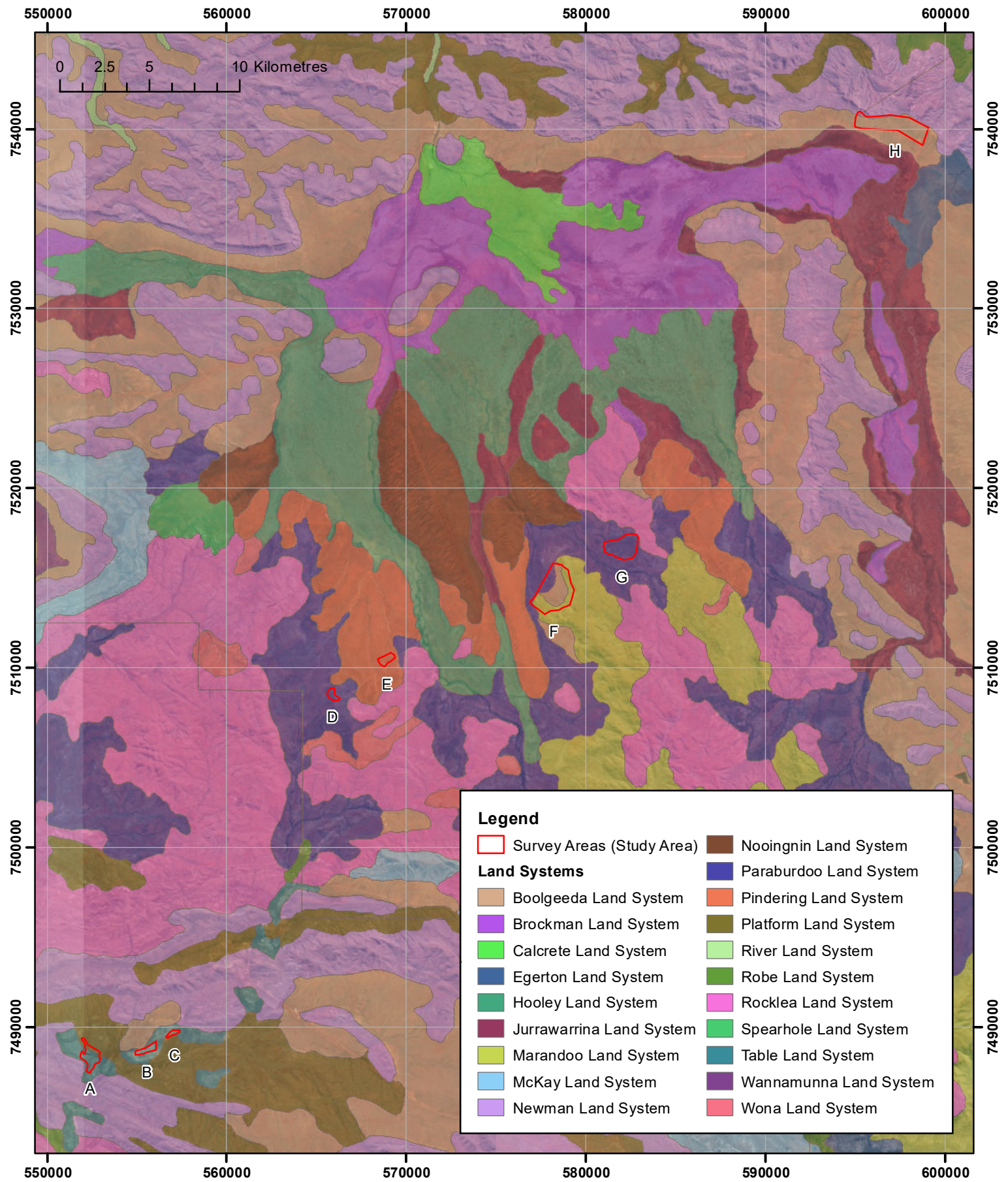


<b>Vegetation System Associations of the Study Area</b>	Author: David Coultas	  <b>Figure</b>  <b>3</b>
	WEC Ref: MR18-34-01	
Filename: MR18-34-01-f03.mxd		
Scale: 1:275,000 (A4)		
Projection: GDA 1994 MGA Zone 50		
Revision: 0 - 21 November 2018		
 <b>WOODMAN</b> ENVIRONMENTAL	This map should only be used in conjunction with WEC report MR18-34-01.	

In 2004, the Department of Agriculture described land systems within the Pilbara IBRA region, considering general ecological information, vegetation physiognomy and composition, patterns of variation, conservation status, gradational association and land system representation (Van Vreeswyk *et al.* 2004). A total of eight land systems occur within the Study Area, as summarised in Table 10 and presented on Figure 4. None of these are considered to be of conservation significance (DBCA 2016, 2017b).

**Table 10: Land Systems Occurring within the Study Area**

Land System	Description of Land System	Survey Area	Mapped Extent (ha)
Boolgeeda	Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands and mulga shrublands	F – 167.5 ha; H – 323.4 ha	774,800
Marandoo	Basalt hills and restricted stony plains supporting grassy mulga shrublands	F – 174.6 ha	459,00
Newman	Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands	H – 21.8 ha	1,458,000
Paraburdoo	Basalt derived stony gilgai plains and stony plains supporting snakewood and mulga shrublands with spinifex and tussock grasses	D – 27.1 ha; F – 76.2 ha; G – 192.7 ha	565, 00
Pindering	Gravelly hardpan plains supporting groved mulga shrublands with hard and soft spinifex	E – 37.5 ha	351,00
Platform	Dissected slopes and raised plains supporting hard spinifex grasslands	A – 21.9 ha; C - 6.8 ha	1,570,00
Rocklea	Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands	G – 0.1 ha	22,993,00
Table	Low calcrete plateaux, mesas and lower plains supporting mulga and cassia shrublands and minor spinifex grasslands	A – 77.7 ha; B – 34.7 ha; C – 7.5 ha	7,700



<p><b>Land Systems of the Study Area</b></p>	Author: Alison Saligari	
	WEC Ref: MR18-34-01	
<p><b>WOODMAN</b> ENVIRONMENTAL</p> <p><small>This map should only be used in conjunction with WEC report MR18-34-01.</small></p>	Filename: MR18-34-01-f04.mxd	<p><b>Figure</b></p> <p><b>4</b></p>
	Scale: 1:275,000 (A4)	
	Projection: GDA 1994 MGA Zone 50	
	Revision: 0 - 21 November 2018	



The interrogation of the DBCA TEC and PEC Database (data provided by Main Roads as per Section 3.1.1) returned a total of three significant communities that have records in the Desktop Study Area. One of the communities (Themeda grasslands on cracking clays (Hamersley Station, Pilbara)) is listed as a TEC, with the remaining communities listed as PECs. Table 11 provides a summary of these communities. None of these communities are currently known to occur within the Study Area itself (see Section 5.1.1.7).

**Table 11: Significant Vegetation Returned from the DBCA Database Search**

Community	Conservation Status (W.A.)	EPBC Act Ranking
Brockman Iron cracking clay communities of the Hamersley Range	P1	-
Kumina Land System	P3	-
Themeda grasslands on cracking clays (Hamersley Station, Pilbara)	Vulnerable	-

The search of the DoEE SPRAT Database with regard to MNES listed under the EPBC Act (DoEE 2018) did not identify any TECs as occurring or potentially occurring within the Desktop Study Area.

### 5.1.1.3 Local Flora and Vegetation Surveys

A number of flora and vegetation surveys which are publically available have been undertaken within the Desktop Study Area as described below.

Biota Environmental Sciences Pty Ltd (Biota) undertook a vegetation and flora survey of White Quartz Road Corridor, located approximately 8 km north-east of Survey Area C (Biota 2007a). This survey recorded 364 native plant taxa including two current significant taxa, being:

- *Ptilotus subspinescens* (P3); and
- *Rostellularia adscendens* var. *latifolia* (P3)

In addition, a total of eight introduced species were recorded, none of which are listed as Declared Plants (Table 13).

A total of 39 vegetation units were mapped within the survey area; none of which were considered to have any affiliation with any listed TECs or PECs (Biota 2007a).

Biota undertook a vegetation and flora survey as part of Marandoo Mine Phase 2, which incorporated the results of previous survey work for the project by Mattiske and Associates (undertaken in 1991) and involved an additional field survey by Biota in 2007 (Biota 2008). The Marandoo Mine Phase 2 is located approximately 17 km east of the Survey Area G, although the eastern-most section is approximately 50 km from the Study Area and is not considered to be relevant to the Study Area. This combined survey results (including the results of Mattiske and Associates) and recorded 537 native plant taxa including three current significant taxa that occur within the Desktop Study Area, being:

- *Calotis latiuscula* (P3);
- *Rhagodia* sp. Hamersley (M. Trudgen 17794) (P3); and

- *Rostellularia adscendens* var. *latifolia* (P3).

In addition, a total of 20 introduced species were recorded, none of which are listed as Declared Plants (Table 13).

A total of 28 vegetation units were mapped within the survey area; none of which were considered to have any affiliation with any listed TECs or PECs (Biota 2008).

Biota undertook a series of flora and vegetation surveys for the West Turner Syncline project (Biota 2013a; b), which overlaps Survey Areas A, B and C. These surveys recorded a total of 638 native plant taxa including 14 current significant taxa, being:

- *Acacia bromilowiana* (P4);
- *Dampiera anonyma* (P3);
- *Eremophila magnifica* subsp. *magnifica* (P4);
- *Eremophila magnifica* subsp. *velutina* (P3);
- *Goodenia nuda* (P4);
- *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) (P3);
- *Hibiscus* sp. Mt Brockman (E. Thoma ET 1354) (P1);
- *Indigofera* sp. Bungaroo Creek (S. van Leeuwen 4301) (P3);
- *Nicotiana umbratica* (P3);
- *Ptilotus mollis* (P4);
- *Ptilotus subspinescens* (P3);
- *Rostellularia adscendens* var. *latifolia* (P3);
- *Sida* sp. Hamersley Range (K. Newbey 10692) (P1); and
- *Sida* sp. Barlee Range (S. van Leeuwen 1642) (P3).

In addition, a total of 20 introduced species were recorded, none of which are listed as Declared Plants (Table 13).

A total of 59 vegetation units were mapped within the survey area; none of which were considered to have any affiliation with any listed TECs or PECs (Biota 2013a; b).

Ecoscape Pty Ltd (Ecoscape) undertook a Level 1 flora and vegetation assessment of the Mt Macleod West exploration area within Fortescue's Central Pilbara Project, located approximately 18 km north-west of Survey Area F (Ecoscape 2013). This survey recorded 228 native plant taxa including four current significant taxa, being:

- *Astrebla lappacea* (P3);
- *Iotasperma sessilifolium* (P3);
- *Rhagodia* sp. Hamersley (M. Trudgen 17794) (P3); and
- *Themeda* sp. Hamersley Station (M.E. Trudgen 11431) (P3).

In addition, a total of four introduced species were recorded, none of which are listed as Declared Plants (Table 13).

A total of 13 vegetation units were mapped within the survey area; none of which were considered to have any affiliation with any listed TECs. One vegetation type was considered

analogous to the 'Brockman Iron cracking clay communities of the Hamersley' Priority 1 PEC (Ecoscape 2013).

GHD undertook a biological assessment of five existing sheeting pits along Nanutarra - Munjina Road, with the southern-most section (311 SLK) located approximately 10 km north-east of Survey Area G and the central section (328 SLK) overlapping Survey Area H (GHD 2016). This survey did not record any significant flora taxa.

In addition, one introduced taxon was recorded, being; *Cenchrus ciliaris*.

A total of seven vegetation units were mapped within the survey area; none of which were considered to have any affiliation with any listed TECs or PECs (GHD 2016).

#### 5.1.1.4 Groundwater and Surface Water Values

The Study Area is located within the Pilbara Groundwater Area, and the Pilbara Surface Water Area, as proclaimed under *the Rights in Water and Irrigation Act 1914* (Department of Water and Environmental Regulation 2018). No rivers proclaimed under *Rights in Water and Irrigation Act 1914* occur in the Study Area (Department of Water and Environmental Regulation 2018). In a local groundwater context, according to the Bureau of Meteorology's 'Groundwater Dependent Ecosystem Atlas', much of the Study Area has not been analysed with regard to Groundwater Dependent Ecosystems (GDE), while there is low potential for Survey Areas A, B, C and H to contain terrestrial GDEs (Bureau of Meteorology 2018c). However, the Hardey River, located approximately 1 km from Survey Areas A, B and C, has moderate potential to contain an aquatic GDE. In a local surface water context, no major watercourses occur in the Study Area, however, as mentioned above, the Hardey River is located approximately 1 km from Survey Areas A, B and C. Minor watercourses occur within all Survey Areas (Bureau of Meteorology 2018c).

#### 5.1.1.5 Summary of Significant Flora

A list of significant flora taxa known from within the Desktop Study Area is presented in Table 12. This list has been compiled from the results of searches of DBCA's Threatened Flora Databases, DoEE's SPRAT Database, and the results of local surveys as outlined in Section 5.1.1.3.

A total of 62 significant taxa are known from within the Desktop Study Area; all are Priority taxa. These are presented on Figure 5. One taxon, *Goodenia pedicellata* (P1), is known to occur in the Study Area.

**Table 12: Significant Flora Taxa Known from Within the Desktop Study Area**

Taxon	Status	Source*	Flowering Period (WA Herbarium 2018)	Habitat (WA Herbarium 1998-)
<i>Acacia bromilowiana</i>	P4	DBCA; Biota	July to August	Ironstone hills
<i>Acacia dawweana</i>	P3	DBCA	July to September	Low rocky rises, along drainage lines.
<i>Acacia effusa</i>	P3	DBCA	May to August	Scree slopes of low ranges.
<i>Adiantum capillus-veneris</i>	P2	DBCA	Not applicable – fern (non-flowering)	Gorges and on cliff walls.
<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>	P3	DBCA	Not applicable – after rainfall	Plains
<i>Astrebula lappacea</i>	P3	DBCA; Ecoscape	Not applicable – after rainfall	Crabhole plains and plains with cracking clay and clay loam
<i>Bothriochloa decipiens</i> var. <i>cloncurrrens</i>	P1	DBCA	Not applicable – after rainfall	Plains and depressions with clay loam
<i>Calotis latiuscula</i>	P3	DBCA; Biota	April to October	Plains and drainage lines
<i>Calotis squamigera</i>	P1	DBCA	July	Plains
<i>Dampiera anonyma</i>	P3	DBCA; Biota	June to September	Hill summits and upper slopes with banded ironstone, basalt, shale and jaspilite
<i>Dicladantha glabra</i>	P2	DBCA	April; August to October	Edges of watercourses and rock pools
<i>Eragrostis surreyana</i>	P3	DBCA	Not applicable – after rainfall	Depressions, drainage lines and wetlands
<i>Eremophila magnifica</i> subsp. <i>magnifica</i>	P4	DBCA; Biota	May to October	Ironstone hills
<i>Eremophila magnifica</i> subsp. <i>velutina</i>	P3	DBCA; Biota	August to September	Ironstone hills and slopes.
<i>Eucalyptus lucens</i>	P1	DBCA	February; March and December**	Rocky crests and slopes.
<i>Euphorbia australis</i> var. <i>glabra</i>	P2	DBCA	April to September	Flats, plains and edges of drainage lines
<i>Euphorbia inappendiculata</i> var. <i>inappendiculata</i>	P2	DBCA	August	Cracking clay plains and flats
<i>Euphorbia inappendiculata</i> var. <i>queenslandica</i>	P1	DBCA	April to September	Plains and depressions with cracking clay
<i>Fimbristylis sieberiana</i>	P3	DBCA	Not applicable – after rainfall	Drainage lines and edges of pools
<i>Geijera salicifolia</i>	P3	DBCA	September	Rocky hills, gullies and gorges.
<i>Glycine falcata</i>	P3	DBCA	May or July	Depressions and floodplains with cracking clay and crabhole plains.
<i>Gompholobium karijini</i>	P2	DBCA	August to September	Ironstone hills
<i>Goodenia nuda</i>	P4	DBCA; Biota	March to July	Plains, flats and drainage lines

Taxon	Status	Source*	Flowering Period (WA Herbarium 2018)	Habitat (WA Herbarium 1998-)
<i>Goodenia pedicellata</i>	P1	DBCA	April to May	Low rises and undulating plains with calcrete soils.
<i>Goodenia</i> sp. East Pilbara (A.A. Mitchell PRP 727)	P3	DBCA; Biota	February to October	Calcrete soils
<i>Grevillea saxicola</i>	P3	DBCA	February to June	Rocky hills, slopes and gullies
<i>Gymnanthera cunninghamii</i>	P3	DBCA	April to December	Major drainage lines
<i>Helichrysum oligochaetum</i>	P1	DBCA	August to November	Depressions, flats and floodplains with clay
<i>Hibiscus</i> sp. Gurinbidy Range (M.E. Trudgen MET 15708)	P2	DBCA	March to August	Rocky slopes and gullies
<i>Hibiscus</i> sp. Mt Brockman (E. Thoma ET 1354)	P1	DBCA; Biota	March to August; November	Rocky slopes and gullies
<i>Indigofera ixocarpa</i>	P2	DBCA	June to August	Ironstone hills and slopes
<i>Indigofera</i> sp. Bungaroo Creek (S. van Leeuwen 4301)	P3	DBCA; Biota	May to July	Slopes, gullies, floodplains and drainage lines, often associated with ironstone
<i>Iotasperma sessilifolium</i>	P3	DBCA; Ecoscape	August to September	Floodplains and flats with cracking clay
<i>Isotropis parviflora</i>	P2	DBCA	February to August	Hills, plains and drainage lines, often associated with ironstone
<i>Lepidium catapycnon</i>	P4	DBCA	August to October	Ironstone hills and drainage lines
<i>Nicotiana umbratica</i>	P3	DBCA; Biota	April to June	Rocky outcrops
<i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	DBCA	March to June	Undulating plains with cracking clay and crabhole plains
<i>Olearia mucronata</i>	P3	DBCA	August to December/ January	Rocky hills, gullies and drainage channels, often associated with ironstone
<i>Oxalis</i> sp. Pilbara (M.E. Trudgen 12725)	P2	DBCA	May to July	In sheltered positions of ironstone hills, and drainage lines
<i>Pentalepis trichodesmoides</i> subsp. <i>hispida</i>	P2	DBCA	April; August to September	Rocky hills and slopes
<i>Pentalepis trichodesmoides</i> subsp. <i>incana</i>	P1	DBCA	May to August	Rocky hills and slopes
<i>Polymeria distigma</i>	P3	DBCA	April to July	Cracking clay
<i>Ptilotus mollis</i>	P4	DBCA; Biota	May to September	Rocky hills
<i>Ptilotus subspinescens</i>	P3	DBCA; Biota	September to December	Rocky undulating plains and hills
<i>Ptilotus trichocephalus</i>	P4	DBCA	June; September	Stony undulating plains, hills and flats

Taxon	Status	Source*	Flowering Period (WA Herbarium 2018)	Habitat (WA Herbarium 1998-)
<i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794)	P3	DBCA; Biota; Ecoscape	March to November	Gentle slopes, plains and drainage lines, often associated with ironstone
<i>Rhynchosia bungarensis</i>	P4	DBCA	May to September	Drainage lines, floodplains and valleys
<i>Rostellularia adscendens</i> var. <i>latifolia</i>	P3	DBCA; Biota	May to August	Hills, gullies, plains and drainage lines
<i>Scaevola</i> sp. Hamersley Range basalts (S. van Leeuwen 3675)	P2	DBCA; Biota	July to August	Basalt hills and slopes
<i>Sida</i> sp. Barlee Range (S. van Leeuwen 1642)	P3	DBCA; Biota	February to September	Ironstone hills, gullies and drainage lines
<i>Sida</i> sp. Hamersley Range (K. Newbey 10692)	P1	DBCA	May to October	Ironstone gullies and breakaways
<i>Solanum albotellatum</i>	P3	DBCA	March to September	Floodplains and flats with clay or cracking clay
<i>Solanum kentrocaule</i>	P3	DBCA	May to September	Rocky hills, slopes, gullies and gorges
<i>Stackhousia clementii</i>	P3	DBCA	February to April	Floodplains and flats
<i>Stylidium weeliwollii</i>	P3	DBCA	March to October	Drainage lines and edges of pools. Damp soil
<i>Swainsona thompsoniana</i>	P3	DBCA	April to August	Floodplains and flats with cracking clay
<i>Tetrateca butcheriana</i>	P1	DBCA	July	Cliff faces and breakaways
<i>Teucrium pilbaranum</i>	P2	DBCA	January; May to July; September	Crabhole plains, floodplains or flats with clay or cracking clay
<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431)	P3	DBCA; Ecoscape	Not applicable – after rainfall	Plains and drainage lines, often with cracking clay
<i>Triodia basitricha</i>	P3	DBCA	Not applicable – after rainfall	Stony hills and gullies, often with ironstone
<i>Triodia</i> sp. Robe River (M.E. Trudgen et al. MET 12367)	P3	DBCA	Not applicable – after rainfall	Rocky mesas, hills and gullies
<i>Triodia</i> sp. Karijini (S. van Leeuwen 4111)	P1	DBCA	Not applicable – after rainfall	Hills and slopes, often with ironstone

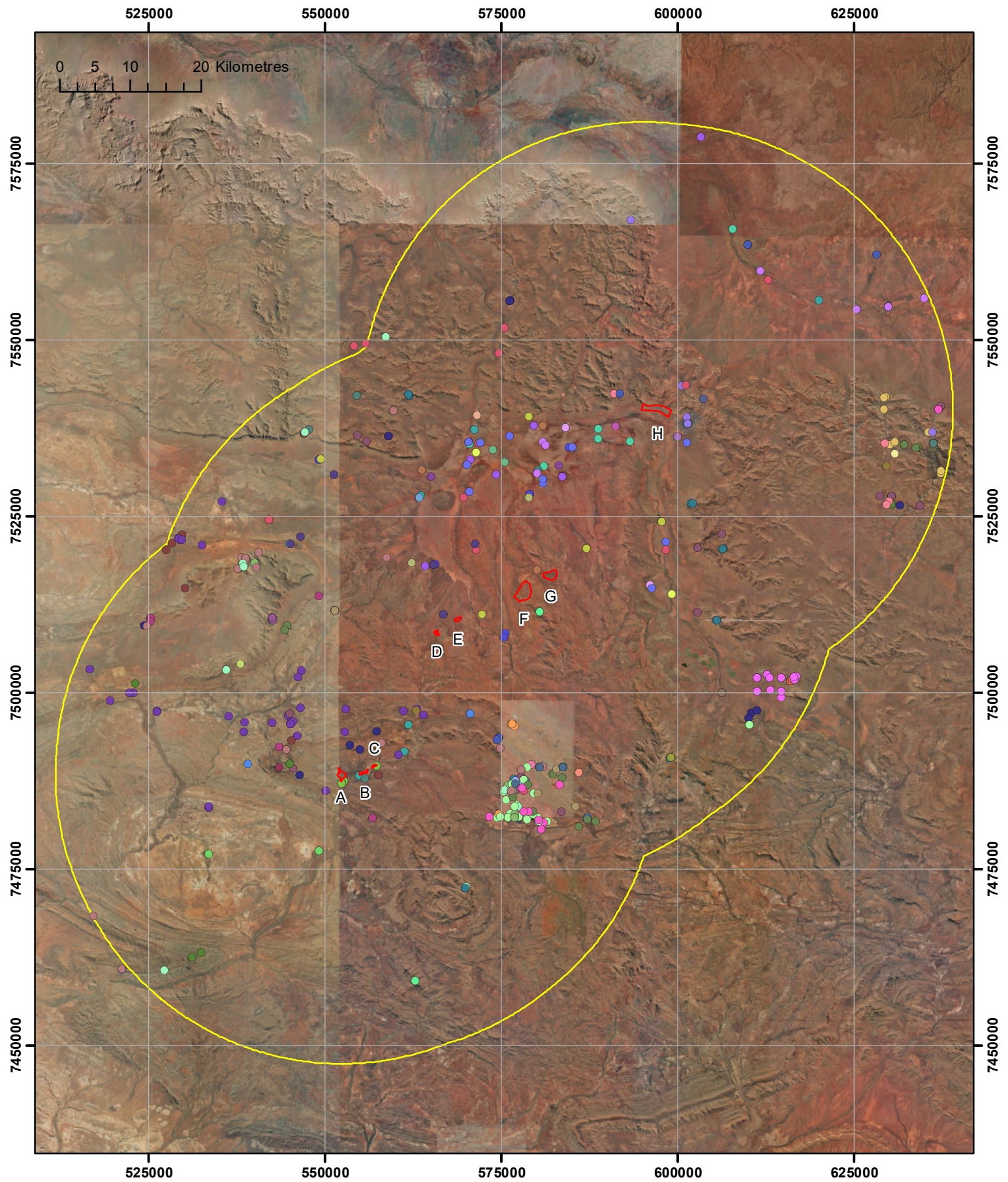
\*Sources are:



DBCA – DBCA's Significant Flora Databases, data provided by Main Roads and Naturemap (see Section 3.1.1);

Biota – Biota (2007; 2013a; b)

Ecoscape – Ecoscape (2013)

\*\*Source for flowering period is Centre for Australian National Biodiversity Research (2015)



<b>Existing Significant Flora Records</b>	Author: David Coultas	
	WEC Ref: MR18-34-01	
 <b>WOODMAN</b> ENVIRONMENTAL	Filename: MR18-34-01-f05-1.mxd	<b>Figure</b>  <b>5.1</b>
	Scale: 1:700,000 (A4)	
	Projection: GDA 1994 MGA Zone 50	
	Revision: 0 - 21 November 2018	
This map should only be used in conjunction with WEC report MR18-34-01.		

## Legend

 Survey Areas (Study Area)

 Desktop Study Area

### Significant Flora

- Abr *Acacia bromilowiana* (P4)
- Ada *Acacia dawsoniana* (P3)
- Aef *Acacia effusa* (P3)
- Acav *Adiantum capillus-veneris* (P2)
- Ajes *Aristida jerichoensis* var. *subspinulifera* (P3)
- Alap *Astrebla lappacea* (P3)
- Bdec *Bothriochloa decipiens* var. *cloncurrans* (P1)
- Cla *Calotis latiuscula* (P3)
- Csq *Calotis squamigera* (P1)
- Dano *Dampiera anonyma* (P3)
- Dgl *Dicladantha glabra* (P2)
- Esur *Eragrostis surreyana* (P3)
- Emam *Eremophila magnifica* subsp. *magnifica* (P4)
- Emav *Eremophila magnifica* subsp. *velutina* (P3)
- Elu *Eucalyptus lucens* (P1)
- Eaug *Euphorbia australis* var. *glabra* (P2)
- Einq *Euphorbia inappendiculata* var. *queenslandica* (P1)
- Euil *Euphorbia inappendiculata* var. *inappendiculata* (P2)
- Fsi *Fimbristylis sieberiana* (P3)
- Gsal *Geijera salicifolia* (P3)
- Gfal *Glycine falcata* (P3)
- Gka *Gompholobium karjini* (P2)
- Gnu *Goodenia nuda* (P4)
- Gped *Goodenia pedicellata* (P1)
- GspEP *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) (P3)
- Gsax *Grevillea saxicola* (P3)
- Gcu *Gymnanthera cunninghamii* (P3)
- Heo *Helichrysum oligochaetum* (P1)
- HspGR *Hibiscus* sp. Gurinbiddy Range (M.E. Trudgen MET 15708) (P2)
- HspMB *Hibiscus* sp. Mt Brockman (E. Thoma ET 1354) (P1)
- Iix *Indigofera ixocarpa* (P2)
- IspBC *Indigofera* sp. Bungaroo Creek (S. van Leeuwen 4301) (P3)
- Ise *Iotasperma sessilifolium* (P3)
- Ipa *Isotropis parviflora* (P2)
- Lca *Lepidium catapycnon* (P4)
- Num *Nicotiana umbratica* (P3)
- OspHS *Oldenlandia* sp. Hamersley Station (A.A. Mitchell PRP 1479) (P3)
- Omu *Olearia mucronata* (P3)
- OspP *Oxalis* sp. Pilbara (M.E. Trudgen 12725) (P2)
- Ptrh *Pentalepis trichodesmoides* subsp. *hispida* (P2)
- Ptri *Pentalepis trichodesmoides* subsp. *incana* (P1)
- Pdi *Polymeria distigma* (P3)
- Pmo *Ptilotus mollis* (P4)
- Psu *Ptilotus subspinescens* (P3)
- Ptr *Ptilotus trichocephalus* (P4)
- Rbu *Rhynchosia bungarensis* (P4)
- Radl *Rostellularia adscendens* var. *latifolia* (P3)
- RspH *Rhagodia* sp. Hamersley (M. Trudgen 17794) (P3)
- SspHR *Scaevola* sp. Hamersley Range basalts (S. van Leeuwen 3675) (P2)
- SspBR *Sida* sp. Barlee Range (S. van Leeuwen 1642) (P3)
- SspH *Sida* sp. Hamersley Range (K. Newbey 10692) (P1)
- Sal *Solanum albostellatum* (P3)
- Ske *Solanum kentrocaule* (P3)
- Scl *Stackhousia clementii* (P3)
- Swe *Stylidium weeliwolli* (P2)
- Swt *Swainsona thompsoniana* (P3)
- Tbu *Tetratea butcheriana* (P1)
- Tpil *Teucrium pilbaranum* (P2)
- Ths *Themeda* sp. Hamersley Station (M.E. Trudgen 11431) (P3)
- Tba *Triodia basitricha* (P3)
- TspRR *Triodia* sp. Robe River (M.E. Trudgen et al. MET 12367) (P3)

## Existing Significant Flora Records

Author: David Coultas

WEC Ref: MR18-34-01

Filename: MR18-34-01-f05-2.mxd

Scale:

Projection:

Revision: 0 - 21 November 2018



Figure

5.2



**WOODMAN**  
ENVIRONMENTAL

This map should only be used in conjunction with WEC report MR18-34-01.



### 5.1.1.6 Summary of Introduced Flora

A list of introduced flora taxa known from within the Desktop Study Area is presented in Table 13. This has been compiled from WA Herbarium specimen data, DoEE's SPRAT Database, and from local flora surveys (Section 5.1.1.3). A total of 48 introduced taxa are known to occur in the Desktop Study Area. None are Declared Pests under the BAM Act and none are WoNS.

**Table 13: Introduced Flora Taxa Known from Within the Desktop Study Area**

Taxon	Common Name	Source*
<i>Aerva javanica</i>	Kapok Bush	DBCA; Biota
<i>Alternanthera pungens</i>	Khaki Weed	DBCA
<i>Amaranthus viridis</i>	Green Amaranth	DBCA
<i>Argemone ochroleuca</i> subsp. <i>ochroleuca</i>	Mexican Poppy	DBCA; Biota
<i>Bidens bipinnata</i>	Bipinnate Beggartick	DBCA; Biota; Ecoscape
<i>Bidens subalternans</i> var. <i>araneosa</i>	-	DBCA
<i>Brassica tournefortii</i>	Mediterranean Turnip	DBCA
<i>Cenchrus ciliaris</i>	Buffel Grass	DBCA; DoEE; Biota; GHD
<i>Cenchrus setiger</i>	Birdwood Grass	DBCA; Biota
<i>Chenopodium murale</i>	Nettle-leaf Goosefoot	DBCA
<i>Chloris barbata</i>	Purpletop Chloris	DBCA
<i>Chloris gayana</i>	Rhodes Grass	DBCA
<i>Chloris virgata</i>	Feathertop Rhodes Grass	DBCA; Biota
<i>Citrullus colocynthis</i>	Colocynth	DBCA
<i>Citrullus lanatus</i>	Pie Melon	DBCA; Biota
<i>Conyza bonariensis</i>	Flaxleaf Fleabane	DBCA
<i>Cucumis melo</i>	Ulcardo Melon	Biota; Ecoscape
<i>Cyclosporum leptophyllum</i>	Wild Celery	DBCA
<i>Cynodon dactylon</i>	Couch	DBCA; Biota
<i>Cyperus involucratus</i>	Umbrella Sedge	DBCA
<i>Cyperus polystachyos</i>	Bunchy Sedge	DBCA
<i>Datura leichhardtii</i> subsp. <i>leichhardtii</i>	Thornapple	DBCA; Biota
<i>Digitaria ciliaris</i>	Summer Grass	DBCA
<i>Echinochloa colona</i>	Awnless Barnyard Grass	DBCA; Biota
<i>Euphorbia hirta</i>	Asthma Plant	DBCA; Biota
<i>Flaveria trinervia</i>	Speedy Weed	DBCA; Biota
<i>Gomphrena celosioides</i>	Gomphrena Weed	DBCA
<i>Lactuca serriola</i>	Prickly Lettuce	DBCA
<i>Lysimachia arvensis</i>	Pimpernel	DBCA
<i>Malvastrum americanum</i>	Spiked Malvastrum	DBCA; Biota
<i>Medicago polymorpha</i>	Burr Medic	DBCA
<i>Melinis repens</i>	Yerba Rosada	DBCA
<i>Melochia pyramidata</i>	Pyramidflower	DBCA; Biota
<i>Oxalis corniculata</i>	Yellow Wood Sorrel	DBCA
<i>Paspalum urvillei</i>	Vasey Grass	DBCA

Taxon	Common Name	Source*
<i>Passiflora foetida</i> var. <i>hispida</i>	Stinking Passion Flower	Biota
<i>Portulaca pilosa</i>	Djanggara	DBCA
<i>Rumex vesicarius</i>	Ruby Dock	DBCA; Biota; Ecoscape
<i>Setaria verticillata</i>	Whorled Pigeon Grass	DBCA; Biota
<i>Sigesbeckia orientalis</i>	Indian Weed	DBCA; Biota
<i>Sisymbrium orientale</i>	Indian Hedge Mustard	DBCA; Biota
<i>Solanum nigrum</i>	Black Berry Nightshade	DBCA; Biota
<i>Sonchus oleraceus</i>	Common Sowthistle	DBCA; Biota
<i>Trianthema portulacastrum</i>	Giant Pigweed	DBCA
<i>Tribulus terrestris</i>	Caltrop	DBCA
<i>Tridax procumbens</i>	Tridax	DBCA
<i>Vachellia farnesiana</i>	Mimosa Bush	DBCA; Biota; Ecoscape
<i>Washingtonia filifera</i>	Desert Fan Palm	DBCA

\*Sources are:

DBCA – WA Herbarium Specimen Database, data provided by Naturemap (see Section 3.1.1);

DoEE – SPRAT Database (see Section 3.1.1)

Biota – Biota (2007; 2013a; b)

Ecoscape – Ecoscape (2013)

GHD – GHD (2016)

### 5.1.1.7 Summary of Significant Vegetation

A list of significant vegetation known from within the Desktop Study Area is presented in Table 14. This list has been compiled from the results of searches of DBCA's TEC and PEC Database, DoEE's SPRAT Database, and the results of local surveys as outlined in Section 5.1.1.3.

A total of three significant vegetation types are known from within the Desktop Study Area, including one TEC and two PECs. The locations of significant vegetation are presented on Figure 6. All are listed as PECs in Western Australia.

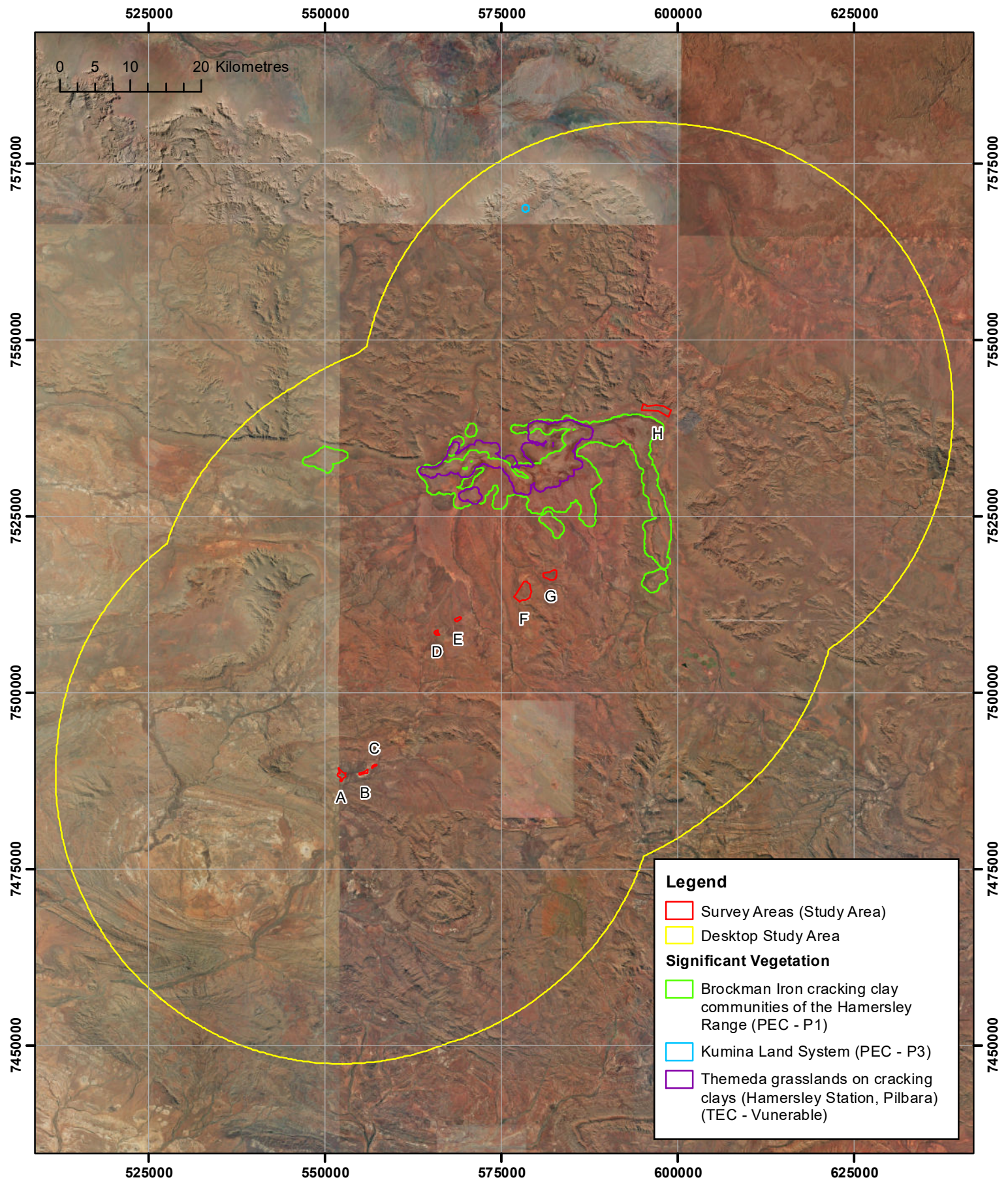
**Table 14: Significant Vegetation Known from Within the Desktop Study Area**



Community	Conservation Status (W.A.)	EPBC Act Ranking	Source
Brockman Iron cracking clay communities of the Hamersley Range	PEC (P1)	-	DBCA; Ecoscape
Kumina Land System	PEC (P3)	-	DBCA
Themeda grasslands on cracking clays (Hamersley Station, Pilbara)	TEC (Vulnerable)	-	DBCA

\*Sources are:

DBCA – DBCA's TEC and PEC Database, data provided by Main Roads and Naturemap (see Section 3.1.1);

Ecoscape – Ecoscape (2013)



<b>Existing Significant Vegetation Records</b>	Author: David Coultas	 <b>Figure</b> <b>6</b>
	WEC Ref: MR18-34-01	
 <b>WOODMAN</b> ENVIRONMENTAL	Filename: MR18-34-01-f06.mxd	
	Scale: 1:700,000 (A4)	
	Projection: GDA 1994 MGA Zone 50	
	Revision: 0 - 21 November 2018	
This map should only be used in conjunction with WEC report MR18-34-01.		

## 5.1.2 Field Survey Results

### 5.1.2.1 Vascular Flora Census

A total of 366 discrete vascular flora taxa and two known hybrids (as per WA Herbarium (1998-)) were recorded in the Study Area by this survey. The taxa and hybrids represent 51 families and 161 genera. The most well-represented families were Poaceae (72 taxa), Fabaceae (56 taxa and two known hybrids), Malvaceae (37 taxa) and Amaranthaceae (23 taxa).

Taxon totals for each of the Survey Areas of the Study Area are:

- Survey Area A: 135 taxa, one known hybrid;
- Survey Area B: 71 taxa, one known hybrid;
- Survey Area C: 68 taxa, one known hybrid;
- Survey Area D: 90 taxa;
- Survey Area E: 149 taxa, one known hybrid;
- Survey Area F: 194 taxa, one known hybrid;
- Survey Area G: 176 taxa, two known hybrids; and
- Survey Area H: 101 taxa.

Average taxon (excluding hybrids) richness per quadrat was 35.3 ( $\pm$  14.9), with the greatest number of taxa recorded in a single quadrat being 71, and the lowest number being seven. A full list of taxa is presented in Appendix F, with raw quadrat data and parameters presented in Appendix G.

### 5.1.2.2 Significant Flora Taxa

Table 15 presents a summary of data relating to significant flora taxa recorded in the Study Area. Seven significant flora taxa were recorded during this survey of the Study Area. A detailed summary of information for each taxon is provided below. No Threatened flora taxa were recorded within the Study Area.

Locations of significant flora taxa are presented on maps in Appendix H, and in Appendix I. Threatened and Priority Flora Report Forms for each population of each significant taxon recorded are presented in Appendix J.

**Table 15: Summary of Significant Flora Taxa Recorded within the Study Area**

Taxon	Status	Survey Area (SA)	Locations Recorded		Individuals Recorded		Populations <sup>^</sup> Recorded*		Vegetation Units
			In SA	Outside SA	In SA	Outside SA	In SA	Outside SA	
<i>Euphorbia inappendiculata</i> var. <i>queenslandica</i>	P1	G	1	0	1	0	1	0	7
<i>Goodenia pedicellata</i>	P1	A	22	0	1,365	0	1	0	2, 3 (rarely), 4 (rarely)
		B	21	12	1,246	1,616	1	1*	
		C	21	0	1,784	0	1	0	
		<b>Total</b>	64	12	4,395	1,616	3	1*	

Taxon	Status	Survey Area (SA)	Locations Recorded		Individuals Recorded		Populations <sup>^</sup> Recorded*		Vegetation Units
			In SA	Outside SA	In SA	Outside SA	In SA	Outside SA	
<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>	P3	G	1	0	1	0	1	0	7
<i>Astrebula lappacea</i>	P3	C	4	2	59	35	1	1*	7
		E	2	0	36	0	1	0	
		G	8	4	187	31	1	1*	
		<b>Total</b>	14	6	282	66	3	2*	
<i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	C	6	8	140	32	1	1*	7
<i>Swainsona thompsoniana</i>	P3	E	5	5	208	22	1	1*	7
		F	2	1	45	25	1	1*	
		<b>Total</b>	7	6	253	47	2	2*	
<i>Goodenia nuda</i>	P4	D	1	0	1	0	1	0	8, 10
		E	1	1	1	20	1	1*	
		G	1	0	12	0	1	0	
		<b>Total</b>	3	1	14	20	3	1*	

<sup>^</sup>Note: numbers of populations are based on the definition of a population provided in Section 3.1.8.1.

\*Note: population identified in the Survey Area extends outside the Survey Area

### ***Euphorbia inappendiculata* var. *queenslandica* (P1)**

*Euphorbia inappendiculata* var. *queenslandica* (P1) is a small, prostrate annual herb growing to a maximum of 0.15 m high (Plate 1) (Halford and Harris 2012; WA Herbarium 1998-). This taxon has a known range in Western Australia of approximately 1,275 km. However, records are from two disjunct areas; the Hamersley Range area of the Pilbara region, and east of Halls Creek in the northern Great Sandy Desert (DBCA 2007-). This taxon is known from seven records that represent approximately six populations, none of which occur within DBCA-managed tenure (DBCA 2017-). It is also known to occur in the Northern Territory (29 records), Queensland (67 records), New South Wales (22 records), and South Australia (44 records) (AVH 2018). In the Pilbara region this species primarily occurs on cracking clays (WA Herbarium 1998-).

*Euphorbia inappendiculata* var. *queenslandica* (P1) was recorded at a single point location in Survey Area G, with a single individual noted. This location was on cracking clay soil in a small claypan mapped as VU 7. Because of the cryptic nature of this taxon (microscopic examination is required for definitive identification), it was only identified post-survey, and was therefore not specifically searched for during the survey. It is therefore possible that this taxon occurs in other areas of VU 7, including in Survey Area G, as well as Survey Areas C, D, E and F; however, it was not recorded at any other quadrats or relevés, and so is not expected to occur widely. It is unlikely to occur in VUs other than 7 given that it appears to be restricted to cracking clay soils in the Pilbara, and therefore is not likely to occur in Survey Areas A, B and H.



**Plate 1:** Specimen of *Euphorbia inappendiculata* var. *queenslandica* (P1), collected by Woodman Environmental (2018)

***Goodenia pedicellata* (P1)**

*Goodenia pedicellata* (P1) is a small, single-stemmed perennial herb growing to a maximum of 0.25 m high (Plate 2) (Sage and Dixon 2005; WA Herbarium 1998-). This taxon has a known range in Western Australia of approximately 410 km (where it is endemic), however is known from two widely disjunct areas, being the Tom Price area in the west, and near the Woodie Woodie mine in the east (DBCA 2007-). This taxon is known from 10 records that represent approximately six populations, none of which occur within DBCA-managed tenure (DBCA 2017-). This species primarily occurs on calcrete soils of undulating plains (WA Herbarium 1998-).

It should be noted that the taxonomy of *Goodenia pedicellata* and another similar and also significant taxon, *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) (P3), requires further attention to resolve taxonomic boundaries, and associated conservation significance (S. Dillon *pers. comm.* 2018). When *Goodenia pedicellata* was described in 2005, it was only known from a single location from a series of calcrete hills on the eastern edge of the Pilbara near Woodie Woodie mine, where the type collection was made (Sage and Dixon 2005). However, recent collections from areas of calcrete in the Tom Price area have been determined as this species, from the same calcrete areas where identical collections have been lodged as *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) (P3); existing records of both are shown on Sheet 2 in Appendix H.

A review of collections at the WAHerb, as well as field investigation, has confirmed that there is only a single taxon in and within the vicinity of the Study Area rather than both *Goodenia pedicellata* and *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) (P3); however which taxon is present is a matter of debate. The taxon differs from *Goodenia pedicellata* at the type location by sometimes having a floral scape with multiple pedicellate flowers; typical *Goodenia pedicellata* apparently only have single flowers on long pedicels. However, many plants of the taxon in the Tom Price area have only single flowers, and it has not been determined whether plants at the type location never have floral scapes. The taxon in and within the vicinity of the Study Area differs consistently from typical *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) (P3) in having an indumentum of dense strigose hairs on the leaves, however indumentum is not always a reliable taxonomic character in *Goodenia* (S. Dillon *pers. comm.*). Until further study of *Goodenia pedicellata* and *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) (P3) is undertaken to determine taxonomic boundaries, the precautionary approach has been adopted in referring material from in and within the vicinity of the Study Area to *Goodenia pedicellata* (P1) (as per recent lodgements at the WAHerb), the taxon with the higher conservation rating.

*Goodenia pedicellata* (P1) was recorded at 64 point locations across Survey Areas A, B and C, with a total of 4,395 individuals recorded across these locations; these represent three populations. One additional existing DBCA record of this taxon occurs in Survey Area C, however no individuals were observed at this location by this survey; this record may have slightly erroneous coordinates as it occurs very close to the edge of a drainage line, where this taxon does not appear to be typically located; it is therefore not included in point location totals in Table 15. This taxon was found to be relatively widespread within these Survey Areas (Appendix H), and was relatively common across Survey Areas B and C, however had a relatively patchy distribution in Survey Area A. It is apparently more or less endemic to the low calcrete rises mapped as VU 2 in these Survey Areas; as such, it is considered unlikely that this taxon occurs in any of the remaining Survey Areas, as VU 2 was not mapped outside these Survey Areas. Although found in vegetation of various fire ages, this taxon was far more common in areas that were more recently burnt. In particular, it was abundant in vegetation burnt less than 12 months ago in Survey Area C (see Plate 3), and was also common although less abundant in areas burnt approximately 2 years ago in Survey Area A. It was relatively uncommon in the longer-unburnt vegetation of Survey Area B. Physical disturbance also appears to promote plant establishment, as it was found to be common along drill lines in Survey Area B.

Because of the widespread occurrence of this taxon and its habitat in Survey Areas A, B and C, together with its small size, somewhat cryptic appearance, and survey time constraints, a complete census of this taxon in these Survey Areas could not be undertaken. The number of individuals recorded is therefore likely an underestimate of the total number of individuals that occur in the Study Area. Numbers of individuals are also likely to be highly variable at any given time depending on fire history of the vegetation. Confirmation of population numbers could also not be completed because of the above reasons; based on the population definition outlined in Section 3.1.8.1, 3 populations are present across these Survey Areas, but it is likely that these represent a single population, given that a full census across and between the Survey Areas (see below) has not been conducted.

A limited amount of survey outside the Survey Areas was undertaken, with 12 point locations recorded in the vicinity of Survey Area B (Appendix H); these are an extension of the population recorded in this Survey Area. A total of 1,616 individuals were recorded across these locations. Numbers of individuals present were generally observed to be similar to within the Survey Areas.



Plate 2: *Goodenia pedicellata* (P1), with inset showing close-up of flower (Photos: Woodman Environmental 2018)





**Plate 3:** High density of *Goodenia pedicellata* (P1) individuals in recently (<12 months) burnt vegetation in Survey Area C (Photos: Woodman Environmental 2018)

#### ***Aristida jerichoensis* var. *subspinulifera* (P3)**

*Aristida jerichoensis* var. *subspinulifera* (P3) is a tufted, perennial grass growing to a maximum of 0.6 m high (Plate 4) (Simon and Alfonso 2011; WA Herbarium 1998-). This taxon has a known range in Western Australia of approximately 540 km; most records are from the Hamersley Range area of the Pilbara region, with a small number of isolated records further south towards the Little Sandy Desert area (DBCA 2007-). This taxon is known from 38 records that represent approximately 30 populations, seven of which occur within DBCA-managed tenure (DBCA 2017-). It is also known to occur in the Northern Territory (32 records), Queensland (291 records), New South Wales (208 records), Australian Capital Territory (three records), Victoria (10 records), and South Australia (five records) (AVH 2018). In the Pilbara region this species primarily occurs on plains and flats that are often dominated by Mulga taxa (WA Herbarium 1998-).

*Aristida jerichoensis* var. *subspinulifera* (P1) was recorded at a single point location in Survey Area G, with a single individual noted (Appendix H). This location was on cracking clay soil in a small depression on a broad drainage flat mapped as VU 7. Because of the cryptic nature of this taxon (microscopic examination is required for definitive identification), it was only identified post-survey, and was therefore not specifically searched for during the survey. It is therefore possible that this taxon occurs in other areas of VU 7, including in Survey Area G, as well as Survey Areas C, D, E and F; however, it was not recorded at any other quadrats

or relevés, and so is not expected to occur widely. It is not expected to occur in VUs other than 7 given that it appears to be most common on plains in clay soils in the Pilbara, and therefore is not likely to occur in Survey Areas A, B and H.



**Plate 4:** Specimen of *Aristida jerichoensis* var. *subspinulifera* (P3), collected by Woodman Environmental (2018)

***Astrebla lappacea* (P3)**

*Astrebla lappacea* (P3) is a tufted, perennial grass growing to a maximum of 0.90 m high (Plate 5) (Simon and Alfonso 2011; WA Herbarium 1998-). This taxon has a known range in Western Australia of approximately 60 km within the Hamersley Range area of the Pilbara region (DBCA 2007-). This taxon is known from 17 records that represent approximately seven populations, none of which occur within DBCA-managed tenure (DBCA 2017-). It is also known to occur in the Northern Territory (34 records), Queensland (283 records), New South Wales (123 records), and South Australia (80 records) (AVH 2018). In the Pilbara

region this species primarily occurs on cracking clays that are often associated with basalt stones (WA Herbarium 1998-).

*Astrebla lappacea* (P3) was recorded at 14 point locations across Survey Areas C, E and G, with a total of 282 individuals recorded across these locations; these represent three populations (Appendix H). This taxon was recorded only on cracking clay soil in claypans mapped as VU 7; this aligns with its known preferred habitat (WA Herbarium 1998-; Simon and Alfonso 2011). As targeted searching for this taxon was undertaken, it is considered that the data recorded for this taxon represents a relatively accurate census in Survey Areas C, E and G, and it is unlikely to occur at a significant number of further locations. VU 7 also occurs in Survey Areas D and F, however searching of these areas failed to locate any individuals, and it is considered unlikely to occur in these Survey Areas. It is unlikely to occur in Survey Areas A, B and H, as no habitat is present.

A limited amount of survey outside the Survey Areas was undertaken, with six point locations recorded: two in the vicinity of Survey Area C, and four in the vicinity of Survey Area G (Appendix H). These represent extensions of the populations recorded in these Survey Areas. It could not be located in the vicinity of Survey Area E, however substantial areas of habitat exist in the vicinity that could not be surveyed because of time constraints. A total of 66 individuals were recorded across these locations. Numbers of individuals present were generally observed to be similar to within the Survey Areas.



Plate 5: *Astrebla lappacea* (P3), with inset showing close-up of inflorescence  
(Photos: Woodman Environmental 2018)

***Oldenlandia* sp. Hamersley Station (A.A. Mitchell PRP 1479) (P3)**

*Oldenlandia* sp. Hamersley Station (A.A. Mitchell PRP 1479) (P3) is a small, low herb growing to a maximum of 0.05 m high (Plate 6) (WA Herbarium 1998-). This taxon has a known range in Western Australia of approximately 345 km (where it is endemic), from the Chichester Range area of the Pilbara region in the north of its range to the Hamersley Range area in the south (DBCA 2007-). This taxon is known from 32 records that represent approximately 29 populations, none of which occur within DBCA-managed tenure (DBCA 2017-). In the Pilbara region this species primarily occurs on cracking clays with basalt stones (WA Herbarium 1998-).

*Oldenlandia* sp. Hamersley Station (A.A. Mitchell PRP 1479) (P3) was recorded at six point locations in Survey Area C, with a total of 140 individuals recorded across these locations; these represent one population (Appendix H). This taxon was recorded only on cracking clay soil in claypans mapped as VU 7; this aligns with its known preferred habitat (WA Herbarium 1998-). As targeted searching for this taxon was undertaken, it is considered that the data recorded for this taxon represents a relatively accurate census, and it is unlikely to occur at a significant number of further locations. VU 7 also occurs in Survey Areas D, E, F, and G, however searching of these areas failed to locate any individuals, and it is considered unlikely to occur in these Survey Areas. It is unlikely to occur in Survey Areas A, B and H, as no habitat is present.

A limited amount of survey outside the Survey Areas was undertaken, with eight point locations recorded; these represent an extension of the population recorded in Survey Area C. A total of 32 individuals were recorded across these locations. Numbers of individuals present were generally observed to be similar to within the Survey Area.



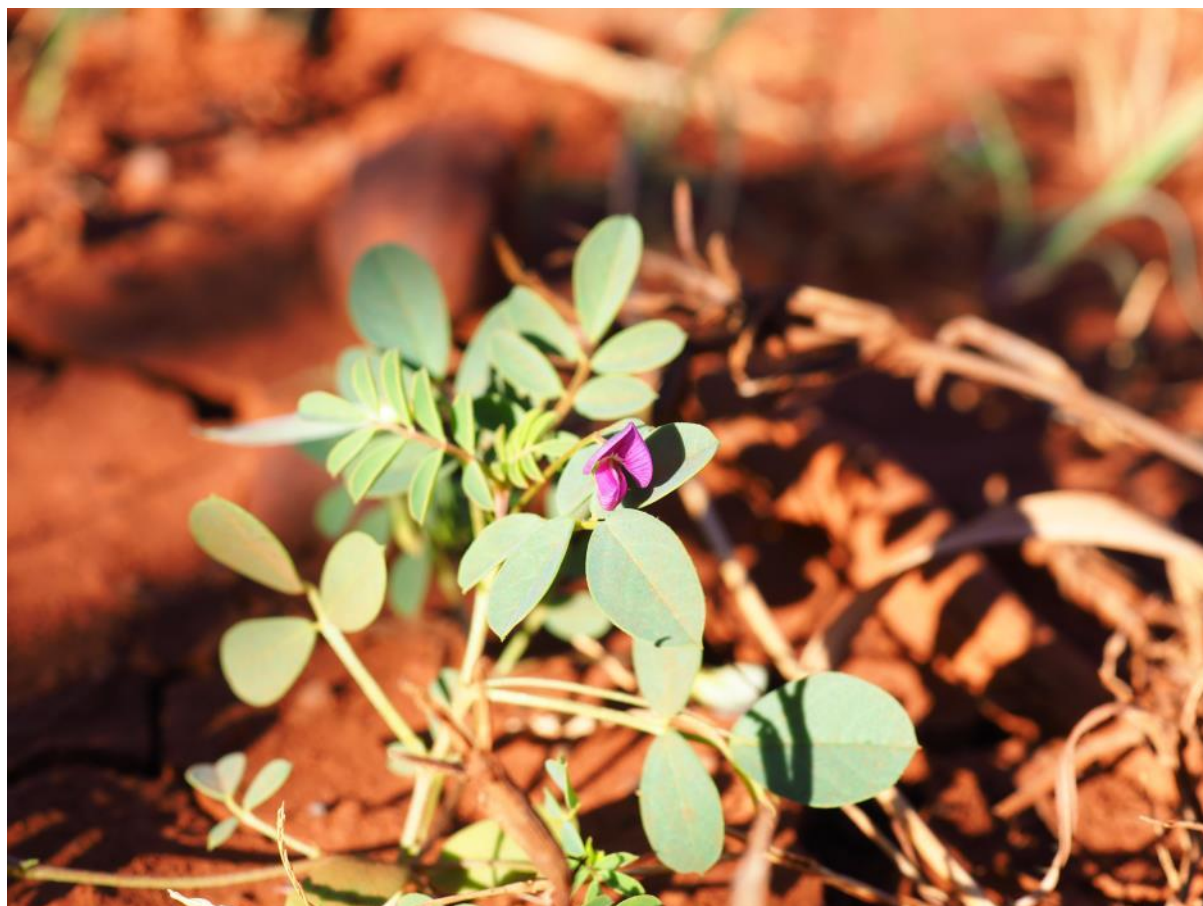
**Plate 6:** *Oldenlandia* sp. Hamersley Station (A.A. Mitchell PRP 1479) (P3), with inset showing flowers and fruits (Photos: Woodman Environmental 2018)

### ***Swainsona thompsoniana* (P3)**

*Swainsona thompsoniana* (P3) is a small, prostrate annual herb growing to a maximum of 0.1 m high (Plate 7) (Davis and Hurter 2013; WA Herbarium 1998-). This taxon has a known range in Western Australia of approximately 345 km (where it is endemic), from the Chichester Range area of the Pilbara region in the north of its range to the Hamersley Range area in the south. (DBCA 2007-). This taxon is known from 32 records that represent approximately 29 populations, none of which occur within DBCA-managed tenure (DBCA 2017-). It is not known to occur outside of Western Australia (AVH 2018). In the Pilbara region this species primarily occurs in clay pans on cracking clays with basalt stones (WA Herbarium 1998-).

*Swainsona thompsoniana* (P3) was recorded at seven point locations across Survey Areas E and F, with a total of 253 individuals recorded across these locations; these represent two populations (Appendix H). This taxon was recorded only on cracking clay soil in claypans mapped as VU 7; this aligns with its known preferred habitat (WA Herbarium 1998-). As targeted searching for this taxon was undertaken, it is considered that the data recorded for this taxon represents a relatively accurate census in Survey Areas E and F, and it is unlikely to occur at a significant number of further locations. VU 7 also occurs in Survey Areas C, D and G, however searching of these areas failed to locate any individuals, and it is considered unlikely to occur in these Survey Areas. It is unlikely to occur in Survey Areas A, B and H, as no habitat is present.

A limited amount of survey outside the Survey Areas was undertaken, with six point locations recorded: five in the vicinity of Survey Area E, and one in the vicinity of Survey Area F (Appendix H). These represent extensions of the populations recorded in these Survey Areas. A total of 47 individuals were recorded across these locations. Numbers of individuals present were generally observed to be similar to within the Survey Areas.



**Plate 7: *Swainsona thompsoniana* (P3) (Photo: Woodman Environmental 2018)**

#### ***Goodenia nuda* (P4)**

*Goodenia nuda* (P4) is an erect, spreading perennial herb growing to a maximum of 0.5 m high (Plate 8) (WA Herbarium 1998-). This taxon has a known range in Western Australia of approximately 910 km (where it is endemic), from the western boundary of the Fortescue area of the Pilbara region to just east of Karlamilyi National Park (DBCA 2007-). This taxon is known from 116 records that represent approximately 92 populations, 17 of which occur within DBCA-managed tenure (DBCA 2017-). This species primarily occurs in water-gaining areas, including on plains or flats, or in drainage lines and depressions (WA Herbarium 1998-).

*Goodenia nuda* (P4) was recorded at three point locations, with one location each recorded in Survey Areas D, E and G, with a total of 14 individuals recorded across these locations; these represent three populations (Appendix H). This taxon was recorded in the Mulga-dominated VUs 8 and 10, with all location in small damper areas with less stones than surrounding areas; this aligns with its known preferred habitat (WA Herbarium 1998-).

Although targeted searching for this taxon was undertaken, it is unclear whether the data recorded for this taxon is an accurate representation of the extent of this taxon in these Survey Areas. It appeared to be present in very low densities in all three Survey Areas where it was recorded, as a reasonable amount of habitat was transected, and only three locations were recorded. However, a large amount of suitable habitat has not been transected, and therefore it is likely that further individuals occur; however, it is not expected that the number of individuals present would be significant. VU 8 also occurs in Survey Area F; a limited amount of transecting failed to locate any individuals, however it is possible that it occurs in this Survey Area. It is unlikely to occur in Survey Areas A, B, C and H, as it is considered that no habitat is present.

A limited amount of survey outside the Survey Areas was undertaken, with one point location recorded in the vicinity of Survey Area E; this location was on the Nanutarra – Munjina Road verge that had been recently graded, with the 20 individuals recorded representing the largest number of individuals recorded by this survey (Appendix H). These represent an extension of the population recorded in Survey Area E.



Plate 8 Specimen of *Goodenia nuda* (P4), collected by Woodman Environmental (2018)

### 5.1.2.3 Other Flora Taxa of Interest

The collection of *Maireana pyramidata* in Survey Area G represents an extension to the known range of this taxon in the order of 50 km to the north-west (DBCA 2007-). However,

this is a common, widespread and recognisable species that consequently is probably not frequently collected, hence the absence of collections from the area. This taxon is not considered significant in the context of EPA (2016a, b).

One taxon, *Sida ?arenicola*, could not be positively identified because of a lack of fruiting material; this taxon is not likely to represent a significant taxon.

#### 5.1.2.4 Likelihood of Occurrence of Further Significant Flora Taxa

As detailed in Section 5.1.1.5, a total of 62 significant flora taxa were identified as occurring within the Desktop Study Area prior to survey. Of these, seven were recorded within the Study Area by this survey (Table 15, 16); as per Table 16, some of these may occur in Survey Areas other than those that they were recorded in. Of the remaining 55 taxa, all were likely identifiable during the survey period, either because the survey period coincided with the taxon's flowering period, or the taxon can be identified reliably when in fruit or when sterile. As such, the likelihood of these taxa occurring in the Study Area is considered to be relatively low. However, it is considered that 11 taxa could potentially still occur in the one or more of the Survey Areas, as suitable habitat may occur in the Study Area (Table 16). The remaining taxa are considered unlikely to occur in any of the Survey Areas, primarily because suitable habitat is not considered to be present in the Study Area. The following definitions for likelihood of occurrence are:

- Unlikely: Taxon was not recorded within the Study Area during the survey, and suitable habitat for the taxon was not observed or otherwise mapped in the Study Area.
- Possible: Taxon was not recorded or otherwise known from the Study Area; suitable habitat to support the taxon was observed or otherwise mapped in the Study Area.
- Known: Taxon was either recorded within the Study Area during this survey, or was otherwise previously known to occur within the Study Area through previous records.

**Table 16: Likelihood of Occurrence of Significant Flora Taxa in the Study Area**

Taxon	Status	Flowering Period (WA Herbarium 2018)	Habitat (WA Herbarium 1998-)	Identifiable During Survey?	Likelihood of Occurrence in Study Area
<i>Acacia bromilowiana</i>	P4	July to August	Ironstone hill crests	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Acacia dawweana</i>	P3	July to September	Scree slopes of ironstone hills	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Acacia effusa</i>	P3	May to August	Scree slopes of ironstone hills	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area



Taxon	Status	Flowering Period (WA Herbarium 2018)	Habitat (WA Herbarium 1998-)	Identifiable During Survey?	Likelihood of Occurrence in Study Area
<i>Adiantum capillus-veneris</i>	P2	Not applicable – fern (non-flowering)	Gorges and on cliff walls	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>	P3	Not applicable – after rainfall	Plains	Yes	<b>Known to occur – Survey Area G;</b> <b>Possible – Survey Areas C, D, E and F</b> – not recorded by survey, VU 7 may be potential habitat; Unlikely – Survey Areas A, B and H – not recorded by survey, habitat not considered to be present
<i>Astrebla lappacea</i>	P3	Not applicable – after rainfall	Crabhole plains and plains with cracking clay and clay loam	Yes	<b>Known to occur – Survey Areas C, E and G;</b> Unlikely – Survey Areas A, B, D, F and H – not recorded by survey, most of potential habitat searched (D and F), or habitat not considered to be present (A, B and H)
<i>Bothriochloa decipiens</i> var. <i>cloncurrans</i>	P1	Not applicable – after rainfall	Plains and depressions with clay loam	Yes	<b>Possible – Survey Areas D, E, F and G</b> - not recorded by survey, VUs 8 and 10 may be potential habitat; Unlikely – Survey Areas A, B, C and H – habitat not considered to be present
<i>Calotis latiuscula</i>	P3	April to October	Plains and drainage lines	Yes	<b>Possible – Survey Areas D, E, F and G</b> - not recorded by survey, VUs 7, 8 and 10 may be potential habitat; Unlikely – Survey Areas A, B, C and H – all of potential habitat searched (C), or habitat not considered to be present (A, B and H)

Taxon	Status	Flowering Period (WA Herbarium 2018)	Habitat (WA Herbarium 1998-)	Identifiable During Survey?	Likelihood of Occurrence in Study Area
<i>Calotis squamigera</i>	P1	July	Plains	Yes	<b>Possible</b> – Survey Areas D, E, F and G - not recorded by survey, VUs 7, 8 and 10 may be potential habitat; Unlikely – Survey Areas A, B, C and H – all of potential habitat searched (C), or habitat not considered to be present (A, B and H)
<i>Dampiera anonyma</i>	P3	June to September	Hill summits and upper slopes with banded ironstone, basalt, shale and jaspilite	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Dicladantha glabra</i>	P2	April; August to October	Edges of watercourses and rock pools in gorges	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Eragrostis surreyana</i>	P3	Not applicable – after rainfall	Seepage areas	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Eremophila magnifica</i> subsp. <i>magnifica</i>	P4	May to October	Crests of ironstone hills	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Eremophila magnifica</i> subsp. <i>velutina</i>	P3	August to September	Crests of ironstone hills	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Eucalyptus lucens</i>	P1	February; March and December**	Crests of ironstone hills	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Euphorbia australis</i> var. <i>glabra</i>	P2	April to September	Broad clay flats and drainage lines	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Euphorbia inappendiculata</i> var. <i>inappendiculata</i>	P2	August	Cracking clay plains and flats	Yes	<b>Possible</b> – Survey Areas C, D, E, F and G - not recorded by survey, VU 7 may be potential habitat; Unlikely – Survey Areas A, B, and H – not recorded by survey, habitat not considered to be present

Taxon	Status	Flowering Period (WA Herbarium 2018)	Habitat (WA Herbarium 1998-)	Identifiable During Survey?	Likelihood of Occurrence in Study Area
<i>Euphorbia inappendiculata</i> var. <i>queenslandica</i>	P1	April to September	Plains and depressions with cracking clay	Yes	<b>Known to occur – Survey Area G;</b> <b>Possible – Survey Areas C, D, E, and F</b> - not recorded by survey, VU 7 may be potential habitat; Unlikely – Survey Areas A, B, and H – not recorded by survey, habitat not considered to be present
<i>Fimbristylis sieberiana</i>	P3	Not applicable – after rainfall	Edges of pools	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Geijera salicifolia</i>	P3	September	Rocky hills, gullies and gorges	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Glycine falcata</i>	P3	May or July	Depressions and floodplains with cracking clay and crabhole plains	Yes	Unlikely - not recorded by survey, most of potential habitat searched (C, D, E, F and G), or habitat not considered to be present (A, B and H)
<i>Gompholobium karjini</i>	P2	August to September	Ironstone hills	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Goodenia nuda</i>	P4	March to July	Plains, flats and drainage lines	Yes	<b>Known to Occur – Survey Areas D, E and G;</b> <b>Possible – Survey Area F</b> - not recorded by survey, VUs 8 and 10 may be potential habitat; Unlikely – Survey Areas A, B, C and H –habitat not considered to be present
<i>Goodenia pedicellata</i>	P1	April to May	Low rises and undulating plains with calcrete soils	Yes	<b>Known to Occur – Survey Areas A, B and C;</b> Unlikely – Survey Areas D, E, F, G and H – habitat not considered to be present
<i>Goodenia</i> sp. East Pilbara (A.A. Mitchell PRP 727)	P3	February to October	Calcrete soils	Yes	Not present – considered conspecific with <i>Goodenia pedicellata</i> (P1) in the context of this survey

Taxon	Status	Flowering Period (WA Herbarium 2018)	Habitat (WA Herbarium 1998-)	Identifiable During Survey?	Likelihood of Occurrence in Study Area
<i>Grevillea saxicola</i>	P3	February to June	Rocky hills, slopes and gullies	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Gymnanthera cunninghamii</i>	P3	April to December	Major drainage lines	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Helichrysum oligochaetum</i>	P1	August to November	Major creeklines	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Hibiscus</i> sp. Gurinbiddy Range (M.E. Trudgen MET 15708)	P2	March to August	Rocky slopes and gullies	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Hibiscus</i> sp. Mt Brockman (E. Thoma ET 1354)	P1	March to August; November	Rocky slopes and gullies	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Indigofera ixocarpa</i>	P2	June to August	Ironstone hills and slopes	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Indigofera</i> sp. Bungaroo Creek (S. van Leeuwen 4301)	P3	May to July	Slopes, gullies and drainage lines in ironstone hills	Yes	<b>Possible – Survey Area A</b> – not recorded by survey, VU 4 may be potential habitat; Unlikely – Survey Areas B, C, D, E, F, G and H - not recorded by survey, all potential habitat searched (B, C) or habitat not considered to be present (D, E, F, G and H)
<i>Iotasperma sessilifolium</i>	P3	August to September	Floodplains and flats with cracking clay	Yes	Unlikely - not recorded by survey, most of potential habitat searched (C, D, E, F and G), or habitat not considered to be present (A, B and H)
<i>Isotropis parviflora</i>	P2	February to August	Recently burnt areas on ironstone hillslopes and outwash areas	Yes	<b>Possible – Survey Area H</b> – not recorded by survey, VUs 11 and 12 may be potential habitat, no recently burnt areas present; Unlikely – Survey Areas A, B, C, D, E, F and G - not recorded by survey, habitat not considered to be present

Taxon	Status	Flowering Period (WA Herbarium 2018)	Habitat (WA Herbarium 1998-)	Identifiable During Survey?	Likelihood of Occurrence in Study Area
<i>Lepidium catapycnon</i>	P4	August to October	Large ironstone hills	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Nicotiana umbratica</i>	P3	April to June	In shade of boulders on rocky hills or outcrops	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	March to June	Undulating plains with cracking clay and crabhole plains	Yes	<b>Known to occur – Survey Area C;</b> Unlikely – Survey Areas A, B, D, E, F, G and H – not recorded by survey, most of potential habitat searched (D, E, F and G), or habitat not considered to be present (A, B and H)
<i>Olearia mucronata</i>	P3	August to December/ January	Large ironstone hills	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Oxalis</i> sp. Pilbara (M.E. Trudgen 12725)	P2	May to July	In sheltered positions on large ironstone hills	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Pentalepis trichodesmoides</i> subsp. <i>hispida</i>	P2	April; August to September	Large basalt or ironstone hills	Yes	<b>Possible – Survey Area F</b> – not recorded by survey, VU 18 may be potential habitat; Unlikely – Survey Areas A, B, C, D, E, G and H – not recorded by survey, habitat not considered to be present in Study Area
<i>Pentalepis trichodesmoides</i> subsp. <i>incana</i>	P1	May to August	Large basalt hills	Yes	<b>Possible – Survey Area F</b> – not recorded by survey, VU 18 may be potential habitat; Unlikely – Survey Areas A, B, C, D, E, G and H – not recorded by survey, habitat not considered to be present in Study Area
<i>Polymeria distigma</i>	P3	April to July	Cracking clay	Yes	Unlikely - not recorded by survey, most of potential habitat searched (C, D, E, F and G), or habitat not considered to be present (A, B and H)
<i>Ptilotus mollis</i>	P4	May to September	Rocky hill summits	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area

Taxon	Status	Flowering Period (WA Herbarium 2018)	Habitat (WA Herbarium 1998-)	Identifiable During Survey?	Likelihood of Occurrence in Study Area
<i>Ptilotus subspinescens</i>	P3	September to December	Base of breakaways	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Ptilotus trichocephalus</i>	P4	June; September	Stony gibber plains	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794)	P3	March to November	Gentle slopes, plains and drainage lines, often associated with ironstone	Yes	<b>Possible – Survey Areas D, E, F and G</b> - not recorded by survey, VUs 8 and 10 may be potential habitat; Unlikely – Survey Areas A, B, C and H –habitat not considered to be present
<i>Rhynchosia bungarensis</i>	P4	May to September	Boulder areas and in gullies on ironstone hills	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Rostellularia adscendens</i> var. <i>latifolia</i>	P3	May to August	Hills, gullies, plains and drainage lines	Yes	<b>Possible – Survey Areas A, B and C</b> - not recorded by survey, VU 4 may be potential habitat; Unlikely – Survey Areas D, E, F, G and H - habitat may be present, however only <i>Rostellularia adscendens</i> var. <i>clementii</i> recorded; and unlikely that both variants would not be present in these areas (D, E, F and G), or no habitat considered to be present (H)
<i>Scaevola</i> sp. Hamersley Range basalts (S. van Leeuwen 3675)	P2	July to August	Basalt hills and slopes	Yes	<b>Possible – Survey Area F</b> - not recorded by survey, VU 18 may be potential habitat; Unlikely – Survey Areas A, B, C, D, E, G and H – habitat not considered to be present
<i>Sida</i> sp. Barlee Range (S. van Leeuwen 1642)	P3	February to September	Large ironstone hills, gullies and drainage lines	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Sida</i> sp. Hamersley Range (K. Newbey 10692)	P1	May to October	Ironstone gullies and breakaways	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area

Taxon	Status	Flowering Period (WA Herbarium 2018)	Habitat (WA Herbarium 1998-)	Identifiable During Survey?	Likelihood of Occurrence in Study Area
<i>Solanum albotellatum</i>	P3	March to September	Floodplains and flats with clay or cracking clay	Yes	Unlikely - not recorded by survey, most of potential habitat searched (C, D, E, F and G), or habitat not considered to be present (A, B and H)
<i>Solanum kentrocaule</i>	P3	May to September	Ironstone hills, slopes, gullies and gorges	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Stackhousia clementii</i>	P3	February to April	Floodplains and flats with cracking clay	Yes	Unlikely - not recorded by survey, most of potential habitat searched (C, D, E, F and G), or habitat not considered to be present (A, B and H)
<i>Stylidium weeliwollii</i>	P3	March to October	Drainage lines and edges of pools. Damp soil	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Swainsona thompsoniana</i>	P3	April to August	Floodplains and flats with cracking clay	Yes	<b>Known to occur – Survey Areas E and F;</b> Unlikely – Survey Areas A, B, C, D, G and H – not recorded by survey, most of potential habitat searched (D, E, F and G), or habitat not considered to be present (A, B and H)
<i>Tetradlea butcheriana</i>	P1	July	Ironstone cliff faces and breakaways	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Teucrium pilbaranum</i>	P2	January; May to July; September	Crabhole plains, floodplains or flats with clay or cracking clay	Yes	Unlikely - not recorded by survey, most of potential habitat searched (C, D, E, F and G), or habitat not considered to be present (A, B and H)
<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431)	P3	Not applicable – after rainfall	Plains and drainage lines, often with cracking clay	Yes	Unlikely - not recorded by survey, most of potential habitat searched (C, D, E, F and G), or habitat not considered to be present (A, B and H)
<i>Triodia basitricha</i>	P3	Not applicable – after rainfall	Stony hills and gullies, often with ironstone	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area

Taxon	Status	Flowering Period (WA Herbarium 2018)	Habitat (WA Herbarium 1998-)	Identifiable During Survey?	Likelihood of Occurrence in Study Area
<i>Triodia</i> sp. Robe River (M.E. Trudgen et al. MET 12367)	P3	Not applicable – after rainfall	Rocky mesas, hills and gullies	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area
<i>Triodia</i> sp. Karijini (S. van Leeuwen 4111)	P1	Not applicable – after rainfall	Hills and slopes, often with ironstone	Yes	Unlikely – not recorded by survey, habitat not considered to be present in Study Area

\*\*Source for flowering period is Centre for Australian National Biodiversity Research (2015)

### 5.1.2.5 Introduced Taxa

A total of seven introduced flora taxa were recorded by this survey of the Study Area. These are listed in Table 17, together with location information, and comments regarding the significance of such taxa, including ecological impact and invasiveness ratings for each introduced taxon under the *Invasive Plant Prioritization Process for the DBCA* for the Pilbara region (DBCA 2014). No Declared Pests under the BAM Act or Weeds of National Significance were recorded in the Study Area. Locations of introduced flora taxa are presented on maps in Appendix K, and in Appendix I.

Of the introduced taxa recorded, *Cenchrus ciliaris* is the most serious, and was recorded the most widely in the Study Area, being present in all Survey Areas except Survey Area H. As previously mentioned, this taxon is considered by the States and Territories of Australia to pose a particularly significant threat to biodiversity (DoEE 2018).

**Table 17: Summary of Introduced Flora Taxa Recorded within the Study Area**

Taxon	Common Name	Survey Area	Number of Locations Recorded	VU	Comments
<i>Bidens bipinnata</i>	Bipinnate Beggartick	A	1	1, 10, 17	Ecological impact unknown, invasiveness rated Rapid (DBCA 2014)
		E	2		
		F	1		
		<b>Total</b>	4		
<i>Cenchrus ciliaris</i>	Buffel Grass	A	4	1, 4, 6, 7, 9, 13, 14, 17, R	Considered by the States and Territories of Australia to pose a particularly significant threat to biodiversity (DoEE 2018); Ecological impact rated High, invasiveness rated Rapid (DBCA 2014)
		B	2		
		C	1		
		D	1		
		E	1		
		F	6		
		G	5		
<b>Total</b>	20				
<i>Cenchrus setiger</i>	Birdwood Grass	C	1	7	Ecological impact rated High, invasiveness rated Rapid (DBCA 2014)
<i>Malvastrum americanum</i>	Spiked Malvastrum	C	1	6, 7, 17	Ecological impact rated High, invasiveness rated Rapid (DBCA 2014)
		E	1		
		F	5		



Taxon	Common Name	Survey Area	Number of Locations Recorded	VU	Comments
		G	2		
		<b>Total</b>	9		
<i>Setaria verticillata</i>	Whorled Pigeon Grass	A	1	4	Ecological impact rated High, invasiveness rated Rapid (DBCA 2014)
<i>Sonchus oleraceus</i>	Common Sowthistle	G	2	7	Ecological impact rated Low, invasiveness rated Rapid (DBCA 2014)
<i>Vachellia farnesiana</i>	Mimosa Bush	A	1	4, 7, 17	Ecological impact rated High, invasiveness rated Rapid (DBCA 2014)
		F	4		
		G	1		
		<b>Total</b>	6		

### 5.1.2.6 Vegetation Units

Eighteen VUs were described using the structural vegetation classification technique, as outlined in EPA (2016a). The VUs comprise four broad vegetation groups:

- Low Eucalypt woodlands and/or tall to mid mixed Acacia shrublands over spinifex grasslands on rocky hills and rises (VUs 1, 2, 3, 5, 9, 11, 12, 14, 15, 16, 17, 18);
- Tall Mulga shrublands over spinifex grasslands on low rises and plains (VUs 8 and 10);
- Tall to mid Snakewood shrublands over chenopod shrublands over spinifex or tussock grasslands on flats and in drainage lines (VUs 6, 7, 13); and
- Low Eucalypt woodlands and tall to mid Acacia shrublands over mixed spinifex and tussock grasslands in drainage lines (VU 4).

VUs mapped in each of the Survey Areas of the Study Area are:


- Survey Area A – Five VUs (1, 2, 3, 4, 5);
- Survey Area B – Four VUs (1, 2, 3, 4);
- Survey Area C – Four VUs (2, 3, 4, 7);
- Survey Area D – Four VUs (6, 7, 8, 9);
- Survey Area E – Three VUs (7, 8, 10);
- Survey Area F – Five VUs (6, 7, 8, 17, 18);
- Survey Area G – Seven VUs (6, 7, 8, 13, 14, 15, 16); and
- Survey Area H – Two VUs (11, 12).



The VUs described in the Study Area are summarised in Table 18. Table 18 includes the general description of the VU (as per Section 3.1.6), total area mapped in the Study Area, sampling effort, taxon richness, significant flora taxa present in the VU and documented variation of the VU across its mapped occurrences. Table 19 presents areas of each VU mapped in the context of the individual Survey Areas. The spatial extent of the VUs is presented on maps in Appendix H. Appendix L presents a taxon-VU matrix, compiled from quadrat data only.



It should be noted that a number of VUs described in the Study Area are clearly similar to each other. A number of such VTs have also been described from very small spatial areas



that were only sampled once. It is possible that with more sampling over a wider area, it would be shown that some VUs are minor variants of a single more broadly defined. However, because this survey only sampled relatively small spatial areas, such VUs are considered to be distinct in the context of these areas, in lieu of further sampling over a wider area. The similarities between VUs are discussed in Table 18.


**Table 18: Summary of Vegetation Units Described in the Study Area**


VU	Summary	Photograph
1	<p><b>Description:</b> Tall open shrubland dominated by <i>Acacia citrinoviridis</i> and occasionally <i>Grevillea berryana</i> and <i>Acacia pruinocarpa</i> over mid sparse shrubland of mixed species dominated by <i>Eremophila fraseri</i> subsp. <i>fraseri</i>, <i>Corchorus crozophorifolius</i> and <i>Sida</i> sp. spiciform panicles (E. Leyland s.n. 14/8/90) over low hummock grassland dominated by <i>Triodia wiseana</i> on brown or red-brown clay loam with calcrete stones and large areas of calcrete outcropping on crests of low ridges</p> <p><b>Location:</b> Survey Areas A, B</p> <p><b>Area mapped (Proportion of Study Area):</b> 16.3 ha (1.4 %)</p> <p><b>Sampling:</b> 3 quadrats (NM-01, NM-08, NM-13)</p> <p><b>Significant Taxa:</b> None recorded</p> <p><b>Average taxon richness per quadrat:</b> 40.7 ± 7.6</p> <p><b>Variation:</b> This VU was relatively invariable; the only noteworthy variation observed was the co-dominance of <i>Acacia pruinocarpa</i> and <i>Grevillea berryana</i> together with <i>Acacia citrinoviridis</i> in the tall shrubland stratum at one occurrence in Survey Area B; these taxa were otherwise uncommon or absent in most occurrences.</p> <p><b>Similar VUs:</b> This VU occurred on the same geological formation (calcrete rises) as VU 2, however always occurred at the top of the largest rises, and generally had a much higher proportion of calcrete outcropping. The tall and mid shrubland strata were distinctive.</p>	 <p><b>Plate 9:</b> Typical VU 1 (Quadrat NM-08)</p>

VU	Summary	Photograph
2	<p><b>Description:</b> Low isolated trees/mallees to low open woodland/mallee woodland of mixed species dominated by <i>Eucalyptus xerothermica</i>, <i>Eucalyptus socialis</i> subsp. <i>eucentrica</i> and <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> over mid sparse shrubland of mixed species dominated by <i>Acacia bivenosa</i> and <i>Melaleuca eleuterostachya</i> over low shrubland sparse shrubland of mixed species dominated by <i>Heliotropium ovalifolium</i> and <i>Androcalva luteiflora</i> over low hummock grassland dominated by <i>Triodia wiseana</i> and occasionally <i>Triodia angusta</i> on brown clay loam with calcrete stones and often calcrete outcropping on slopes of low ridges and low rises</p> <p><b>Location:</b> Survey Areas A, B, C</p> <p><b>Area mapped (Proportion of Study Area):</b> 80.9 ha (6.9 %)</p> <p><b>Sampling:</b> 4 quadrats (NM-03, NM-06, NM-14, NM-50)</p> <p><b>Significant Taxa:</b> <i>Goodenia pedicellata</i> (P1)</p> <p><b>Average taxon richness per quadrat:</b> 20.8 ± 3.6</p> <p><b>Variation:</b> There was notable variation in this VU across most of the strata. Typically, there were isolated trees or mallees present, however in several occurrences, a well-developed low woodland or mallee woodland was present (Plate 11). In the mid shrubland stratum, <i>Acacia bivenosa</i> and <i>Melaleuca eleuterostachya</i> were generally present, however there were some occurrences where these taxa were present as only isolated individuals or absent altogether; at such occurrences the low tree stratum was also usually absent. Typically, <i>Triodia wiseana</i> dominated the hummock grassland stratum, with <i>Triodia angusta</i> sometimes co-dominating, however there were some occurrences, particularly in low points between rises in Survey Areas B and C, where <i>Triodia angusta</i> was dominant.</p> <p><b>Similar VUs:</b> Similar to VU 1 geologically, however the shrubland strata composition is clearly distinct. Also similar to VU 9 in the presence of a mid shrubland stratum dominated by <i>Acacia bivenosa</i> and <i>Melaleuca eleuterostachya</i>, however the low shrubland stratum is quite different; VU 9 contains a number of chenopod shrubs which are absent from VU 2. VU 15 is somewhat similar in that it occurs on a calcrete rise and <i>Eucalyptus socialis</i> subsp. <i>eucentrica</i> forms a low open mallee woodland, however the calcrete is much more limited, and the mid and low shrubland strata differ compositionally.</p>	 <p><b>Plate 10:</b> Typical VU 2 (Quadrat NM-50)</p>  <p><b>Plate 11:</b> Variant of VU 2 (low open mallee woodland (Quadrat NM-50))</p>



VU	Summary	Photograph
3	<p><b>Description:</b> Mid sparse shrubland of mixed species dominated by <i>Acacia bivenosa</i> and occasionally <i>Acacia synchronicia</i> over low sparse shrubland of mixed species including <i>Senna artemisioides</i> subsp. <i>oligophylla</i> and <i>Senna stricta</i> over hummock grassland dominated by <i>Triodia wiseana</i> and occasionally <i>Triodia angusta</i> on red-brown clay loam with ironstone and occasionally calcrete stones on undulating plains and lower slopes</p> <p><b>Location:</b> Survey Areas A, B, C</p> <p><b>Area mapped (Proportion of Study Area):</b> 16.4 ha (1.4 %)</p> <p><b>Sampling:</b> 3 quadrats (NM-04, NM-10, NM-12)</p> <p><b>Significant Taxa:</b> <i>Goodenia pedicellata</i> (P1) (rarely)</p> <p><b>Average taxon richness per quadrat:</b> 22.0 ± 12.3</p> <p><b>Variation:</b> Typically this VU had sparse mid and lower shrubland strata with few taxa in each, however one occurrence of this VU had prominent mid and lower shrubland strata with relatively high taxon diversity (Plate 13), including a number of <i>Acacia</i> species in the mid shrubland stratum. This occurrence was punctuated by a number of minor flow lines, which likely resulted in the higher relative foliage cover and diversity in these strata.</p> <p><b>Similar VUs:</b> This VU is not considered to be especially similar to any other VUs.</p>	 <p><b>Plate 12:</b> Typical VU 3 (Quadrat NM-04)</p>  <p><b>Plate 13:</b> Variant of VU 3 (prominent, diverse mid shrubland and low shrubland stratum) (Quadrat NM-10)</p>


VU	Summary	Photograph
4	<p><b>Description:</b> Low open woodland dominated by <i>Eucalyptus xerothermica</i> and <i>Corymbia hamersleyana</i> over tall open shrubland of mixed species dominated by <i>Petalostylis labicheoides</i>, <i>Acacia bivenosa</i>, <i>Eremophila longifolia</i>, <i>Acacia pyrifolia</i> var. <i>pyrifolia</i> and <i>Acacia citrinoviridis</i> over mid sparse shrubland of mixed species including <i>Tephrosia rosea</i> var. <i>Fortescue Creeks</i>, <i>Corchorus lasiocarpus</i> subsp. <i>parvus</i> and <i>Dodonaea lanceolata</i> var. <i>lanceolata</i> over low open hummock and tussock grassland of mixed species including <i>Themeda triandra</i>, <i>Cenchrus ciliaris</i>, <i>Eulalia aurea</i>, <i>Eriachne tenuiculmis</i> and <i>Triodia epactia</i> on red-brown clay loam, usually with mixed stony colluvium, in drainage lines and on adjacent flats</p> <p><b>Location:</b> Survey Areas A, B, C</p> <p><b>Area mapped (Proportion of Study Area):</b> 20.9 ha (1.8 %)</p> <p><b>Sampling:</b> 4 quadrats (NM-05, NM-07, NM-09, NM-11)</p> <p><b>Significant Taxa:</b> <i>Goodenia pedicellata</i> (P1) (rarely)</p> <p><b>Average taxon richness per quadrat:</b> 44.0 ± 8.4</p> <p><b>Variation:</b> This VU had a relatively large amount of variation depending on the size of the drainage feature it occurred in. The description above is typical of this VU in well-defined drainage lines with an incised channel (Plate 14). In smaller drainage lines without an incised channel where water likely flows in sheets, there tended to be far fewer trees and shrubs, however the shrubs and trees that were present were typical of occurrences with incised channels (Plate 15). The grassland stratum was also far more prominent; often it was dominated by a combination of <i>Triodia</i> species and <i>Eragrostis desertorum</i>, with other tussock grasses typical of occurrences with incised channels also present but as minor components.</p> <p><b>Similar VUs:</b> This VU is not considered to be similar to any other VUs.</p>	 <p><b>Plate 14:</b> Typical VU 4 (Quadrat NM-07)</p>  <p><b>Plate 15:</b> Variant of VU 4 (few trees and shrubs, prominent grassland with <i>Eragrostis desertorum</i> and <i>Triodia</i> species) (Quadrat NM-09)</p>



VU	Summary	Photograph
5	<p><b>Description:</b> Low isolated trees of <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> over tall sparse shrubland of mixed species including <i>Acacia maitlandii</i>, <i>Acacia kempeana</i>, <i>Acacia wanyu</i>, <i>Acacia marramamba</i> and <i>Acacia bivenosa</i> over mid sparse shrubland of mixed species including <i>Senna glutinosa</i> subsp. <i>pruinosa</i>, <i>Ptilotus rotundifolius</i>, <i>Ptilotus obovatus</i> and <i>Indigofera monophylla</i> over low hummock grassland dominated by <i>Triodia brizoides</i> and occasionally <i>Triodia epactia</i> on red-brown clay loam with ironstone stones and ironstone outcropping on hill slopes</p> <p><b>Location:</b> Survey Area A</p> <p><b>Area mapped (Proportion of Study Area):</b> 6.2 ha (0.5 %)</p> <p><b>Sampling:</b> 1 quadrat (NM-02)</p> <p><b>Significant Taxa:</b> -</p> <p><b>Average taxon richness per quadrat:</b> 41</p> <p><b>Variation:</b> None observed – mapped over a very small area.</p> <p><b>Similar VUs:</b> This VU is topographically similar to VU 18 in occurring on large hills, and shares a similar hummock grassland stratum. However, the composition of the tall shrubland stratum is very different, as well as the presence of tussock grasses and ephemeral herbs in VU 18; these VUs are also quite geologically different with VU 5 on ironstone hills and VU 18 on basalt hills.</p>	 <p><b>Plate 16:</b> VU 5 (Quadrat NM-02)</p>


VU	Summary	Photograph
6	<p><b>Description:</b> Tall open shrubland dominated by <i>Acacia xiphophylla</i> and occasionally <i>Acacia aptaneura</i> over mid sparse shrubland of mixed species including <i>Senna stricta</i>, <i>Eremophila cuneifolia</i>, <i>Senna glutinosa</i> subsp. <i>x luerssenii</i>, <i>Senna glutinosa</i> subsp. <i>glutinosa</i> and <i>Rhagodia eremaea</i> over low chenopod shrubland of mixed species including <i>Maireana triptera</i>, <i>Maireana melanocoma</i>, <i>Sclerolaena eriacantha</i>, <i>Sclerolaena minuta</i> and <i>Sclerolaena cuneata</i> over open to sparse hummock grassland dominated by <i>Triodia wiseana</i> on red or red-brown clay loam with stony colluvium and occasional basalt boulder outcropping on flats</p> <p><b>Location:</b> Survey Area D, F, G</p> <p><b>Area mapped (Proportion of Study Area):</b> 89.5 ha (7.7 %)</p> <p><b>Sampling:</b> 3 quadrats (NM-22, NM-28, NM-37)</p> <p><b>Significant Taxa:</b> -</p> <p><b>Average taxon richness per quadrat:</b> 32.7 ± 2.5</p> <p><b>Variation:</b> This VU was relatively consistent, however there was some minor variation observed. In particular, there were some occurrences where <i>Acacia aptaneura</i> was relatively prominent in the tall shrubland stratum, however in many occurrences it was virtually absent. Also, the chenopod shrubland stratum was compositionally variable across occurrences of this VU, however this was not unexpected given that there were no obvious dominant taxa in most occurrences.</p> <p><b>Similar VUs:</b> This VU is clearly similar to VU 7, and it could be argued that these VUs are clinal variants of a single VU, with VU 6 occurring in slightly higher parts of the landscape, grading into VU 7 in lower parts of the landscape where cracking clay soils in claypans and flow lines occur. However, the distinctive tussock grassland and ephemeral herbland associated with such claypans and flow lines is considered justification to describe separate VUs. VU 13 could also arguably be part of the aforementioned clinal variation of a single VU, however the virtual absence of <i>Acacia xiphophylla</i>, and the presence of a distinct <i>Triodia longiceps</i> hummock grassland, clearly separate this VU.</p>	 <p><b>Plate 17:</b> VU 6 (Quadrat NM-28)</p>






VU	Summary	Photograph
7	<p><b>Description:</b> Tall open shrubland dominated by <i>Acacia xiphophylla</i> over mid to low sparse shrubland of mixed species <i>Eremophila cuneifolia</i>, <i>Senna artemisioides</i> subsp. <i>oligophylla</i> and <i>Rhagodia eremaea</i> over low chenopod shrubland of mixed species including <i>Senna</i> sp. Karijini (M.E. Trudgen 10392), <i>Maireana triptera</i>, <i>Sclerolaena eriacantha</i>, <i>Sclerolaena lanicuspis</i> and <i>Sclerolaena cuneata</i> over open to sparse hummock grassland of mixed species including <i>Triodia wiseana</i> and <i>Triodia epactia</i> on red clay loam with stony colluvium and basalt rocks, interspersed with claypans with open to sparse tussock grassland of mixed species including <i>Eriachne benthamii</i>, <i>Aristida latifolia</i>, <i>Astrebla elymoides</i>, <i>Dichanthium fecundum</i> and <i>Eragrostis xerophila</i> over a seasonal open hermland and tussock grassland of mixed species including <i>Dichanthium sericeum</i> subsp. <i>humilius</i>, <i>Panicum laevinode</i>, <i>Sida fibulifera</i>, <i>Stemodia kingii</i> and <i>Goodenia muelleriana</i> on red cracking clay with basalt stones and rocks, on flats and in broad drainage lines.</p> <p><b>Location:</b> Survey Areas C, D, E, F, G</p> <p><b>Area mapped (Proportion of Study Area):</b> 34.9 ha (3.0 %)</p> <p><b>Sampling:</b> 5 quadrats (NM-26, NM-39, NM-42, NM-45, NM-49), 2 relevés (NMR-01, NMR-02)</p> <p><b>Significant Taxa:</b> <i>Euphorbia inappendiculata</i> var. <i>queenslandica</i> (P1), <i>Aristida jerichoensis</i> var. <i>subspinulifera</i> (P3), <i>Astrebla lappacea</i> (P3), <i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479) (P3), <i>Swainsona thompsoniana</i> (P3)</p> <p><b>Average taxon richness per quadrat:</b> 53.4 ± 13.3</p> <p><b>Variation:</b> There was a relatively large amount of variation in this VU related to the distribution and size of the cracking clay soil claypans present, and therefore it is difficult to define a typical state for this VT. In some occurrences there was a limited amount of cracking clay, and consequently there were fewer tussock grasses and herbs, and the chenopod shrubland and hummock grassland strata were more prominent (Plate 18). In other occurrences, there were extensive areas of cracking clay, and consequently, the tussock grassland and hermland was very prominent and taxon-rich (Plate 19). There were also occurrences that were somewhat in between these (Plate 20), with a moderate amount of cracking clay.</p> <p><b>Similar VUs:</b> This VU is clearly similar to VU 6, and also to VU 13 – see VU 6 for discussion.</p>	 <p><b>Plate 18:</b> VU 7 (limited cracking clay) (Quadrat NM-45)</p>  <p><b>Plate 19:</b> VU 7 (extensive cracking clay) (Quadrat NM-42)</p>


VU	Summary	Photograph
		 <p><b>Plate 20:</b> VU 7 (moderate cracking clay) (Quadrat NM-26)</p>


VU	Summary	Photograph
8	<p><b>Description:</b> Low open woodland to low isolated trees dominated by <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> over tall open to sparse shrubland dominated by <i>Acacia aptaneura</i> and <i>Acacia pruinocarpa</i>, and occasionally <i>Acacia aneura</i>, <i>Acacia ayersiana</i> and <i>Acacia atkinsiana</i> over low hummock grassland dominated by <i>Triodia wiseana</i> on red clay loam with laterised ironstone gravel and occasional laterised ironstone outcropping on low rises</p> <p><b>Location:</b> Survey Areas D, E, F, G</p> <p><b>Area mapped (Proportion of Study Area):</b> 140.3 ha (12.0 %)</p> <p><b>Sampling:</b> 6 quadrats (NM-21, NM-27, NM-30, NM-31, NM-46, NM-47)</p> <p><b>Significant Taxa:</b> <i>Goodenia nuda</i> (P4)</p> <p><b>Average taxon richness per quadrat:</b> 24.0 ± 10.5</p> <p><b>Variation:</b> Typically this VU possessed a tall open shrubland stratum of Mulga (in this case usually <i>Acacia aptaneura</i> but occasionally <i>Acacia aneura</i> and <i>Acacia ayersiana</i>) and <i>Acacia pruinocarpa</i>, with emergent trees of <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> (Plate 21). However, some occurrences did not possess any trees, and the tall shrubland stratum was very sparse (Plate 22). Also, in a small number of other occurrences, other <i>Acacia</i> species such as <i>Acacia atkinsiana</i> were prominent in the tall shrubland stratum, and <i>Eucalyptus gamophylla</i> was present in the tree stratum. Notwithstanding this variation, typically this VU was taxon-poor, with species totals for three quadrats numbering 17 taxa or less. However, several small occurrences have many more (&gt;25 total) taxa, which are predominantly herbs – this is considered to be because of influence of surrounding VUs that are always herb-rich, including VUs 10 and 17.</p> <p><b>Similar VUs:</b> This VU is clearly similar to VU 10, possessing an almost identical tree and tall shrub stratum. However, VU 10 has a hummock grassland always dominated by <i>Triodia epactia</i>, and also always has a relatively taxon-rich low shrubland and herbland stratum. Some occurrences are also somewhat similar to VU 11, however the tree stratum of VU 11 is generally of different composition, and Mulga taxa are very rarely present in the tall shrubland stratum.</p>	 <p><b>Plate 21:</b> Typical VU 8 (Quadrat NM-30)</p>  <p><b>Plate 22:</b> Variant of VU 8 (trees absent, tall shrubland very sparse) (Quadrat NM-46)</p>

VU	Summary	Photograph
9	<p><b>Description:</b> Isolated low trees of <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> over mid sparse shrubland dominated by <i>Acacia bivenosa</i> and <i>Melaleuca eleuterostachya</i> over low sparse chenopod shrubland of mixed species including <i>Sclerolaena eriacantha</i>, <i>Sclerolaena minuta</i>, <i>Sclerolaena lanicuspis</i> and <i>Maireana melanocoma</i> over hummock grassland dominated by <i>Triodia angusta</i> and <i>Triodia wiseana</i> on red-brown clay loam with metamorphic stones on undulating plains</p> <p><b>Location:</b> Survey Area D</p> <p><b>Area mapped (Proportion of Study Area):</b> 0.6 ha (0.1 %)</p> <p><b>Sampling:</b> 1 quadrat (NM-48)</p> <p><b>Significant Taxa:</b> -</p> <p><b>Average taxon richness per quadrat:</b> 36</p> <p><b>Variation:</b> None observed – mapped over a very small area.</p> <p><b>Similar VUs:</b> This VU is similar to VU 2, possessing similar tree and mid shrubland strata, however the low shrubland stratum is quite different containing a number of chenopod shrubs which are absent from VU 2. Geologically VU 9 has metamorphic stones rather than calcrete, however they appear to also be somewhat calcareous.</p>	 <p><b>Plate 23:</b> VU 9 (Quadrat NM-48)</p>


VU	Summary	Photograph
10	<p><b>Description:</b> Isolated low trees of <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> over tall shrubland to open shrubland dominated by <i>Acacia aptaneura</i> and <i>Acacia pruinocarpa</i>, and occasionally <i>Acacia aneura</i> and <i>Acacia ayersiana</i>, over low sparse shrubland of mixed species including <i>Senna glutinosa</i> subsp. <i>glutinosa</i> and <i>Ptilotus rotundifolius</i> over low hummock grassland of <i>Triodia epactia</i> over low sparse herbland and tussock grassland of mixed species including <i>Aristida contorta</i>, <i>Ptilotus helipteroides</i>, <i>Goodenia tenuiloba</i> and <i>Eriachne pulchella</i> subsp. <i>dominii</i> on red clay loam with ironstone and occasionally basalt gravel on undulating plains or low rises</p> <p><b>Location:</b> Survey Area E</p> <p><b>Area mapped (Proportion of Study Area):</b> 26.4 ha (2.3 %)</p> <p><b>Sampling:</b> 4 quadrats (NM-40, NM-41, NM-43, NM-44)</p> <p><b>Significant Taxa:</b> <i>Goodenia nuda</i> (P4)</p> <p><b>Average taxon richness per quadrat:</b> 45.5 ± 10.4</p> <p><b>Variation:</b> Typically this VU possessed a tall open shrubland stratum of Mulga (in this case usually <i>Acacia aptaneura</i> but occasionally <i>Acacia aneura</i> and <i>Acacia ayersiana</i>) and <i>Acacia pruinocarpa</i>. However, some occurrences had emergent trees of <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>. At several occurrences the tall shrubland stratum was sparser, and the herbland and tussock grassland stratum was more prominent (Plate 25); these occurrences appeared to have been more recently affected by fire, which may have resulted in this variation.</p> <p><b>Similar VUs:</b> This VU is clearly similar to VU 8, possessing an almost identical tree and tall shrub stratum. However, VU 10 has a hummock grassland always dominated by <i>Triodia epactia</i>, and also always has a relatively taxon-rich low shrubland and herbland stratum. This VU is also clearly similar to VU 17, however VU 17 is essentially a hummock grassland with a low sparse shrubland and only isolated tall shrubs; there are also a different suite of tall shrubs present, which probably reflects differing geology (basalt rocks for VU 17, generally laterised ironstone and occasionally basalt gravel for VU 10).</p>	 <p><b>Plate 24:</b> Typical VU 10 (Quadrat NM-40)</p>  <p><b>Plate 25:</b> Variant of VU 10 (tall shrubland sparse, herbland and tussock grassland prominent, relatively recently burnt) (Quadrat NM-46)</p>


VU	Summary	Photograph
11	<p><b>Description:</b> Low open woodland dominated by <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>, <i>Eucalyptus gamophylla</i>, <i>Corymbia deserticola</i> subsp. <i>deserticola</i> and <i>Corymbia hamersleyana</i> over tall open to sparse shrubland of mixed species dominated by <i>Acacia atkinsiana</i> and occasionally <i>Acacia monticola</i>, <i>Acacia bivenosa</i> and <i>Acacia elachantha</i> over low sparse shrubland of mixed species including <i>Seringia elliptica</i>, <i>Senna artemisioides</i> subsp. <i>oligophylla</i>, <i>Scaevola parvifolia</i> subsp. <i>pilbarae</i> and <i>Acacia adoxa</i> var. <i>adoxo</i> over low hummock grassland dominated by <i>Triodia wiseana</i> on red-brown clay-loam with ironstone stones on lower slopes of ranges</p> <p><b>Location:</b> Survey Area H</p> <p><b>Area mapped (Proportion of Study Area):</b> 279.0 ha (23.9 %)</p> <p><b>Sampling:</b> 3 quadrats (NM-15, NM-18, NM-20)</p> <p><b>Significant Taxa:</b> -</p> <p><b>Average taxon richness per quadrat:</b> 43.7 ± 7.6</p> <p><b>Variation:</b> This VU was relatively consistent, with the most notable variation in the tree and tall shrubland strata. The tree stratum was always present, however in some areas only isolated trees were present. The composition was also variable, with up to three of the taxa listed above occasionally absent, and many other combinations of the four taxa listed occurring across the mapped area. The tall shrubland always contained <i>Acacia atkinsiana</i>, however the presence of other <i>Acacia</i> taxa was variable across the mapped area, and often no other taxa were present. The tall shrubland was generally open, however was occasionally sparse, and was rarely a shrubland (i.e. foliage cover between 30-70 %).</p> <p><b>Similar VUs:</b> This VU is somewhat similar to VU 12, however VU 12 is comparatively very taxon-poor, and lacks the tall shrubland stratum, and also the tree species other than <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>. It is also somewhat similar to some occurrences of VU 8, but VU 11 generally lacks Mulga taxa and <i>Acacia pruinocarpa</i> in the tall shrubland, and generally has a diverse tree stratum compared to VU 8.</p>	 <p><b>Plate 26:</b> Typical VU 11 (Quadrat NM-20)</p>


VU	Summary	Photograph
12	<p><b>Description:</b> Low open woodland dominated by <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> over isolated mid shrubs of mixed species including <i>Senna glutinosa</i> subsp. <i>glutinosa</i> over low hummock grassland dominated by <i>Triodia wiseana</i> on brown clay loam with ironstone stones and ironstone outcropping on mid and lower slopes of ranges</p> <p><b>Location:</b> Survey Area H</p> <p><b>Area mapped (Proportion of Study Area):</b> 59.6 ha (5.1 %)</p> <p><b>Sampling:</b> 3 quadrats (NM-16, NM-17, NM-19)</p> <p><b>Significant Taxa:</b> -</p> <p><b>Average taxon richness per quadrat:</b> 17.6 ± 12.2</p> <p><b>Variation:</b> This VU was consistent across its mapped extent, however part of its extent had been recently burnt – this resulted in a much higher number of taxa (31) being recorded in a quadrat compared to long-unburnt areas (15 and 7 respectively).</p> <p><b>Similar VUs:</b> This VU is somewhat similar to VU 11, however VU 12 is comparatively very taxon-poor, and lacks the tall shrubland stratum of VU 11, and also the tree species other than <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>.</p>	 <p><b>Plate 27:</b> VU 12 (Quadrat NM-20)</p>


VU	Summary	Photograph
13	<p><b>Description:</b> Mid sparse shrubland dominated by <i>Acacia synchronicia</i> and <i>Acacia bivenosa</i> over mid sparse shrubland of mixed species including <i>Senna glutinosa</i> subsp. <i>glutinosa</i>, <i>Senna glutinosa</i> subsp. <i>x luerssenii</i> and <i>Senna stricta</i> over low sparse chenopod shrubland of mixed species including <i>Maireana triptera</i>, <i>Maireana pyramidata</i>, <i>Sclerolaena cuneata</i>, <i>Sclerolaena densiflora</i> and <i>Sclerolaena eriacantha</i> over low hummock grassland dominated by <i>Triodia longiceps</i> on red clay-loam with stony colluvium on flats</p> <p><b>Location:</b> Survey Area G</p> <p><b>Area mapped (Proportion of Study Area):</b> 4.8 ha (0.4 %)</p> <p><b>Sampling:</b> 1 quadrat (NM-25)</p> <p><b>Significant Taxa:</b> -</p> <p><b>Average taxon richness per quadrat:</b> 54</p> <p><b>Variation:</b> None observed – mapped over a very small area.</p> <p><b>Similar VUs:</b> This VU is similar to VUs 6 and 7 – see these VUs for discussion.</p>	 <p><b>Plate 28:</b> VU 13 (Quadrat NM-25)</p>




VU	Summary	Photograph
14	<p><b>Description:</b> Low isolated trees of <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> over tall sparse shrubland of mixed species dominated by <i>Acacia pruinocarpa</i> and <i>Acacia bivenosa</i> over mid sparse shrubland of mixed species dominated by <i>Ptilotus rotundifolius</i>, <i>Senna glutinosa</i> subsp. <i>x luerssenii</i> and <i>Senna glutinosa</i> subsp. <i>glutinosa</i> over low hummock grassland dominated by <i>Triodia wiseana</i> on red-brown clay loam with basalt, laterised ironstone and quartz stones and basalt boulder outcropping on low rises</p> <p><b>Location:</b> Survey Area G</p> <p><b>Area mapped (Proportion of Study Area):</b> 13.1 ha (1.1 %)</p> <p><b>Sampling:</b> 1 quadrat (NM-29)</p> <p><b>Significant Taxa:</b> -</p> <p><b>Average taxon richness per quadrat:</b> 55</p> <p><b>Variation:</b> None observed – mapped over a very small area.</p> <p><b>Similar VUs:</b> This VU is similar to VU 8, however the differing geology of VU 14 (basalt) likely influences the presence of a relatively taxon-rich low shrubland stratum, as well as the presence of numerous herbs. The characteristic Mulga taxa of the tall shrubland stratum of VU 8 are also uncommon. It is also somewhat similar to VU 18, including in geology, however the hummock grassland of VU 18 is generally dominated by <i>Triodia brizoides</i> and occasionally <i>Triodia epactia</i>, with <i>Triodia wiseana</i> only rarely present. VU 18 also contains a number of different shrubs in the tall shrub stratum.</p>	 <p><b>Plate 29:</b> VU 14 (Quadrat NM-29)</p>

VU	Summary	Photograph
15	<p><b>Description:</b> Low open mallee woodland of <i>Eucalyptus socialis</i> subsp. <i>eucentrica</i> over mid sparse shrubland of mixed species including <i>Acacia bivenosa</i>, <i>Senna glutinosa</i> subsp. <i>x luerksenii</i>, <i>Senna artemisioides</i> subsp. <i>oligophylla</i> and <i>Senna glutinosa</i> subsp. <i>glutinosa</i> over low hummock grassland dominated by <i>Triodia wiseana</i> on pale brown clay loam with calcrete and laterised ironstone stones on low rises</p> <p><b>Location:</b> Survey Area G</p> <p><b>Area mapped (Proportion of Study Area):</b> 1.0 ha (0.1 %)</p> <p><b>Sampling:</b> 1 quadrat (NM-23)</p> <p><b>Significant Taxa:</b> -</p> <p><b>Average taxon richness per quadrat:</b> 22</p> <p><b>Variation:</b> None observed – mapped over a very small area.</p> <p><b>Similar VUs:</b> This VU is somewhat similar to VU 2, however the calcrete in VU 2 is much more abundant, and the mid and low shrubland strata differ compositionally.</p>	 <p><b>Plate 30:</b> VU 15 (Quadrat NM-23)</p>

VU	Summary	Photograph
16	<p><b>Description:</b> Low open woodland dominated by <i>Corymbia hamersleyana</i> over tall open shrubland of mixed species dominated by <i>Acacia bivenosa</i>, <i>Acacia inaequilatera</i> and <i>Acacia kempeana</i> over low hummock grassland dominated by <i>Triodia wiseana</i> on red-brown clay loam with calcrete and laterised ironstone stones on undulating plains</p> <p><b>Location:</b> Survey Area G</p> <p><b>Area mapped (Proportion of Study Area):</b> 5.6 ha (0.5 %)</p> <p><b>Sampling:</b> 1 quadrat (NM-24)</p> <p><b>Significant Taxa:</b> -</p> <p><b>Average taxon richness per quadrat:</b> 29</p> <p><b>Variation:</b> None observed – mapped over a very small area.</p> <p><b>Similar VUs:</b> This VU is not especially similar to any of the other described VTs – it occurs immediately adjacent to VU 15, and these VTs may represent a variation of a single VT, however this is currently unclear.</p>	 <p><b>Plate 31:</b> VU 16 (Quadrat NM-24)</p>

VU	Summary	Photograph
17	<p><b>Description:</b> Tall sparse shrubland to isolated tall shrubs of mixed species including <i>Acacia aptaneura</i>, <i>Acacia pruinocarpa</i>, <i>Acacia synchronicia</i>, <i>Acacia ancistrocarpa</i> and <i>Acacia inaequilatera</i> over mid sparse shrubland of mixed species including <i>Ptilotus rotundifolius</i>, <i>Acacia bivenosa</i>, <i>Senna glutinosa</i> subsp. <i>x luerssenii</i>, <i>Senna artemisioides</i> subsp. <i>oligophylla</i> and <i>Senna glutinosa</i> subsp. <i>glutinosa</i> over low hummock grassland of <i>Triodia epactia</i> over a seasonal sparse hermland and tussock grassland of mixed species dominated by <i>Ptilotus helipteroides</i>, <i>Aristida contorta</i> and <i>Goodenia tenuiloba</i> on red clay loam with basalt stones and rocks on lower slopes and outwash plains</p> <p><b>Location:</b> Survey Area F</p> <p><b>Area mapped (Proportion of Study Area):</b> 290.5 ha (24.8 %)</p> <p><b>Sampling:</b> 3 quadrats (NM-33, NM-34, NM-36)</p> <p><b>Significant Taxa:</b> -</p> <p><b>Average taxon richness per quadrat:</b> 48.0 ± 7.8</p> <p><b>Variation:</b> This VU was fairly consistent. There was some variability in the tall shrubland stratum; usually there were isolated tall shrubs, sometimes there was a sparse tall shrubland, and on other occasions, tall shrubs were completely absent. The tall shrubland composition was also variable across the mapped area. The hermland and tussock grassland was usually present, however in some areas the density of <i>Triodia epactia</i> was such that there were few herbs or tussock grasses present.</p> <p><b>Similar VUs:</b> This VU is similar to VU 10, however VU 17 is essentially a hummock grassland with a low sparse shrubland and usually isolated tall shrubs; there are also a different suite of tall shrubs present, which probably reflects differing geology (basalt rocks for VU 17, generally laterised ironstone and occasionally basalt gravel for VU 10).</p>	 <p><b>Plate 32:</b> Typical VU 17 (Quadrat NM-34)</p>

VU	Summary	Photograph
18	<p><b>Description:</b> Low isolated trees of <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> and <i>Corymbia hamersleyana</i> over tall sparse shrubland of mixed species dominated by <i>Acacia aptaneura</i>, <i>Hakea lorea</i> subsp. <i>lorea</i>, <i>Acacia monticola</i>, <i>Acacia inaequilatera</i> and <i>Acacia pruinocarpa</i> over mid sparse shrubland of mixed species dominated by <i>Ptilotus rotundifolius</i>, <i>Senna glutinosa</i> subsp. <i>x luerssenii</i>, <i>Senna artemisioides</i> subsp. <i>oligophylla</i>, <i>Senna glutinosa</i> subsp. <i>pruinosa</i> and <i>Senna glutinosa</i> subsp. <i>glutinosa</i> over low hummock grassland dominated by <i>Triodia brizoides</i> over a seasonal open to sparse herbland and tussock grassland of mixed species dominated by <i>Aristida contorta</i>, <i>Ptilotus helipteroides</i>, <i>Fimbristylis dichotoma</i>, <i>Mnesithea formosa</i> and <i>Schizachyrium fragile</i> on red-brown or brown clay loam with basalt stones and basalt boulder outcropping on hill crests and upper slopes</p> <p><b>Location:</b> Survey Area F</p> <p><b>Area mapped (Proportion of Study Area):</b> 50.8 ha (4.3 %)</p> <p><b>Sampling:</b> 3 quadrats (NM-32, NM-35, NM-38)</p> <p><b>Significant Taxa:</b> -</p> <p><b>Average taxon richness per quadrat:</b> 56.7 ± 4.2</p> <p><b>Variation:</b> This VU was fairly consistent. In some occurrences, low trees were completely absent. <i>Triodia epactia</i> was somewhat prominent in the hummock grassland layer in some occurrences, but was never dominant. <i>Triodia wiseana</i> was also present in the hummock grassland stratum in one occurrence, but was a minor component.</p> <p><b>Similar VUs:</b> This VU is topographically similar to VU 5 in occurring on large hills, and shares a similar hummock grassland stratum. However, the composition of the tall shrubland stratum is very different, as well as the presence of tussock grasses and ephemeral herbs in VU 18; these VUs are also quite geologically different with VU 5 on ironstone hills and VU 18 on basalt hills. It is also somewhat similar to VU 18, including in geology, however the hummock grassland of VU 18 is generally dominated by <i>Triodia brizoides</i> and occasionally <i>Triodia epactia</i>, with <i>Triodia wiseana</i> only rarely present. VU 18 also contains a number of different shrubs in the tall shrub stratum.</p>	 <p><b>Plate 33:</b> VU 18 (Quadrat NM-32)</p>

**Table 19: Areas of Vegetation Units and Other Areas mapped in the Study Area**

VU	Area (ha) in each Survey Area								Total
	A	B	C	D	E	F	G	H	
1	12.1	4.2	-	-	-	-	-	-	16.3
2	44.1	25.9	10.9	-	-	-	-	-	80.9
3	12.3	2.1	1.9	-	-	-	-	-	16.4
4	20.1	0.6	0.2	-	-	-	-	-	20.9
5	6.2	-	-	-	-	-	-	-	6.2
6	-	-	-	1.3	-	42.2	46.0	-	89.5
7	-	-	1.2	2.7	3.5	23.1	4.3	-	34.9
8	-	-	-	15.5	2.3	9.6	112.9	-	140.3
9	-	-	-	0.6	-	-	-	-	0.6
10	-	-	-	-	26.4	-	-	-	26.4
11	-	-	-	-	-	-	-	279.0	279.0
12	-	-	-	-	-	-	-	59.6	59.6
13	-	-	-	-	-	-	-	4.8	4.8
14	-	-	-	-	-	-	-	13.1	13.1
15	-	-	-	-	-	-	-	1.0	1.0
16	-	-	-	-	-	-	-	5.6	5.6
17	-	-	-	-	-	290.5	-	-	290.5
18	-	-	-	-	-	50.8	-	-	50.8
R	3.7	0.7	-	6.4	5.2	-	2.2	6.5	24.7
C	1.1	1.1	0.1	0.5	0.1	2.0	2.9	0.1	8.0

#### 5.1.2.7 Other Areas Described

Areas where natural vegetation has been completely and apparently permanently removed, with no native taxa remaining, have been mapped as 'cleared land' (C). This includes roads (and associated infrastructure including culverts) and tracks. A total of 8.0 ha of 'Cleared Land' was mapped, representing 0.7 % of the Study Area.

Several areas in the Study Area associated with previous gravel extraction are characterised by the presence of what is assumed to be re-growth vegetation, and do not closely resemble any of the VUs mapped in the Study Area. Some areas may have also been rehabilitated, however also do not currently closely resemble any of the VUs mapped in the Study Area. These sections were mapped as 'regrowth vegetation' (R). A total of 24.7 ha of 'regrowth vegetation' was mapped, representing 2.1 % of the Study Area.

#### 5.1.2.8 Significant Vegetation

No formally listed significant vegetation was recorded in the Study Area, with none of the VUs described and mapped in the Study Area considered to represent any formally listed vegetation. Although VU 7 resembles the PEC 'Brockman Iron cracking clay communities of the Hamersley Range' (P1) in some respects, as it contains areas of cracking clay with tussock grasses including *Astrelba lappacea* (P3), it is not considered to represent this PEC. The occurrence of this PEC in the vicinity of the Study Area contains extensive areas of pure tussock grassland, which VU 7 does possess, with the dominant stratum being a tall shrubland of *Acacia xiphophylla*.

Of the VUs described and mapped in the Study Area, it is considered that the majority are not likely to represent significant vegetation for reasons other than formal listing (see Section 3.1.8.2). As no Pilbara-wide vegetation dataset defined at the same scale that the VUs were defined at is available, it is not possible to accurately assess the significance of the VUs in a regional context. However, based on field observations and aerial photograph interpretation, and the overall taxon composition of the VUs, all VUs are considered to extend outside the Study Area, and all are expected to occur over relatively extensive areas in the immediate vicinity of the Study Area.

Of the VUs described and mapped in the Study Area, it is considered possible that VUs 1, 2 and 15 (all associated with calcrete), and VU 7 (containing areas of cracking clay) may be of some regional significance.

Areas of calcrete are relatively common in the vicinity of the Study Area and in other areas of the Pilbara, however are generally small in extent and scattered in distribution, and are not regionally extensive. VU 2 appears to be equivalent to VU EsMeAbTaTw as described by Biota (2013a). This VU is described as '*Eucalyptus socialis* subsp. *eucentrica* low open mallee woodland over *Melaleuca eleuterostachya*, *Acacia bivenosa* scattered shrubs over *Triodia angusta*, *T. wiseana* open hummock grassland'. A total of 832.8 ha of this VU was mapped, including over Survey Areas A, B and C, and it was not considered to be of conservation significance. However, VU 2 contains some taxa known to commonly occur elsewhere on this substrate in the Pilbara (e.g. *Eucalyptus socialis* subsp. *eucentrica*, *Acacia bivenosa*, *Androcalva luteiflora*), and others that appear to have relatively restricted distributions on this substrate in the Pilbara (e.g. *Melaleuca eleuterostachya*, *Heliotropium ovalifolium*). It is therefore possible that this VU may be regionally restricted to an extent, and may be of some significance.

Interestingly, VU 1 does not appear equivalent to any VUs described and mapped by Biota (2013a), and appears to have been included in VU EsMeAbTaTw. This may have been an issue of mapping scale, or vegetation comprising VU 1 may not have been sampled, as VU 1 is clearly distinguishable from VU 2 / VU EsMeAbTaTw. Although aerial photography indicates that VU 1 extends outside the Study Area, it is unclear if it occurs widely; the description of VU EsMeAbTaTw indicates that it may not be particularly extensive, and therefore may be of some significance.

It is clear from aerial photography and field observations that VU 7 extends outside the Study Area; it is also likely to be relatively extensive in a local context. However, cracking clay soils do not appear to be especially common regionally; this is reflected in the number of cracking clay endemic or near endemic taxa in the Pilbara that are listed significant taxa (see Section 5.1.2.2). It is also considered that such areas are likely to be more prone to degradation from cattle grazing (including weed introduction); this was observed at several locations of VU 7 in the Study Area (see Section 5.1.2.10). It is therefore possible that VU 7 is of some significance.

### 5.1.2.9 Wetlands and Riparian Vegetation

VUs 4 and 7 are both considered to be ephemeral wetlands. VU 4 occurs in relatively major drainage lines in Survey Areas A, B and C (Appendix H). VU 7 occurs on flats and in broad drainage lines; in particular, it contains clay pans with cracking clay soil that are likely to become seasonally inundated. This VU was mapped in Survey Areas C, D, E, F and G (Appendix H).

Additionally, a number of minor drainage lines occur throughout the Study Area that do not possess vegetation that is distinct from surrounding areas; this is common to all rocky areas in the Pilbara. These areas have therefore not been mapped separately, however occur in Survey Areas F, G and H.

No GDEs were identified in the Study Area.

### 5.1.2.10 Vegetation Condition

Vegetation condition mapping polygons are displayed on maps in Appendix K. The condition of the majority of the vegetation in the Study Area was rated Excellent. Generally, there was little evidence of unnatural disturbance; evidence of cattle grazing was observed, however this appears to have had limited impact to the vegetation. Weed levels were also generally low across the Study Area. However, there were several areas mapped of poorer condition, as outlined below:

- In Survey Area A, portions of the major drainage lines had relatively large infestations of *Cenchrus ciliaris*; these areas were mapped as a mosaic of Excellent and Very Good.
- In Study Area C, a small area had a number of vehicle tracks within it, and also contained several weed taxa; this area was mapped as Very Good.
- In Survey Areas F and G, significant cattle trampling was observed in several areas; this has apparently led to significant infestations of *Cenchrus ciliaris*, as well as relatively high numbers of *Malvastrum americanum* and *Vachellia farnesiana*, both of which are considered to be relatively serious weeds. Some of these areas with the most significant infestations of *Cenchrus ciliaris* have been mapped as a mosaic of Good and Poor, with others with smaller infestations mapped as a mosaic of Excellent and Very Good.
- In Survey Area H, several areas had obvious signs of historical partial clearing, however the vegetation generally resembled adjacent undisturbed vegetation, albeit with obviously lower foliage cover, and no weeds were present. These areas were mapped as Good.

The areas in the Study Area mapped as 'regrowth vegetation' have been mapped as Degraded, as they still appear to have been obviously disturbed, and generally do not resemble remnant vegetation at this stage. Areas mapped as 'cleared land' have been mapped as such in Appendix K.



Additionally, some areas had been recently affected by fire, including in Survey Areas C and H, however the condition of such vegetation in the context of the condition scale used (Appendix B) has not been affected.

## 5.2 Fauna

### 5.2.1 Fauna Habitats

Seven fauna habitats were identified in the Study Area (Table 20, Appendix M). There is some disturbance to all Survey Areas from access tracks and existing gravel pits. In addition, the Survey Areas are inhabited by livestock (cattle) and evidence of their presence, such as tracks and scats, was common. All the habitats present in the Study Area are widely represented in the region. Habitats that may be refugia for vertebrates in this bioregion (e.g. gorges, mountain tops or permanent waters) are absent.

Cleared areas such as roads are unlikely to support fauna, though some will forage or disperse through them. Some fauna will also occur where there is regrowth vegetation or rehabilitation in the existing gravel pits, though these will only comprise a few, generalist species. The majority of fauna that occur will be reliant on the habitats present to fulfil their needs for shelter, foraging and/or breeding sites.

**Table 20: Area of Each Fauna Habitat in the Study Area**

Habitat	Area (ha) in each Survey Area								
	A	B	C	D	E	F	G	H	Total
Calcrete rises	56.2	30.1	10.9	-	-	-	1.0	-	98.3
Stony Hills	6.2	-	-	-	-	50.8	-	59.6	116.6
Shrubland on low stony rises	-	-	-	16.2	28.7	9.6	126.0	279.0	459.4
Acacia Flats	-	-	1.2	4.0	3.5	65.4	55.1	-	129.2
Creek-line	20.1	0.6	0.2	-	-	-	-	-	20.9
Stony Spinifex Plains	12.3	2.1	1.9	-	-	-	5.6	-	22.0
Stony Outwash Plain	-	-	-	-	-	290.5	-	-	290.5
Regrowth/Rehabilitation	3.7	0.7	-	6.4	5.2	-	2.2	6.5	24.7
Cleared Areas (e.g. roads and tracks)	1.1	1.1	0.1	0.5	0.1	2.0	2.9	0.1	8.0

#### 5.2.1.1. Calcrete Rises

This habitat is comprised of three vegetation units (VU 1, VU 2 and VU 15) and occurred in Survey Areas A, B, C and G (Plates 34 and 35). Calcrete rises and low hills support Spinifex grassland with a shrubland of *Acacia*, *Grevillea* and *Eremophila fraseri* on the ridges.



Plate 34: Calcrete Rises in Survey Area A



Plate 35: Calcrete Rises in Survey Area B (left) and C (right)

#### 5.2.1.2. Stony Hills

This habitat is comprised of three vegetation units (VU 5, VU 12 and VU 18) and occurred in Survey Areas A, F and H (Plates 36 and 37). The substrate is stony, generally occurring on the mid to lower slopes of larger hills adjacent to the Survey Areas. There are occasional rock outcroppings, but no significant rocky habitats. The vegetation is Spinifex grassland with scattered Snappy Gum (*Eucalyptus leucophloia*), sometimes with an open shrubland of *Acacia*, *Senna* and *Ptilotus* spp.



Plate 36: Stony Hills in Survey Area F (left) with an example of a small rocky outcrop (right)



Plate 37: Stony Hills at Survey Area H

### 5.2.1.3. Shrubland on Low Stony Rises

This habitat comprised of five vegetation units (VU 8, VU 9, VU 10, VU 11 and VU 14) and was present in Survey Areas D, E, F, G and H (Plates 38, 39 and 40). The low stony rises were characterised by a stony or pebbly substrate. It is vegetated with Spinifex, an open shrubland of Mulga, *Acacia* and/or *Senna* spp. and occasional Snappy Gums (*Eucalyptus leucophloia*).



**Plate 38: Shrubland on Low Stony Rises in Survey Area D (left) and E (right)**



**Plate 39: Shrubland on Low Stony Rises in Survey Area G**



**Plate 40: Shrubland on Low Stony Rises in Survey Area H**

#### 5.2.1.4. Stony Spinifex Plains

This habitat comprised of two vegetation units (VU 3 and VU 16) and was present in Survey Areas A, B, C and G (Plate 41). The substrate is a stony undulating plain, vegetated with sparse *Acacia* shrubland over Spinifex.



Plate 41: Stony Spinifex Plains at Survey Area C (left) and Survey Area G (right)

#### 5.2.1.5. Acacia Flats

This habitat comprised of three vegetation units (VU 6, VU 7 and VU 13) and was present in Survey Areas C, D, E, F and G (Plates 42 and 43). This habitat occurs on stony or clayey flats. The vegetation consists of *Acacia* and/or Mulga over low chenopod shrubland (*Maireana* and *Sclerolaena* spp.) over open Spinifex grassland.



Plate 42: Acacia Flats in Survey Area G



Plate 43: Acacia Flats with cracking clays in Survey Area E (left) and Acacia flats in Survey Area F (right)

### 5.2.1.6. Creek-line

This habitat is comprised of one vegetation unit (VU 4) and was present in the Survey Area A, though minor creek-lines too small to be separately mapped were also present in Survey Areas F and H (Plate 44). The creek-lines were dry at the time of the field survey, but may temporarily hold small pools of water after heavy rain.



Plate 44: Creek-line in Survey Area A (left) and minor creek-line in Survey Area H (right)

### 5.2.1.7. Stony Outwash Plain

This habitat comprised of one vegetation unit (VU 17) and was present in Survey Area F (Plate 45). The substrate is a stony outwash plain, including un-vegetated open areas of gravelly soil. The vegetation is a Spinifex grassland over a herbland and/or tussock grassland, with occasional *Acacia* and Mulga shrubs. Minor *Acacia*-lined creek-lines are common.

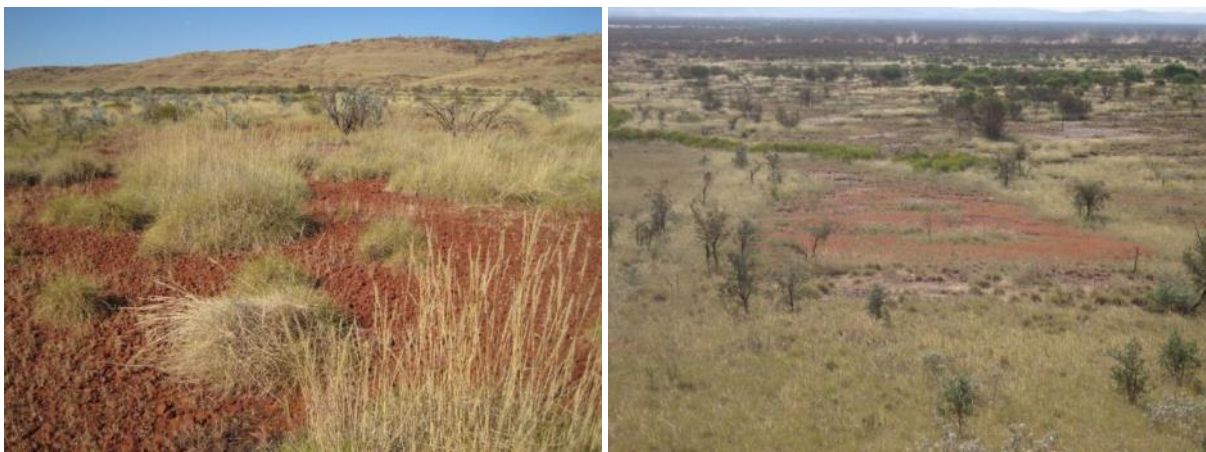


Plate 45: Stony Outwash Plain at Survey Area F

## 5.2.2 Faunal Assemblage

The results of the literature review and field survey were combined to create a list of all the vertebrate fauna potentially occurring in the Study Area (Appendix N). Indicated in Appendix N are all the species observed during the site visit, and those recorded in the region as part

of the Desktop Study (see Table 3 for search areas). Note that as the Survey Areas are relatively small, not all the listed species are likely to be present in each Survey Area. However, as all the species occur in the local area, it is difficult to state with certainty which will occur.

The potentially occurring faunal assemblage is summarised in Table 21. Of these, the species in Table 22 were recorded in the Study Area during the site visit. The overall vertebrate faunal assemblage is likely to be largely intact, with the exception of species that are extinct or greatly reduced in their distribution in the bioregion. The faunal assemblage and conservation significant species likely to occur are further discussed in the sections below. The conservation significant fauna recorded within 40 km of the Study Area on DBCA's Threatened and Priority Fauna Database (omitting erroneous records, vagrants, waterbirds and migratory shorebirds) are indicated in Figure 7.

**Table 21: Summary of Vertebrate Fauna Potentially Occurring in the Study Area**

Taxon	Total Species	Introduced Species	EPBC Act	WC Act	DBCAs Priority	Locally Significant
Frogs	8	-	-	-	-	-
Reptiles	107	-	1	1	5	-
Birds	116	-	3	5	-	3
Mammals	43	8	4	4	4	-
<b>Total:</b>	<b>274</b>	<b>8</b>	<b>8</b>	<b>10</b>	<b>9</b>	<b>3</b>

**Table 22: Fauna Observed in the Study Area, May 2018**

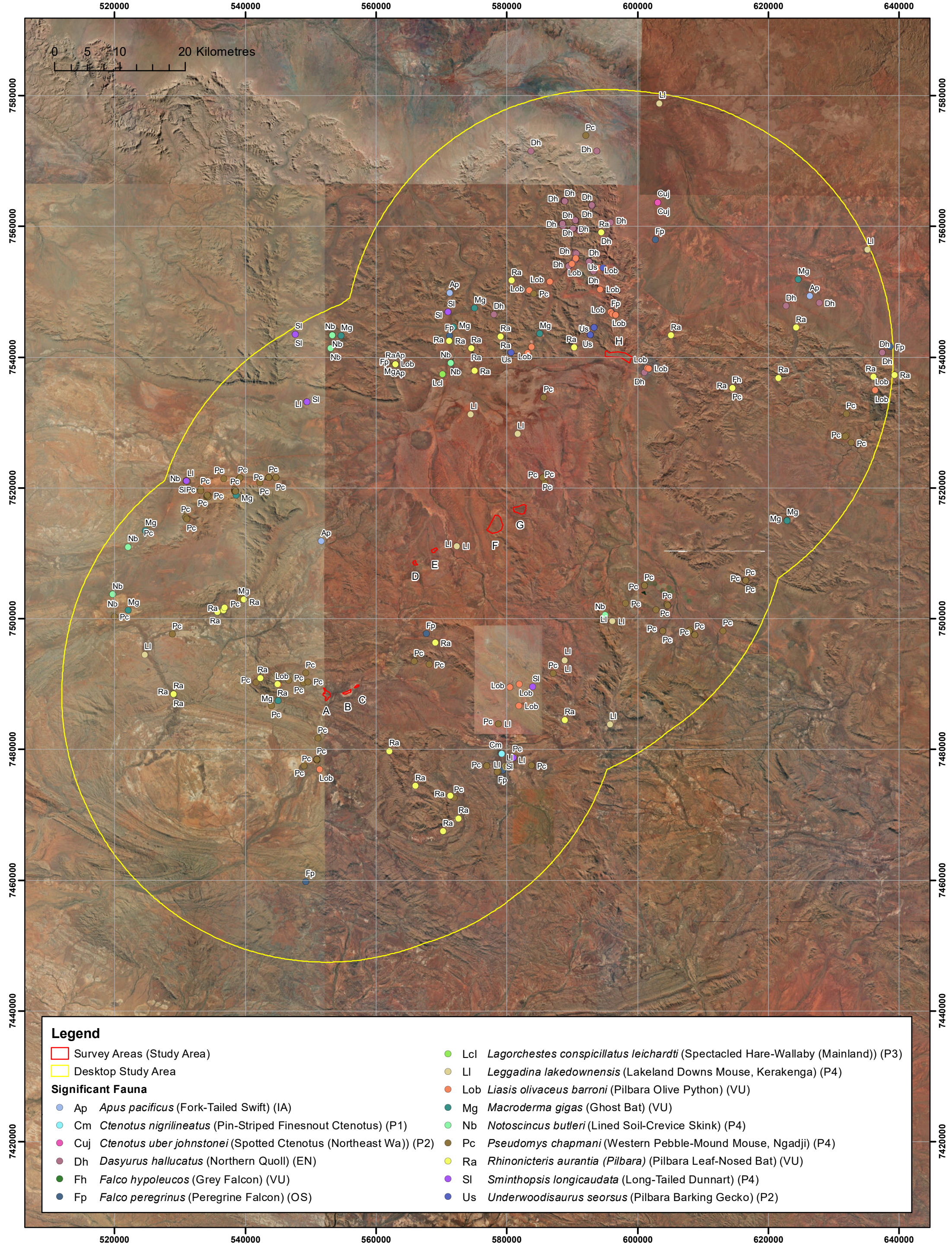
Scientific Name	Common Name	Conservation Status	Survey Area							
			A	B	C	D	E	F	G	H
<b>Reptiles</b>										
<i>Gehyra punctata</i>								+		
<i>Ctenophorus caudicinctus</i>	Ring-tailed Dragon							+	+	+
<i>Varanus sp.</i>	Goanna sp.		D		D			D		
<b>Birds</b>										
<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk					+				
<i>Aquila audax</i>	Wedge-tailed Eagle				+					
<i>Haliastur sphenurus</i>	Whistling Kite				+		+	+		+
<i>Circus assimilis</i>	Spotted Harrier							+		
<i>Turnix velox</i>	Little Button-quail			+		+	+	+		+
<i>Phaps chalcoptera</i>	Common Bronzewing		+			+			+	+
<i>Ocyphaps lophotes</i>	Crested Pigeon					+		+	+	
<i>Geopelia cuneata</i>	Diamond Dove			+		+		+	+	
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar								+	+
<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher		+					+	+	
<i>Merops ornatus</i>	Rainbow Bee-eater		+				+			+
<i>Falco cenchroides</i>	Australian Kestrel		+		+	+	+	+	+	
<i>Falco berigora</i>	Brown Falcon				+	+		+	+	+
<i>Falco longipennis</i>	Australian Hobby		+							



Scientific Name	Common Name	Conservation Status	Survey Area								
			A	B	C	D	E	F	G	H	
<i>Cacatua roseicapilla</i>	Galah		+		+					+	
<i>Nymphicus hollandicus</i>	Cockatiel					+					+
<i>Melopsittacus undulatus</i>	Budgerigar		+	+		+			+	+	+
<i>Platycercus zonarius</i>	Australian Ringneck		+		+					+	+
<i>Malurus lamberti</i>	Variigated Fairy-wren		+	+		+	+			+	+
<i>Malurus leucopterus</i>	White-winged Fairy-wren				+				+	+	
<i>Stipiturus ruficeps</i>	Rufous-crowned Emuwren	LS				+			+		
<i>Amytornis striatus</i>	Striated Grasswren	LS							+		
<i>Pardalotus rubricatus</i>	Red-browed Pardalote								+		+
<i>Pardalotus striatus</i>	Striated Pardalote									+	+
<i>Epthianura tricolor</i>	Crimson Chat								+	+	+
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater					+			+	+	+
<i>Manorina flavigula</i>	Yellow-throated Miner		+	+	+		+			+	+
<i>Gavicalis virescens</i>	Singing Honeyeater		+	+	+	+	+	+	+	+	+
<i>Ptilotula keartlandi</i>	Grey-headed Honeyeater										+
<i>Ptilotula penicillata</i>	White-plumed Honeyeater									+	
<i>Smicrornis brevirostris</i>	Weebill		+	+	+	+	+			+	+
<i>Acanthiza apicalis</i>	Inland Thornbill			+						+	
<i>Acanthiza robustirostris</i>	Slaty-backed Thornbill					+				+	+
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill									+	
<i>Gerygone fusca</i>	Western Gerygone									+	
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler		+			+	+	+	+	+	+
<i>Ptilonorhynchus maculatus</i>	Western Bowerbird								+		+
<i>Artamus personatus</i>	Masked Woodswallow										+
<i>Artamus cinereus</i>	Black-faced Woodswallow		+						+	+	+
<i>Cracticus tibicen</i>	Australian Magpie		+						+	+	
<i>Cracticus nigrogularis</i>	Pied Butcherbird		+	+					+	+	
<i>Cracticus torquatus</i>	Grey Butcherbird									+	+
<i>Lalage tricolor</i>	White-winged Triller								+		+
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike								+	+	+
<i>Oreoica gutturalis</i>	Crested Bellbird			+	+	+			+	+	+
<i>Pachycephala rufiventris</i>	Rufous Whistler		+			+			+	+	+
<i>Colluricincla harmonica</i>	Grey Shrike-thrush					+	+	+			+
<i>Rhipidura leucophrys</i>	Willie Wagtail				+				+	+	+
<i>Grallina cyanoleuca</i>	Magpie-lark										
<i>Corvus orru</i>	Torresian Crow		+	+					+	+	+
<i>Melanodryas cucullata</i>	Hooded Robin		+						+	+	+
<i>Eremiornis carteri</i>	Spinifexbird		+			+			+	+	+
<i>Emblema pictum</i>	Painted Finch			+		+			+	+	+
<i>Taeniopygia guttata</i>	Zebra Finch			+	+	+	+	+	+	+	+
<i>Anthus australis</i>	Australian Pipit				+						
<i>Petrochelidon nigricans</i>	Tree Martin				+						
<i>Dicaeum hirundinaceum</i>	Mistletoebird						+				+
<i>Cisticola exilis</i>	Golden-headed Cisticola								+		
<i>Megalurus cruralis</i>	Brown Songlark								+		

Scientific Name	Common Name	Conservation Status	Survey Area								
			A	B	C	D	E	F	G	H	
<i>Mirafra javanica</i>	Horsfield's Bushlark								+		
<b>Mammals</b>											
<i>Osphranter robustus</i>	Euro		S			S	S	S	S	S	S
<i>Pseudomys chapmani</i>	Western Pebble-mound Mouse	P4	M	M	M	M		M	M		
<i>Canis familiaris</i>	Dingo/Dog	Int.	S			T		S	T		
<i>Felis catus</i>	Cat	Int.								T	
<i>Bos taurus</i>	Cow	Int.	T	T	T	T	T	T	T	T	T

+ = observation, D = digging, T = tracks, S = scats, F = feathers, M = pebble-mound.



**Legend**

- Survey Areas (Study Area)
- Desktop Study Area

**Significant Fauna**

- Ap *Apus pacificus* (Fork-Tailed Swift) (IA)
- Cm *Ctenotus nigrilineatus* (Pin-Striped Finesnout Ctenotus) (P1)
- Cuj *Ctenotus uber johnstonei* (Spotted Ctenotus (Northeast Wa)) (P2)
- Dh *Dasyurus hallucatus* (Northern Quoll) (EN)
- Fh *Falco hypoleucos* (Grey Falcon) (VU)
- Fp *Falco peregrinus* (Peregrine Falcon) (OS)
- Lcl *Lagorchestes conspicillatus leichardti* (Spectacled Hare-Wallaby (Mainland)) (P3)
- LI *Leggadina lakedownensis* (Lakeland Downs Mouse, Kerakenga) (P4)
- Lob *Liasis olivaceus barroni* (Pilbara Olive Python) (VU)
- Mg *Macroderma gigas* (Ghost Bat) (VU)
- Nb *Notoscincus butleri* (Lined Soil-Crevice Skink) (P4)
- Pc *Pseudomys chapmani* (Western Pebble-Mound Mouse, Ngadji) (P4)
- Ra *Rhinonictis aurantia* (Pilbara) (Pilbara Leaf-Nosed Bat) (VU)
- SI *Sminthopsis longicaudata* (Long-Tailed Dunnart) (P4)
- Us *Underwoodisaurus seorsus* (Pilbara Barking Gecko) (P2)

### 5.2.2.1. Frogs

Eight species of frog potentially occur in the Study Area (Table 21, Appendix N). None were observed during the site visit, as expected with a brief, dry season field survey. The frog assemblage is typical of arid Western Australia, dominated by species with adaptations to low or irregular rainfall. Many species aestivate underground and are only able to be observed when breeding after rainfall events. Frogs may be present across each of the Survey Areas, potentially breeding where water pools in the minor creek-lines. Frogs are also likely to breed in man-made depressions such as the existing gravel pits in some of the Survey Areas.

No conservation significant frog species are likely to be present.

### 5.2.2.2. Reptiles

A total of 107 species of reptile potentially occur in the Study Area (Table 21, Appendix N). Only three common species were recorded, as expected on a brief field survey (Table 22). The reptile assemblage of the Pilbara bioregion is very diverse, including a suite of endemic species associated with rocky surfaces (Doughty *et al.* 2011). As the reptile assemblage is generally informed by the ground surface (e.g. rocky, sandy, clay) the Survey Areas are likely to support a diverse assemblage of species that occur on stony hills, stony plains, and clay flats. The Survey Areas are less likely to support species that favour heavily dissected rocky habitats (e.g. gorges) or sandy habitats, as these habitats are absent, though they may occur nearby.

There are six conservation significant reptile species that potentially occur in the Study Area:

- **Pilbara Olive Python** (*Liasis olivaceous barroni*) - Vulnerable (EPBC Act), Schedule 3/Vulnerable (WC Act);
- **Gane's Blind Snake** (*Anilius ganei*) - Priority 1;
- **Black-lined Skink** (*Ctenotus nigrilineatus*) - Priority 1;
- **Pilbara Barking Gecko** (*Underwoodisaurus seorsus*) - Priority 2;
- **Spotted Skink** (*Ctenotus uber johnstonei*) - Priority 2 and
- **Lined Soil-crevice Skink** (*Notoscincus butleri*) - Priority 4.

#### Pilbara Olive Python

The Pilbara Olive Python is a large species that usually inhabits deep gorges with water pools, though it has also been recorded from habitats adjacent to these (DoEE 2008). In the winter it shelters in caves or rock crevices and in summer it moves more widely, though usually in close proximity to water and rocky areas (DoEE 2008). The main threats to this species are predation by feral cats or foxes, predation of food sources and habitat destruction (DoEE 2008). Although the Pilbara Olive Python is known from nearby (Figure 7), the Study Area lacks the deep gorges and river pools favoured by this species. However, rocky habitats are adjacent to Survey Areas A and H, and the Pilbara Olive Python has been recorded near these areas. The python may range into Survey Areas A and H, but is likely to be absent from the remaining Survey Areas.

### **Gane's Blind Snake**

The habitat requirements for Gane's Blind Snake are poorly known, as this species is known from relatively few records and was only formally described in 1998. It is endemic to the Pilbara, occurring between Newman and Pannawonica. This species is tentatively associated with moist gorges and gullies, though some of the early specimens are from the Newman townsite and Mt Whaleback waste dump (Aplin 1998). It is unknown whether the habitats present in the Study Area are suitable for Gane's Blind Snake. It has not been recorded nearby (Figure 7), but the Survey Areas are within the known range of this species and it has been recorded within 40 km on NatureMap (Appendix N). It potentially could occur in any of the Survey Areas, but may favour those adjacent to rocky habitats.

### **Black-lined Skink**

The Black-lined Skink was originally collected from Spinifex at the base of a granite outcrop near Woodstock (Wilson and Swan 2010). There is one nearby record from 2012, located about 10 km south of Tom Price (Figure 7), and this species is also known from Meentheena Conservation Park. This species is known from very few records so its distribution and habitat requirements are poorly known. It could potentially occur in any of the Survey Areas.

### **Pilbara Barking Gecko**

The Pilbara Barking Gecko was only formally described in 2011. It is found in the Hamersley Ranges, inhabiting rocky areas, as well as gorges with spinifex, low shrubs and sparse tree cover (Doughty and Oliver 2011). It is uncommon, with very few records despite the Pilbara bioregion being generally well-surveyed. The Pilbara Barking Gecko is known from sites to the north of Survey Area H (Figure 7). It is unlikely to occur anywhere except in Survey Area H, where there are rocky hills in close proximity to known records.

### **Spotted Skink**

The Spotted Skink is thought to occur in a range of habitats (Wilson and Swan 2010), often on small rocky outcrops surrounded by plains (Cogger 2014). This subspecies mostly occurs in the northeast and Kimberley regions, but there are a few records in the north-eastern Pilbara on NatureMap, and while some may be erroneously assigned to the wrong subspecies, some are backed by specimen records (DBCA 2007-). There are two records of this species on DBCA's Threatened and Priority Database (Figure 7), and the Spotted Skink potentially could occur in any of the Survey Areas.

### **Lined Soil-crevice Skink**

The Lined Soil-Crevice Skink occurs in Spinifex dominated habitats in rocky areas and near creek and river margins (Wilson and Swan 2010, Teale *et al.* 2018). Though not commonly recorded, it is more widespread than previously thought, and has now been recorded throughout the Pilbara (Teale *et al.* 2018). This species has been recorded nearby (Figure 7) and potentially could occur in any of the Survey Areas.

#### **5.2.2.3. Birds**

Up to 116 bird species potentially occur in the Study Area (Appendix N). Of these, 60 were recorded during the field survey (Table 22). The bird assemblage is likely to be typical of the

Pilbara, consisting of a suite of broad-ranging species with the addition of species that favour stands of Mulga. The minor creek-lines are likely to support a higher species richness than other habitats, however, there are no large riverine systems present and it is these that support some of the highest bird species richness in the Pilbara (Burbidge *et al.* 2010).

Waterbirds and migratory shorebirds have been omitted from the list in Appendix N, as though they occur in the region, there is no significant habitat for these species in the Study Area.

There are eight species of conservation significant bird that potentially occur in the Study Area:

- **Night Parrot** (*Pezoporus occidentalis*) - Endangered (EPBC Act), Schedule 1/Critically Endangered (WC Act);
- **Grey Falcon** (*Falco hypoleucos*) - Schedule 3 (Vulnerable) (WC Act);
- **Peregrine Falcon** (*Falco peregrinus*) - Schedule 7/Other Specially Protected Fauna (WC Act);
- **Fork-tailed Swift** (*Apus pacificus*) - Migratory (EPBC Act), Schedule 5/Migratory Birds Protected under an International Agreement (WC Act);
- **Oriental Plover** (*Charadrius veredus*) - Migratory (EPBC Act), Schedule 5/Migratory Birds Protected under an International Agreement (WC Act);
- **Rufous-crowned Emu-wren** (*Stipiturus ruficeps*) - this species may be Locally Significant as it is patchily distributed and favours stands of long-unburnt Spinifex;
- **Striated Grasswren** (*Amytornis striatus*) - this species may be Locally Significant as it is patchily distributed and favours stands of long-unburnt Spinifex in rocky gullies and outcrops; and
- **Grey Honeyeater** (*Lacustroica whitei*) - this species may be Locally Significant as it is uncommonly recorded and favours Mulga Woodlands.

### Night Parrot

The current status of the Night Parrot in Western Australia is poorly known. There have been very few records in recent years, with the exact locations remaining undisclosed in order to protect the species from disturbance. However, there was a sighting of the Night Parrot on the Fortescue Marsh in 2005, in the Shire of Wiluna in 2017 and a photograph from a central Western Australian salt lake in 2017. The Night Parrot is thought to roost and breed in old-growth Spinifex. Records thus far have been in *Triodia longiceps*, though potentially other Spinifex species may be used (Night Parrot Recovery Team 2018). Foraging sites are less well-known, but are likely to include seeding Spinifex, chenopods (including *Sclerolaena* spp.) and areas rich in herbs and grasses (DBCA 2017a). Birds potentially fly long distances to forage, so foraging habitat is not necessarily in close proximity to roosting/breeding habitat (Night Parrot Recovery Team 2018).

The Acacia flats habitat, particularly at Survey Area G, may support the Night Parrot, as well as the Stony Outwash Plain habitat that occurs across much of Survey Area F. These areas include some large clumps of old-growth Spinifex (Plate 46), as well as foraging species such as herbs and chenopod shrublands. In addition, patches of Spinifex on the stony rises at Survey Area H were relatively long-unburnt (Plate 46). Although the presence of shrubland

in this Survey Area may make this area less suitable for Night Parrots, the overall lack of current data on this species means it cannot be excluded. Areas of potential Night Parrot habitat are shown in Appendix O.



**Plate 46: Large Spinifex clump at Survey Area G (left) and Survey Area H (right)**

### **Grey Falcon**

The Grey Falcon forages over lightly timbered plains, including *Acacia* shrublands, with its distribution centred on inland drainages. The Grey Falcon nests in tall trees on watercourses (Garnett *et al.* 2011) and occasionally on man-made structures such as transmission line towers (pers. obs.). The population of this species is estimated at 1,000 individuals and declining (Garnett *et al.* 2011). There is a single nearby record of this species on DBCA's Threatened and Priority Fauna Database (Figure 7). As this species occurs at very low densities (Garnett *et al.* 2011), it is unlikely that more than a single pair of birds is present. This species potentially breeds nearby on tree-lined watercourses, and if present, may forage over the Study Area. However, there is no breeding habitat within the Study Area.

### **Peregrine Falcon**

The Peregrine Falcon is a widespread bird of prey that globally has a very large range and a very large population that appears to be secure (BirdLife International 2018). The Peregrine Falcon nests mainly on ledges on cliffs or rocky outcrops, and it may also use tall trees (Johnstone and Storr 1998). This species also takes advantage of man-made structures such as abandoned open pits or quarries. The Peregrine Falcon has been recorded nearby on DBCA's Threatened and Priority Fauna Database (Figure 7). The Peregrine Falcon may forage in the Study Area, with potential breeding habitat present nearby in rocky areas.

### **Fork-tailed Swift**

The Fork-tailed Swift is a non-breeding visitor to Australia between September and April (Boehm 1962). While it can be scarce in south-west Australia this species is generally more common in the north (Johnstone and Storr 1998). The bird is often observed foraging for insects in proximity to cyclonic weather (Boehm 1962), and can occur in small groups or flocks of more than 1,500 (DoEE 2015). Although a migratory species, the Fork-tailed Swift has a large range and a large population that appears to be stable (Birdlife International 2018). The Study Area may support this species at times, however, the Fork-tailed Swift is largely an aerial species in Australia and is unlikely to rely on the Study Area specifically.

### Oriental Plover

The Oriental Plover inhabits dry grasslands and sparsely vegetated plains (Geering *et al.* 2007). Although generally more coastal in its distribution, it does occur inland. There are no nearby records of this species on DBCA's Threatened and Priority Fauna Database (Figure 7). However, this species potentially occurs in open habitats such as Acacia flats. An area would need to support 700 or more birds (i.e. at least 1 % of the population) in order to be significant, and the Survey Areas are only likely to support one or two individuals on an occasional basis.

### Rufous-crowned Emu-wren, Striated Grasswren and Grey Honeyeater

Of the locally significant bird species, the Rufous-crowned Emu-wren was recorded at Survey Areas D and F and the Striated Grasswren was recorded at Survey Area F during the field survey (Table 22). The Rufous-crowned Emu-wren is patchily distributed throughout its range, and may be dependent on old-growth Spinifex. The Striated Grasswren is associated with rocky gullies containing old-growth Spinifex. The Grey Honeyeater is a rarely recorded bird of Mulga woodlands in the interior of Australia. Though it has a large range, the population is thought to be declining (Birdlife International 2018).

#### 5.2.2.4. Mammals

A total of 43 species of mammal (35 native and eight introduced) potentially occur in the Study Area (Table 21, Appendix N). Only five species were recorded, two native and three introduced, as expected on a brief site visit (Table 22). The mammal assemblage is likely to be typical of the Pilbara bioregion, and the small mammal fauna present is influenced by substrate (Gibson and McKenzie 2009). A suite of generalist species, such as the Pilbara Ningau (Ningau *timeylei*) is likely to occur in all Survey Areas. Species that favour rocky habitats, such as the Woolley's Pseudantechinus (*Pseudantechinus woolleyae*), are likely to be associated with rocky outcrops in the Survey Areas, though the most rugged of these habitats have been excluded. Species that favour sandier substrates, such as the Kaluta (*Dasykaluta rosamondiae*), are likely to be absent or in low numbers in the Study Area.

There are eight conservation significant mammals that potentially occur in the Study Area:

- **Northern Quoll** (*Dasyurus hallucatus*) - Endangered (EPBC Act), Schedule 2 (Endangered) (WC Act);
- **Bilby** (*Macrotis lagotis*) - Vulnerable (EPBC Act), Schedule 3 (Vulnerable) (WC Act);
- **Ghost Bat** (*Macroderma gigas*) - Vulnerable (EPBC Act), Schedule 3 (Vulnerable) (WC Act);
- **Pilbara Leaf-nosed Bat** (*Rhinonicteris aurantia*, Pilbara form) - Vulnerable (EPBC Act), Schedule 3 (Vulnerable) (WC Act);
- **Long-tailed Dunnart** (*Sminthopsis longicaudata*) - Priority 4 (DBCA);
- **Spectacled Hare-wallaby, mainland** (*Lagorchestes conspicillatus leichardti*) - Priority 3 (DBCA);
- **Western Pebble-mound Mouse** (*Pseudomys chapmani*) - Priority 4 (DBCA); and
- **Lakeland Downs Mouse** (*Leggadina lakedownensis*) - Priority 4 (DBCA).



## Northern Quoll

The Northern Quoll occurs across the northern parts of Australia including Western Australia, the Northern Territory, Queensland and some offshore islands (Van Dyck and Strahan 2008). The Northern Quoll has declined historically, now occurring as several disjunct populations, of which the Pilbara population is one (Braithwaite and Griffiths 1994). Recent declines have occurred and are expected to occur in association with the arrival of the Cane Toad (Woinarski *et al.* 2014). The Northern Quoll occurs in a variety of habitats across its range, but in the Pilbara favours dissected rocky escarpments (Hill and Ward 2010; Van Dyck and Strahan 2008). Where shelter habitat occurs with the Northern Quolls predicted range, it is considered 'habitat critical to the survival of the species', as it is important for breeding and as a refuge from fire (Commonwealth of Australia 2016). In the Pilbara, shelter habitat consists of rocky habitats such as ranges, escarpments, mesas, gorges, breakaways, boulder fields and major drainage lines (Commonwealth of Australia 2016). Little is known about Northern Quoll foraging and dispersal habitats (Commonwealth of Australia 2016). Northern Quolls have been recorded dispersing considerable distance between trapping locations, such as 2.5 km in one day (Schmitt *et al.* 1989), 3.5 km in seven days (King 1989) and 2 km at the Buckland Project (Phoenix Environmental Sciences 2012). All vegetation within 1 km of shelter habitat is considered to be foraging and dispersal habitat, and this is 'critical habitat' when associated with or connecting populations important for the long-term survival of the Northern Quoll (Commonwealth of Australia 2016). Important populations are those that are high density, occur in habitat that is free or likely to remain free of Cane Toads and/or subject to on-going research or conservation efforts (Commonwealth of Australia 2016).

Potential Northern Quoll shelter habitat is mapped in Appendix P. The rocky hills and outcrops adjacent to the Survey Area H contained cracks and crevices and therefore appeared to be suitable shelter habitat (Plate 47). The Northern Quoll is also known from several records in the ranges north of Survey Area H (Figure 7). It is likely that this species shelters within 1 km of Survey Area H and may forage or disperse through the Survey Area. The rocky areas adjacent to Survey Area A appeared smaller, more isolated and of low suitability. In addition, there are no records of Northern Quoll in the vicinity (Figure 7), and it is not confirmed whether the Northern Quoll occurs in this area. The status of any Northern Quoll population was unable to be determined with the level of survey undertaken. If an important (high density) population is present in the rocky habitats adjacent to Survey Areas A or H, important foraging and dispersal habitat would be present within the Survey Area (Appendix P). The Northern Quoll is unlikely to occur in the remaining Survey Areas as there is little or no rocky habitat present and there are no records of this species in the surrounding area.



**Plate 47: Potential rocky shelter habitat for Northern Quoll within 1 km of Survey Area H**

### **Bilby**

The range of the Bilby has declined considerably. The species currently occurs patchily across the Pilbara and inland northern Australia with the total population estimated at less than 10,000 individuals and in decline (Woinarski *et al.* 2014). The Bilby inhabits spinifex on plains and alluvial areas, mulga on ridges and rises and tussock grasslands on uplands and hills (Pavey 2006). Current threats to the Bilby in the northern part of its range include too-frequent fires and introduced herbivores and water-points (TSSC 2016a). Potential threats include predation by cats and foxes, land clearing and mining developments (TSSC 2016a). As the Bilby can move its home range in response to the changing availability of food (Van Dyck and Strahan 2008), they may not always be present despite suitable habitat being available. There are no nearby records of the Bilby on DBCA's Threatened and Priority Fauna Database (Figure 7), and nearby records on NatureMap consist of two uncertain records of anecdotal sightings on the Pilbara Threatened Fauna Database (DBCA 2007-). Based on the lack of records and the current known distribution of this species, the Bilby has a low likelihood of occurring in any of the Survey Areas.

### **Ghost Bat**

The Ghost Bat is a large carnivorous bat that occurs across northern Australia. The population is thought to be less than 10,000 individuals, with two thirds of those in the Kimberley region (Woinarski *et al.* 2014, TSSC 2016b). Permanent roosts are in deep caves and mines with relatively stable temperatures and high humidity (Woinarski *et al.* 2014). Rock crevices and shallow caves are also used as daytime roosts. Ghost bats use several roost sites, contracting back to relatively few permanent roost sites when breeding. Studies have found that foraging occurs within 1.9 km from the roost on average, with a mean foraging area of 61 ha (Woinarski *et al.* 2014). Ghost Bats are threatened by loss of roosting habitat (mostly in the Pilbara), disturbance at roost sites, degradation of foraging habitat, mortality on barbed wire fences near roost sites and poisoning by Cane Toads (Woinarski *et al.* 2014, TSSC 2016b). There is no roosting or breeding habitat present for the Ghost Bat. However, it has been recorded in the surrounding area (Figure 7) and may roost in ranges nearby and forage over habitats in the Study Area.

**Pilbara Leaf-nosed Bat**

The Pilbara Leaf-nosed Bat occurs in the Pilbara, roosting communally in warm, humid caves or mine adits and foraging in adjacent habitats (Woinarski *et al.* 2014, Duncan *et al.* 1999). Although the Pilbara form is listed as Vulnerable under the EPBC Act, the taxon as a whole is considered of Least Concern in the Action Plan for Australian Mammals 2012 (Woinarski *et al.* 2014). This species has been recorded in the surrounding area on DBCA's Threatened and Priority Fauna Database (Figure 7). There is no roosting or breeding habitat present in the Study Area for the Orange Leaf-nosed Bat. However, it may roost in ranges nearby and forage over habitats in the Study Area.

**Long-tailed Dunnart**

The Long-tailed Dunnart inhabits rocky ranges, breakaways and scree in the Pilbara and adjacent arid inland areas (Van Dyck and Strahan 2008). It has also been recorded from open country with a stony surface (Van Dyck and Strahan 2008). This species has been recorded in the surrounding area on DBCA's Threatened and Priority Fauna Database (Figure 7), and potentially occurs in rocky and stony habitats in Survey Areas A, F and H.

**Spectacled Hare-wallaby (mainland)**

The mainland form of the Spectacled Hare-wallaby occurs in Spinifex grasslands across northern Australia. It has declined significantly in the past and is listed as Near Threatened in the Action Plan for Australian Mammals 2012 (Woinarski *et al.* 2014). The Pilbara subpopulation of this species is in decline (Woinarski *et al.* 2014), possibly due to predation by Foxes and inappropriate fire regimes preventing the formation of large old Spinifex clumps that are used for shelter (Van Dyck and Strahan 2008). There is a single record of this species in the vicinity of the Study Area, from 1966. All other records on NatureMap are to the north and east of the Study Area. It appears unlikely that this species still occurs in the area, but if present it may occur in Spinifex on plains.

**Western Pebble-mound Mouse**

The Western Pebble-mound Mouse occurs in rocky areas throughout the Pilbara and into the Little Sandy Desert, favouring gentle slopes (Van Dyck and Strahan 2008). There are many records of this species in the surrounding area on DBCA's Threatened and Priority Fauna Database (Figure 7). The mounds house a colony of mice, though not all active mounds are necessarily in use, with foraging mice tending to unoccupied mounds within their ranges (Van Dyck and Strahan 2008). Although it appears to have declined in the past, and the population may currently be declining slightly, the species is considered to be of 'Least Concern' in the Action Plan for Australian Mammals 2012 (Woinarski *et al.* 2014). Although mining destroys some mounds, this is not considered to be a significant threat (Woinarski *et al.* 2014). The Western Pebble-mound Mouse was recorded (active mounds found) on the calcrete rises and stony low rises in all Survey Areas except E and H (Plate 48). The locations of the mounds are shown on maps in Appendix M, and the details of each mound are listed in Appendix Q.



**Plate 48: Active Western Pebble-mound Mouse mound in Survey Area A**

### Lakeland Downs Mouse

The Lakeland Downs Mouse occurs in a range of habitats, including Spinifex grasslands, tussock grasslands and *Acacia* shrublands, though it favours seasonally inundated sandy-clay soils (Van Dyck and Strahan 2008). The population of this species can fluctuate markedly (Van Dyck and Strahan 2008). It has been recorded in the surrounding area (Figure 7), and potentially could occur in any of the Survey Areas. If present, it may favour the Acacia Flats, Creek-line or Stony Outwash Plain habitats.

### 5.2.3 Likelihood of Occurrence of Significant Fauna

The significant fauna potentially occurring in the Study Area are summarised in Table 23, including an assessment of the likelihood of occurrence in each Survey Area. The likelihood of occurrence of these significant fauna taxa within the Study Areas is defined as:

- **Very Low (VL):** The study area is outside the current known distribution of the species, as presented in the literature; no suitable habitat was identified as being present during the field survey; for some species, individuals may occur occasionally as vagrants, especially if suitable habitat is located nearby, but the study area itself would not the species; includes species generally accepted as being locally extinct.
- **Low (L):** The study area is within or just outside the current known distribution of the species, as presented in the literature; any habitat present is of either limited in extent

or marginal quality at best; no recent or nearby records of the species on databases; the species is generally known to be less common in the vicinity of the study area (e.g. for inland sites, where the species usually occurs on the coast).

- **Moderate (M):** The study area is within the current known distribution of the species, as presented in the literature; habitat of reasonable quality was identified as being present during the field survey; some recent and/or nearby records of the species of databases;
- **High (H):** The study area is well within the current known distribution of the species, as presented in the literature; habitat of good quality was identified as being present during the field survey; many recent and nearby records of the species on databases.
- **Known to Occur (K):** The species was positively identified in the study area during this field survey, or recorded as occurring in the study area on previous recent field surveys. Note that for a species 'known to occur', the habitat may still be marginal and therefore the population may be small or the species may visit the site irregularly.

**Table 23: Summary of Significant Vertebrate Fauna of the Study Area**

**Key to Status:** Cr = Critically Endangered, En = Endangered, Vu = Vulnerable, M = Migratory, IA = Migratory Species listed under an International Agreement, OS = Other Specially Protected Fauna, S1 – S7 = Schedules 1 – 7, P1 – P4 = Priority 1 – 4.

**Key to Likelihood of occurrence:** L = Low, M = Moderate, H = High, K = Known to occur.

**Key to Habitat:** CR = Calcrete rises, SH = Stony hills, LSR = Shrubland on low stony rises, AF = Acacia flats, CL = Creek-line, SSP = Stony Spinifex Plain, SOP = Stony outwash plain.

Species	Status			DBCA (2018) Records	Likelihood of Occurrence in each Survey Area								Habitat Use	Explanation
	EPBC Act	WC Act	DBCA		A	B	C	D	E	F	G	H		
<b>Reptiles</b>														
Pilbara Olive Python <i>Liasis olivaceus barroni</i>	Vu	S3 (Vu)	-	28 records, including Tom Price (1999), Solomon Rail (2008), Hamersley Gorge (2013), Wittenoom Gorge (2013), Solomon Mine (2013, 2015 & 2016) and Rocklea (2012).	M	L	L	L	L	L	L	M	SH, may range into adjacent habitats.	No favoured habitats (gorges or waterholes) present in Study Area, but habitat and records present adjacent to Survey Areas A and H.
Gane's Blind Snake <i>Anilius ganei</i>	-	-	P1	None, but recorded within 40km on NatureMap (Appendix N).	M	L	L	L	L	L	L	M	SH, LSR	Although thought to be associated with gorges/moist microhabitats, this species has been collected in other habitats and may occur.
Black-lined Skink <i>Ctenotus nigrilineatus</i>	-	-	P1	1 record from Tom Price (2011).	L	L	L	L	L	L	L	L	LSR, AF, CL, SSP, SOP	This species is rarely recorded despite extensive Pilbara surveys, so its habitat requirements are not well known and it has a low likelihood of occurring anywhere.

Species	Status			DBCA (2018) Records	Likelihood of Occurrence in each Survey Area								Habitat Use	Explanation
	EPBC Act	WC Act	DBCA		A	B	C	D	E	F	G	H		
Pilbara Barking Gecko <i>Underwoodisaurus seorsus</i>	-	-	P2	6 records, five from Solomon Mine in 2014, one from Tom Price in 2008.	L	L	L	L	L	L	L	M	SH	Associated with more rocky habitats, but recorded from ranges adjacent to Survey Area H.
Spotted Skink <i>Ctenotus uber johnstonei</i>	-	-	P2	2 records from Munjina (2012).	L	L	L	L	L	L	L	L	CR, LSR, AF, CL, SSP, SOP	Inhabits a range of habitats and may occur.
Lined Soil-crevice Skink <i>Notoscincus butleri</i>	-	-	P4	14 records, including Mount Sheila (2011), Mt Brockman Homestead (2004), Hamersley Iron Homestead (1995) & Western Hub Project, Rocklea (2012).	M	M	M	M	M	M	M	M	CR, SH, LSR, AF, CL, SSP, SOP	This species favours spinifex in rocky areas or creek-lines and has been recorded in the surrounding area, so may occur.
<b>Birds</b>														
Night Parrot <i>Pezoporus occidentalis</i>	En	S1 (Cr)	-	-	L (?)	L (?)	L (?)	L (?)	L (?)	M (?)	M (?)	M (?)	AF, SOP, some LSR	There is little data available that it is hard to ascertain the likelihood of occurrence, but it may occur in Survey Areas with large Spinifex clumps or chenopod shrublands.
Grey Falcon <i>Falco hypoleucos</i>	-	S3 (Vu)	-	1 record from Tom Price (2012).	M	M	M	M	M	M	M	M	Forage over all habitats	May occur as a foraging visitor. Unlikely to nest in the Study Area.
Fork-tailed Swift <i>Apus pacificus</i>	Mi	S5 (IA)	-	5 records, including Kings Area, Mount Sheila (2010), Mount Sheila (2011) and Koodaideri (2012).	L	L	L	L	L	L	L	L	Forage over all habitats	May occur as an aerial visitor, but the Study Area does not provide significant habitat for this species.
Oriental Plover <i>Charadrius veredus</i>	Mi	S5 (IA)	-	-	L	L	L	L	L	L	L	L	AF, SOP	May occur on occasion, using open disturbed or recently burnt areas, but is more common near the coast.

Species	Status			DBCA (2018) Records	Likelihood of Occurrence in each Survey Area								Habitat Use	Explanation
	EPBC Act	WC Act	DBCA		A	B	C	D	E	F	G	H		
Peregrine Falcon <i>Falco peregrinus</i>	-	S7 (OS)	-	9 records, including Solomon Mine (2012 & 2013), Wittenoom Airstrip (2001) and Mt Jope Area (2004)	H	M	M	M	M	H	M	H	Forage over all habitats	May occur as a foraging visitor. Unlikely to nest in the Study Area.
<b>Mammals</b>														
Northern Quoll <i>Dasyurus hallucatus</i>	En	En	-	95 records, including Wittenoom Gorge (1990), many records from Solomon Mine (2012, 2013, 2014, 2015 & 2017) and Yindjibarndi Country, Mount Sheila (2014).	M	L	L	L	L	L	L	H	SH, may range into adjacent habitats.	This species has been recorded near Survey Area H, and there is potential shelter habitat adjacent to Survey Area A and potential shelter habitat within and adjacent to Survey Area H.
Bilby <i>Macrotis lagotis</i>	Vu	S3	-	None, but recorded within 40km on NatureMap (Appendix N).	L	L	L	L	L	L	L	L	AF, SOP	The Study Area is outside the current known range of this species, with all records to the north/east. The habitats of the Study Area are generally unsuitable for this species.
Ghost Bat <i>Macroderma gigas</i>	Vu	S3 (Vu)	-	14 records, including Solomon Mine (2013), Karijini National Park (2011 & 2012), Brockman (2010), Hamersley Ranges, 80km south of Wittenoom (2011).	H	H	H	M	M	M	M	H	Forage over all habitats	May occur as a foraging visitor, particularly at Survey Areas A, B, C and H, near ranges where this species has been recorded. No roosting/breeding habitat present.
Pilbara Leaf-nosed Bat <i>Rhinonicteris auratia</i>	Vu	S3 (Vu)	-	36 records, including Beasley River at Rocklea (2009), Mount Sheila (2011 & 2015), Tom Price (2012), Solomon Mine (2013 & 2014), Wittenoom Gorge (2013) and Brockman (2015).	H	H	H	M	M	M	M	H	Forage over all habitats	May occur as a foraging visitor, particularly at Survey Areas A, B, C and H, near ranges where this species has been recorded. No roosting/breeding habitat present.



Species	Status			DBCA (2018) Records	Likelihood of Occurrence in each Survey Area								Habitat Use	Explanation
	EPBC Act	WC Act	DBCA		A	B	C	D	E	F	G	H		
Spectacled Hare-Wallaby <i>Lagorchestes conspicillatus leichardti</i>	-	-	P3	1 record from Near Walluna Mill not far from the Hamersley Iron Railway in the Weelymurra area (1966).	L	L	L	L	L	L	L	L	SSP, SOP	Likely to be locally extinct, if present this species may occur in plains habitats with large Spinifex clumps.
Lakeland Downs Mouse <i>Legadina lakedownensis</i>	-	-	P4	24 records, including near Tom Price (2006), 17.5km northeast of Tom Price (2005), Beasley River (2009), Solomon Mine (2014) and Hamersley Iron Nammuldi/Silvergrass Mining Lease (1999).	M	M	M	M	M	M	M	M	AF, SOP, CL	Suitable habitat is present and this species has been recorded in the surrounding area.
Western Pebble-mound Mouse <i>Pseudomys chapmani</i>	-	-	P4	115 records, including Hamersley Iron Nammuldi/Silvergrass Mining Lease (1998 & 1999), Southern Plains Project, Mt Sheila (2001), Brockman (2011 & 2015), Wittenoom (1992) and Rocklea (2011).	K	K	K	K	H	K	K	H	CR, LSR, SSP, SOP	Active and inactive pebble mounds recorded in most Survey Areas (Appendix M, Q). This species occurs on the stony hills and low stony rises that comprise much of the Study Area.
Long-tailed Dunnart <i>Sminthopsis longicaudata</i>	-	-	P4	Eight records, including Mt Sheila (undated, 1998 & 2011), 1.5km east of Tom Price (2006), 53km NNW of Tom Price (2006) and Hamersley Range (2011).	M	L	L	L	L	M	L	H	CR, SH, LSR	Suitable habitat is present, and though there are few records from surrounding areas, this species can be difficult to trap, so this is not necessarily an indicator of rarity.

## 6. DISCUSSION AND CONCLUSIONS

### 6.1 Flora and Vegetation

Although the Survey Areas are relatively small in size, it is considered that these areas are relatively diverse in terms of taxon richness. In particular, Survey Areas E, F and G were particularly rich. This is likely because of a combination of factors, with the presence of cracking clay soils in claypans on basaltic flats considered an especially strong driver of taxon richness; this most notably, the number of ephemeral taxa and perennial tussock grass taxa was high in these areas. Additionally, the presence of basalt in other areas, including on the outwash plain mapped as VU 17, the hills mapped as VU 18, and the low rises mapped as VU 14, also appeared to be a strong driver of taxon richness, with these areas containing high numbers of ephemeral taxa relative to other substrates (e.g. calcrete, ironstone).

It is also worthy of note that the significant rainfall event that forced the abandonment of the initial survey ultimately allowed for the second survey to be undertaken at what is considered to be an optimal time in a biodiversity context, both from a taxon presence and taxon identifiability point of view, with a relatively high number of taxa recorded, and few identification issues. Had this event not occurred, it is expected that the taxon totals would have been lower than recorded by the survey, and that many taxa, including some perennials, would have been difficult to identify; the latter issue appeared to affect a previous survey undertaken in the vicinity of the Study Area (GHD 2016) to a reasonable extent.

As outlined in Section 5.1.2.2, *Goodenia pedicellata* (P1) was found across relatively large portions of Survey Areas A, B and C, occasionally in relatively high numbers depending on fire history (more plants were present in recently burnt areas). Because of this, the total number of individuals in these Survey Areas could not be ascertained in the time allocated for survey. However, the survey conducted provides a strong indication that the populations present are large. As numerous individuals were recorded outside Survey Area B from a far shorter amount of survey time compared to within Survey Areas, it is expected that the number of individuals in the vicinity of these Survey Areas would be large. However, as outlined in Section 5.1.2.2, numbers of individuals are likely to significantly vary depending on fire history.

The extent of suitable habitat for this taxon is unknown within the Pilbara Region. Relatively few records in close proximity are known of this taxon, and therefore the regional distribution information available is limited. The majority of collections of this taxon housed at the WAHerb refer to habitat being composed of gentle slopes to small hills of calcrete soils, calcrete mounds, having calcrete subsoils, or undulating calcrete soils. Survey Areas A, B and C are located predominantly on the Table Land System (Figure 4), which occupies 0.04% of the Pilbara survey area as mapped by Payne *et al.* (1994) (7,700 ha<sup>2</sup> of 181, 723 ha<sup>2</sup>). Approximately 50% of the total area of this Landsystem is composed of calcrete mesas, low hills and plateaux, with calcrete also dominating all other landforms in the Table Landsystem (Payne *et al.* 1994).

Other Land Systems mapped by Payne *et al.* (1994) which are represented mainly by calcrete soils were likewise not extensive throughout the Pilbara survey area, including Oakover (0.8% of the Pilbara study area), Calcrete (0.08%), Lime (0.03%) and Warri (0.2%). Other Landsystems with minor representation of calcrete (1% or less within the Landsystem) included Coolibah (0.6% of the Pilbara Study Area), Egerton (0.3%), Giralia (0.04%), Kanjenjie (0.1%), Macroy (7.2%), Paterson (0.5%), Pyramid (0.1%), Satirist (0.25), Uaroo (4.2%), Wannamunna (0.3%). Therefore, the potential regional habitat for this taxon, whilst not being rare, cannot be considered extensive throughout the region.

Of the remaining significant flora taxa recorded, the extent and abundance of *Astrebla lappacea* (P3), *Oldenlandia* sp. Hamersley Station (A.A. Mitchell PRP 1479) (P3) and *Swainsona thompsoniana* (P3) in the Survey Areas has likely been relatively accurately defined. These taxa are endemic to cracking clay soils which are easily recognisable and relatively restricted in distribution in the Survey Areas. The extent and abundance of *Euphorbia inappendiculata* var. *queenslandica* and *Aristida jerichoensis* var. *subspinulifera* in the Survey Areas has not been resolved by this survey, because of the cryptic nature of these taxa. However, based on the records made by this survey, it appears that they also are restricted to the areas of cracking clay soils and therefore are unlikely to occur over extensive areas in the Survey Areas.

Regionally, cracking clays were described by Payne *et al.* (1994) as 'self-mulching cracking clays (soil type 602)', typically located in drainage foci, swamps, gilgai plains and saline plains in the Pilbara study area. This soil type is relatively common within a greater number of Landsystems in comparison to that of calcrete soils (approximately 18 Landsystems); however, none of these Landsystems are themselves regionally extensive, with most being less than 1% of the Pilbara study area. Therefore, although not rare, the habitat for these significant flora taxa cannot be considered extensive on a regional basis.

The extent and abundance of *Goodenia nuda* (P4) in the Survey Areas has also not been resolved by this survey, also because of the cryptic nature of these taxa. Based on the records made by this survey, it is possible that this taxon occurs over relatively large areas, particularly in Survey Areas D, E and G. However, based on the results of this survey, there are unlikely to be large numbers of individuals. It is expected that this is a result of the fire history of its habitat in the Survey Areas; most of its habitat appears to be relatively long unburnt. It is likely that an increased numbers of individuals would be present immediately post-fire, however this cannot be confirmed, as none of the areas of VU 8 or 10 had been recently burnt. It is worthy of note that the largest number of individuals was recorded outside Survey Area E on the recently disturbed verge of Nanutarra Munjina Road, indicating that disturbance from grading or fire is likely to result in mass plant establishment.

As noted in Section 5.1.2.8, several of the VUs mapped in the Study Area may be of some significance. However, without a comprehensive regional vegetation dataset to provide context for assessments of significance of VUs, it is not possible to be certain of the significance of any of the VUs. Notwithstanding this, it appears certain that all of the VUs mapped in the Study Area extend outside the Study Area, based on field observations and aerial photography, and most are likely to occur relatively extensively in the wider region. It

is possible that even those VUs considered to be of potential significance may also occur relatively extensively, however this requires further investigation. Areas of calcrete and cracking clays are known to occur in scattered, sometimes widely separated areas, and therefore the vegetation occurring in these areas may vary geographically.

## 6.2 Fauna

The fauna habitat of the Study Area is common in the region. The Study Area is unlikely to be part of an important linkage ('wildlife corridor' or 'stepping stone') as the habitat is broad in extent and the bioregion remains largely uncleared. The faunal assemblage of the Study Area is likely to be largely intact, missing only those species locally extinct or greatly reduced in the bioregion.

The only significant fauna recorded during the field survey was the Western Pebble-mound Mouse (*Pseudomys chapmani*). However, several significant species were identified as potentially occurring on the basis of the desktop study and the habitat present in the Study Area. Eight are listed under the EPBC Act; the Pilbara Olive Python, Night Parrot, Fork-tailed Swift, Oriental Plover, Northern Quoll, Bilby, Pilbara Leaf-nosed Bat and Ghost Bat. For most of these species, though they may occur, the Study Area is unlikely to provide significant habitat. The habitat present is unlikely to support the Pilbara Olive Python, though this species may range out from rocky hills adjacent to Survey Areas A and H. Although likely to occur, bats (Ghost Bat and Pilbara Leaf-nosed Bat) are only likely to forage in the Study Area as part of a larger foraging range, as roosting and breeding habitat is absent. The Fork-tailed Swift may occur, but as it is a primarily aerial species, the Study Area is not specifically significant as habitat. The Oriental Plover may occur on occasion, but not in significant numbers. It remains unconfirmed that the current range of the Bilby extends as far southwest as the Study Area, and the habitats present are not generally suitable.

The Night Parrot may occur in the Acacia flats and Stony Outwash Plain habitats, as well as in some parts of the low stony rises where there is large Spinifex. Large long-unburnt Spinifex clumps potentially comprise breeding habitat and areas of chenopod shrubland potentially comprise foraging habitat. There is a potentially moderate likelihood of occurrence of this species within Survey Areas F, G and H, however the lack of data on this species makes it difficult to more accurately define this likelihood and at this stage insufficient data has been collected to determine their presence.

The Northern Quoll has been recorded in the ranges to the north of Survey Area H, and all the Survey Areas are within the known distribution of the species. There is a moderate likelihood of occurrence of this species at Survey Area A, and a High likelihood of occurrence of this species at Survey Area H, due to the presence of potential shelter habitat in close proximity to these Survey Areas. Potential dispersal and foraging habitat is located in both of these Survey Areas (Appendix P).

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## Appendix A: Scope of Works

This survey was undertaken as per the following Scope of Works (SoW) provided by Main Roads WA as listed below:

### Desktop Assessment

- Complete a desktop assessment of the study area prior to the field survey work to identify all biological features and constraints, which may be in, or nearby the project area. Desktop assessment to include presentation and review of data from the Department of the Environment and Energy's (DoEE) Protected Matters Search Tool, DBCA's *NatureMap* and *FloraBase*, Main Roads supplied database searches from DBCA's Species & Communities Branch (threatened and priority flora/fauna/TEC & PEC);
- Review relevant environmental reports as provided by Main Roads and/or relevant to the project area and ecological values;
- Identify significant flora, vegetation/ecological communities, fauna, soil/land system, groundwater and surface water values and potential sensitivity to impact;
- Identify broad pre-European vegetation type(s) (Beard various).

### Field Survey

- Conduct a field survey (to be done by an environmental specialist in accordance with regulatory expectation for years of experience in the relevant bioregion) to verify / ground truth the desktop assessment findings through targeted and comprehensive survey (refer to relevant EPA published flora and fauna Technical Guides & guidance for Matters of National Environmental Significance (MNES) species where available);
- Undertake vegetation community/type mapping to a scale appropriate for the bioregion and described according to the National Vegetation Information System (NVIS) structure and floristics. NVIS (ESCAVI 2003) is the current nationally adopted classification system and should be used for vegetation description. Mapping at a scale of 1:10,000 using NVIS sub-association level (L5) for structural descriptions (NHT 2003);
- Where TEC or PECs occur within or in the vicinity of the survey area, quadrat data should be analysed against State data for that community (*NatureMap*), consistent with methods used in key regional surveys. Where TEC/PEC areas are mapped, the mapping is to be at a scale of 1:5,000 and include four representative photographs (presented as 4 images per A4 page) to illustrate that the extent and condition of the vegetation mapped is consistent with an extant extent of that TEC/PEC;
- Assess the project areas plant species diversity, density, composition, structure and weed cover, recording the percentage of each in nominated quadrats. Quadrats shall be measured out with tape and fence droppers and photographed as such. Quadrat data to be appended to report;
- Track logs from GPS are to be recorded during the field survey to attest to time and effort expended;
- Undertake vegetation condition mapping using EPA (2016) condition scale;
- Targeted survey for rare and priority flora based on desktop likelihood of occurrence and habitat availability. When populations are identified, survey and map extent of populations to determine number and habitat area for each population. Shapefiles shall be provided with point data indicating the number of plants identified at each

point. If more than 100, the edges of the population boundary can be mapped and provided as a shapefile to Main Roads. If the population extends outside the survey area, the survey will map the extent of the population;

- Identify locations of any Weeds of National Significance or Declared Pests;
- Identification and mapping of fauna habitat. Habitat mapping should be based on vegetation types and the report should include a summary of which vegetation types are suitable for each conservation significant fauna considered likely or possible to occur, or fauna recorded in the survey area;
- Record fauna within survey area and fauna of conservation significance. Any Western Pebble-mound Mouse mounds must be recorded, mapped and identified as either 'active' or inactive'.

### Post-Survey Debrief Email

- Within one week of returning from the field survey, the consultant will send an email to summarise the preliminary survey results;
- The email shall include details of observed potentially significant environmental values and if further survey or other actions are required to be followed up by Main Roads.

### Reporting

- Provide environmental constraints mapping using GIS mapping software (e.g. ArcMap) for flora, fauna, ecological communities, watercourse, wetlands, ESAs etc.;
- Assess all biological aspects likely to require referral of the project to the Environmental Protection Authority (EPA);
- Assess MNES and indicate whether potential impacts on MNES as protected under the EPBC Act are likely to require referral of the project to the Commonwealth DotEE. Provide justification of decision as to whether referral to DotEE is likely to be required. Ensure to reference relevant Commonwealth significant impact guidelines;
- Determine the legislative context of environmental aspects required for the assessment;
- Provide a concise report on the findings of the biological survey (see reporting findings section for detail required in report).

### Department of Biodiversity, Conservation and Attractions

- All conservation significant flora shall have a specimen taken and lodged with the WA Herbarium. WAHerb accession number to be provided in final report;
- For each species of conservation significant flora, a DBCA Threatened & Priority Flora report form (<https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants?view=categories&id=108>) is to be completed and submitted to DBCA Species & Communities Branch. A copy shall be appended to the final report;
- For each occurrence of TEC or PEC, a DBCA TEC/PEC report form (<https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/wa-s-threatened-ecological-communities>) is to be completed and submitted to DBCA Species & Communities Branch. A copy shall be appended to the final report;

- For each record of conservation significant fauna, a DBCA Threatened & Priority Fauna report form (<https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-animals?view=categories&id=109>) is to be completed and submitted to DBCA Species & Communities Branch. Where relevant, records to also be submitted to WA Museum. A copy shall be appended to the final report.

**Data**

- Raw survey data (results) are to be provided at Rev A Report Stage and include quadrat data (Excel format), GIS data of all biological survey components including but not limited to flora/fauna records, DBH trees, ecological community and condition mapping, and track logs for survey effort;
- At Project completion (Rev 0/final report) data in electronic format final data is to be provided. The data is to be provided in a format that satisfies Main Roads data standards, as supplied.

**Appendix B: Vegetation Condition Scale for the Eremaean and Northern Botanical Provinces (EPA 2016a)**



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 activity 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 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 weed or crop species with isolated native trees or shrubs

**Appendix E: Results of Search of the Department of the Environment and Energy Species Profile and Threats (SPRAT) Database (DoEE 2018)**



# 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: 11/06/18 18:53:22

[Summary](#)

[Details](#)

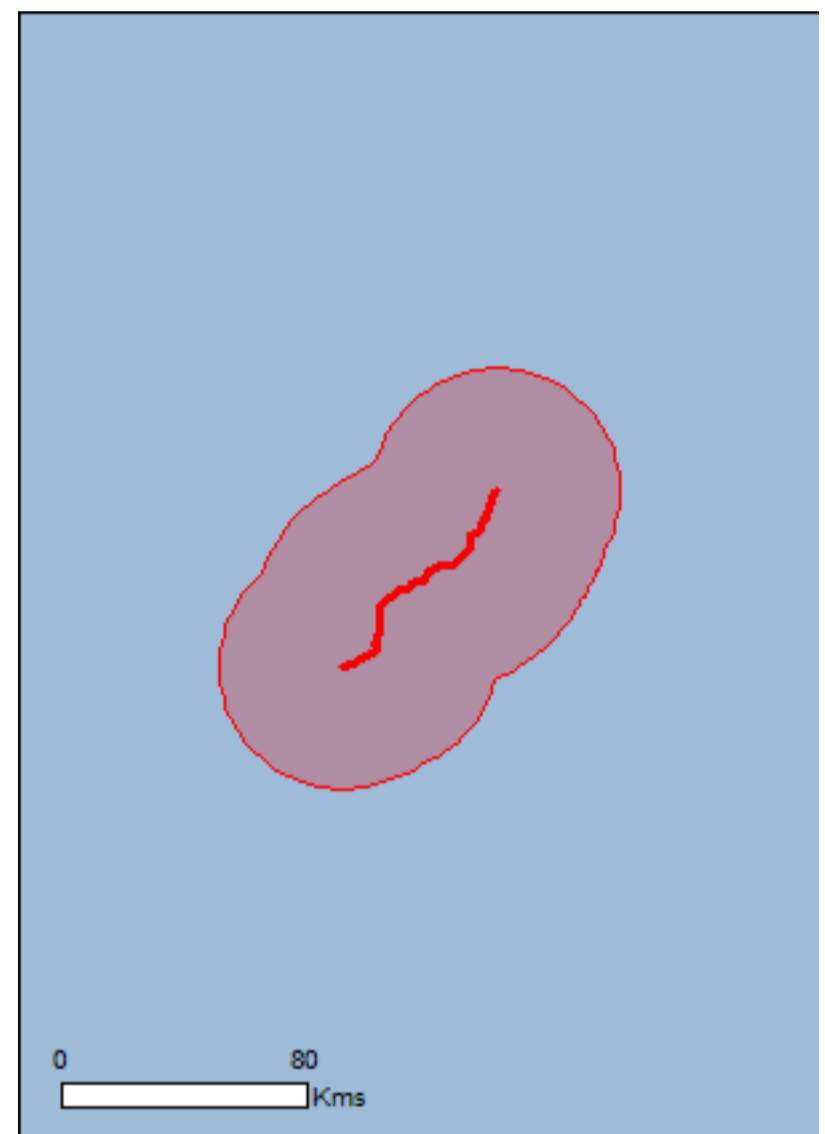
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

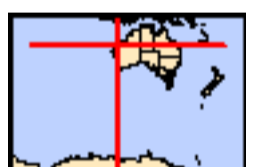
[Acknowledgements](#)



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

[Coordinates](#)

Buffer: 40.0Km



# 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](#).

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance:</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	None
<a href="#">Listed Threatened Species:</a>	8
<a href="#">Listed Migratory Species:</a>	9

## 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.

<a href="#">Commonwealth Land:</a>	2
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	14
<a href="#">Whales and Other Cetaceans:</a>	None
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Commonwealth Reserves Marine:</a>	None

## Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

<a href="#">State and Territory Reserves:</a>	2
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	11
<a href="#">Nationally Important Wetlands:</a>	1
<a href="#">Key Ecological Features (Marine)</a>	None

# Details

## Matters of National Environmental Significance

### Listed Threatened Species [\[ Resource Information \]](#)

Name	Status	Type of Presence
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#### Birds

<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
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<a href="#">Pezoporus occidentalis</a> Night Parrot [59350]	Endangered	Species or species habitat may occur within area
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<a href="#">Rostratula australis</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
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#### Mammals

<a href="#">Dasyurus hallucatus</a> Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
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<a href="#">Macroderma gigas</a> Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
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<a href="#">Macrotis lagotis</a> Greater Bilby [282]	Vulnerable	Species or species habitat likely to occur within area
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<a href="#">Rhinonictes aurantia (Pilbara form)</a> Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat known to occur within area
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#### Reptiles

<a href="#">Liasis olivaceus barroni</a> Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat known 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

<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
---	--	--

#### Migratory Terrestrial Species

<a href="#">Hirundo rustica</a> Barn Swallow [662]		Species or species habitat may occur within area
---	--	--

Name	Threatened	Type of Presence
<a href="#">Motacilla cinerea</a> Grey Wagtail [642]		Species or species habitat may occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area
<b>Migratory Wetlands Species</b>		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Charadrius veredus</a> Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area

## Other Matters Protected by the EPBC Act

### Commonwealth Land [\[ Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Defence - TOM PRICE TRAINING DEPOT

### 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
<b>Birds</b>		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat known to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Charadrius veredus</a> Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
<a href="#">Hirundo rustica</a> Barn Swallow [662]		Species or species habitat may occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Motacilla cinerea</a> Grey Wagtail [642]		Species or species habitat may occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

## Extra Information

State and Territory Reserves	[ Resource Information ]
Name	State
Karijini	WA
Unnamed WA41696	WA

## 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 Resources Audit, 2001.

Name	Status	Type of Presence
<b>Birds</b>		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
<b>Mammals</b>		
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area

### Plants

Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area

### Nationally Important Wetlands [ [Resource Information](#) ]

Name	State
<a href="#">Fortescue Marshes</a>	WA



# Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

## Coordinates

-22.237241 117.969107,-22.242325 117.960867,-22.307137 117.940268,-22.31476 117.936148,-22.318571 117.926535,-22.341436 117.923788,-22.352868 117.915549,-22.363028 117.89083,-22.397314 117.88671,-22.439208 117.834525,-22.437939 117.816672,-22.441746 117.815299,-22.443016 117.808432,-22.443016 117.804312,-22.449362 117.798819,-22.455708 117.7741,-22.456977 117.768607,-22.463323 117.76174,-22.47982 117.7535,-22.486164 117.739768,-22.493778 117.717795,-22.503928 117.706809,-22.505196 117.683463,-22.525494 117.654623,-22.538179 117.636771,-22.548326 117.631278,-22.558472 117.625784,-22.564813 117.620291,-22.587638 117.620291,-22.601585 117.620291,-22.618065 117.623038,-22.626939 117.621664,-22.632009 117.614798,-22.647219 117.614798,-22.652288 117.610678,-22.664961 117.616171,-22.671297 117.613425,-22.677633 117.601065,-22.690303 117.56536,-22.706773 117.543387,-22.714374 117.513174

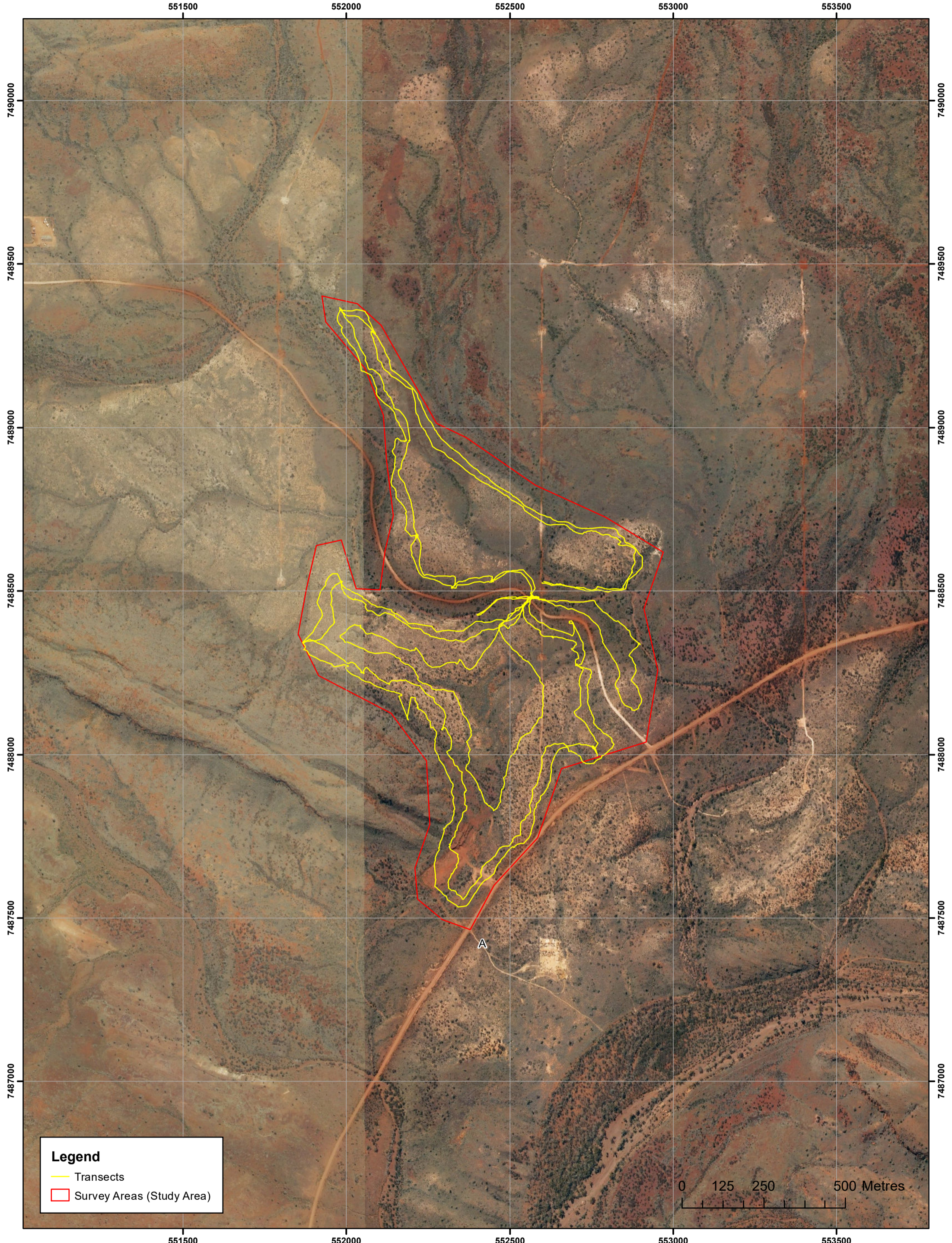
# Acknowledgements

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

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

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

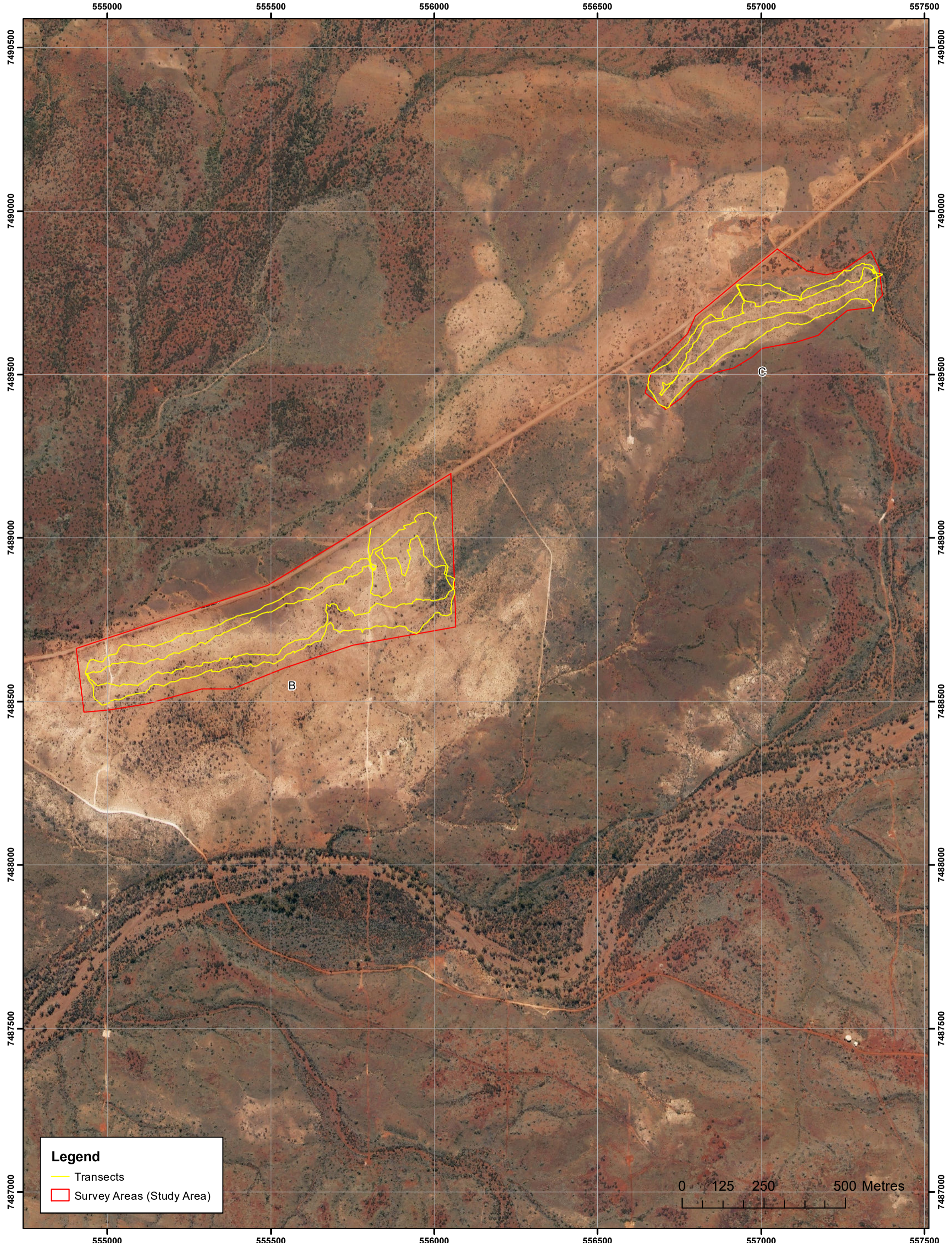
Please feel free to provide feedback via the [Contact Us](#) page.



**Legend**

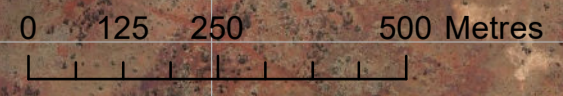
- Transects
- Survey Areas (Study Area)





**Legend**

- Transects
- Survey Areas (Study Area)




This map should only be used in conjunction with WEC report MR18-34-01.

**Fauna Survey Transects Walked Through the Study Area**

Revision: 0 - 21 Nov 2018      Scale: 1:10,000 (A3)

Author: David Coultas  
 WEC Ref: MR18-34-01  
 Filename: MR18-34-01-App-D.mxd  
 Projection: GDA 1994 MGA Zone 50

**Appendix**

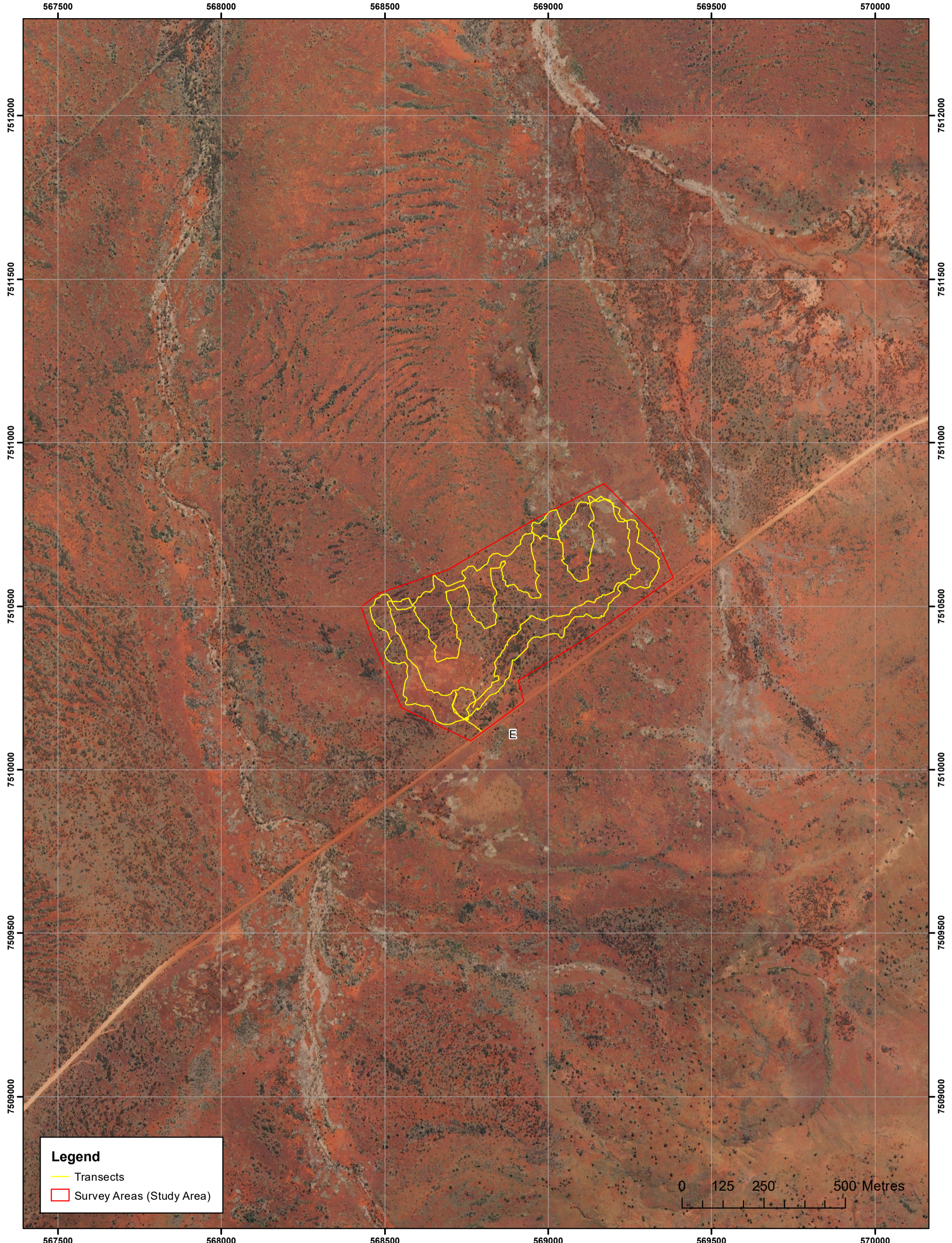
**D2**



**Legend**

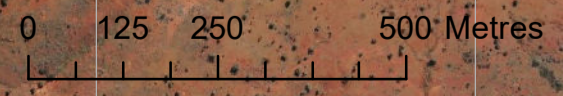
- Transects
- Survey Areas (Study Area)

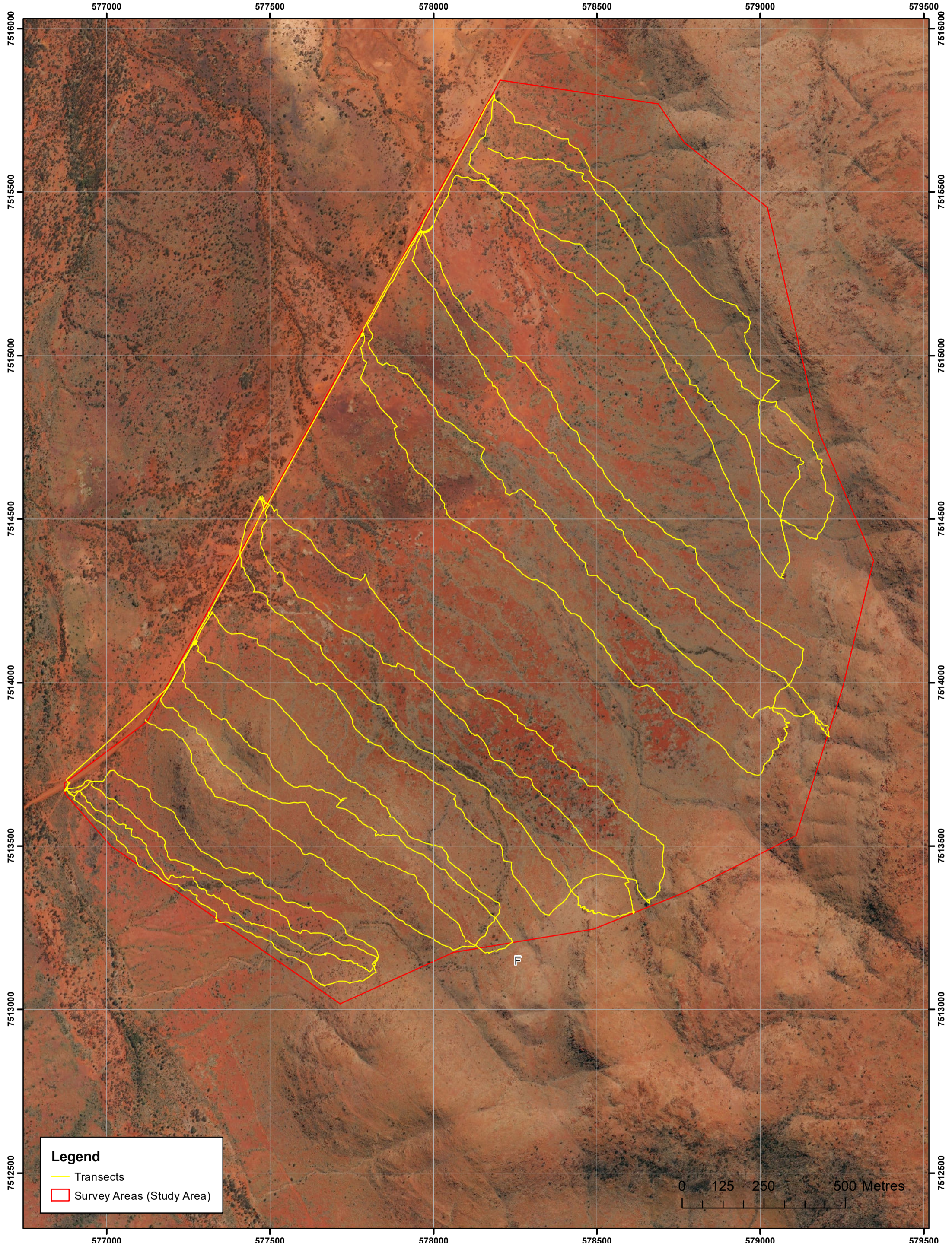




**Legend**

- Transects
- Survey Areas (Study Area)





**Legend**

- Transects
- Survey Areas (Study Area)



**WOODMAN**  
ENVIRONMENTAL

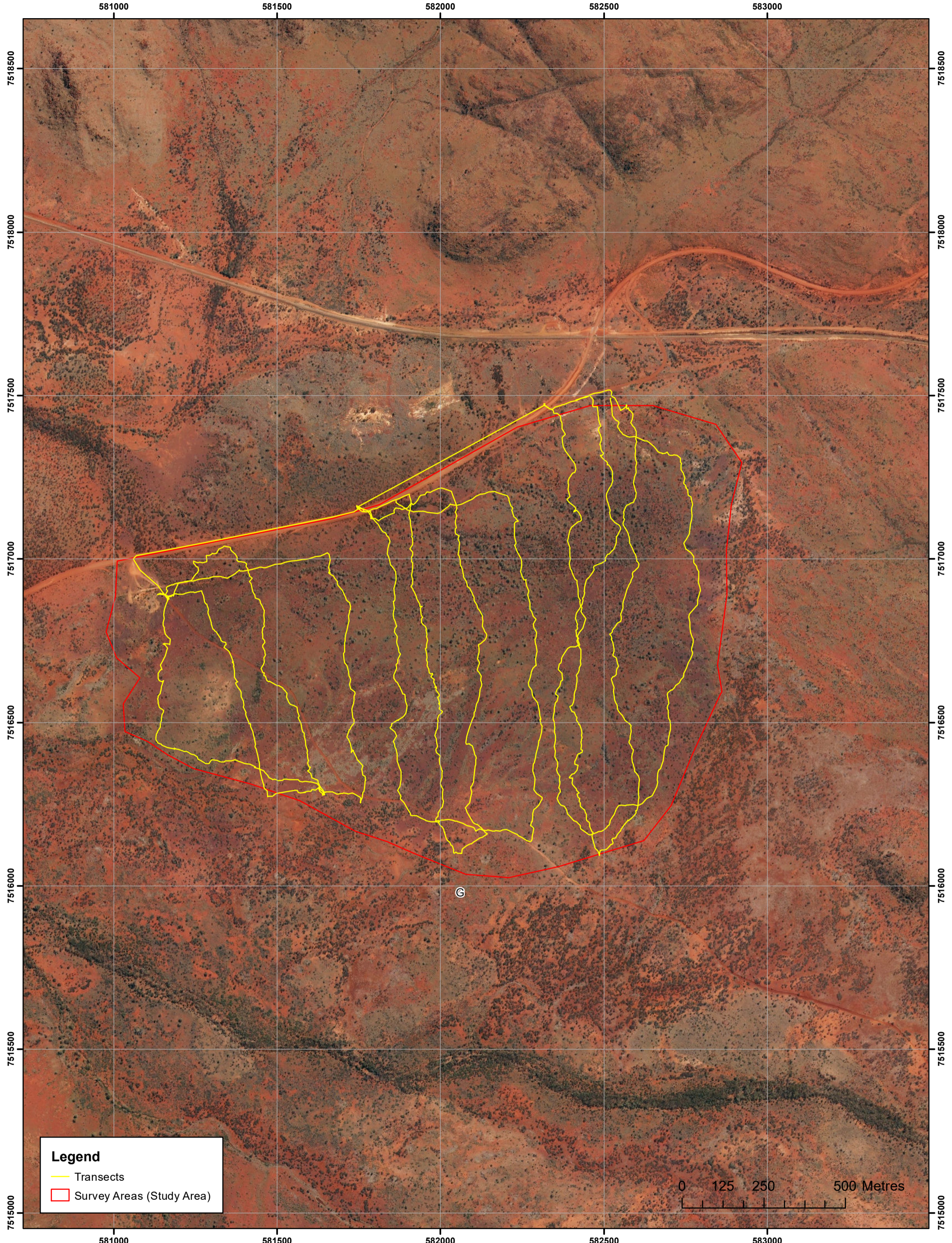
This map should only be used in conjunction with WEC report MR18-34-01.

**Fauna Survey Transects Walked  
Through the Study Area**

Revision: 0 - 21 Nov 2018      Scale: 1:10,000 (A3)

Author: David Coultas  
 WEC Ref: MR18-34-01  
 Filename: MR18-34-01-App-D.mxd  
 Projection: GDA 1994 MGA Zone 50

**Appendix**  
  
**D5**



**Legend**

- Transects
- Survey Areas (Study Area)



This map should only be used in conjunction with WEC report MR18-34-01.

**Fauna Survey Transects Walked Through the Study Area**

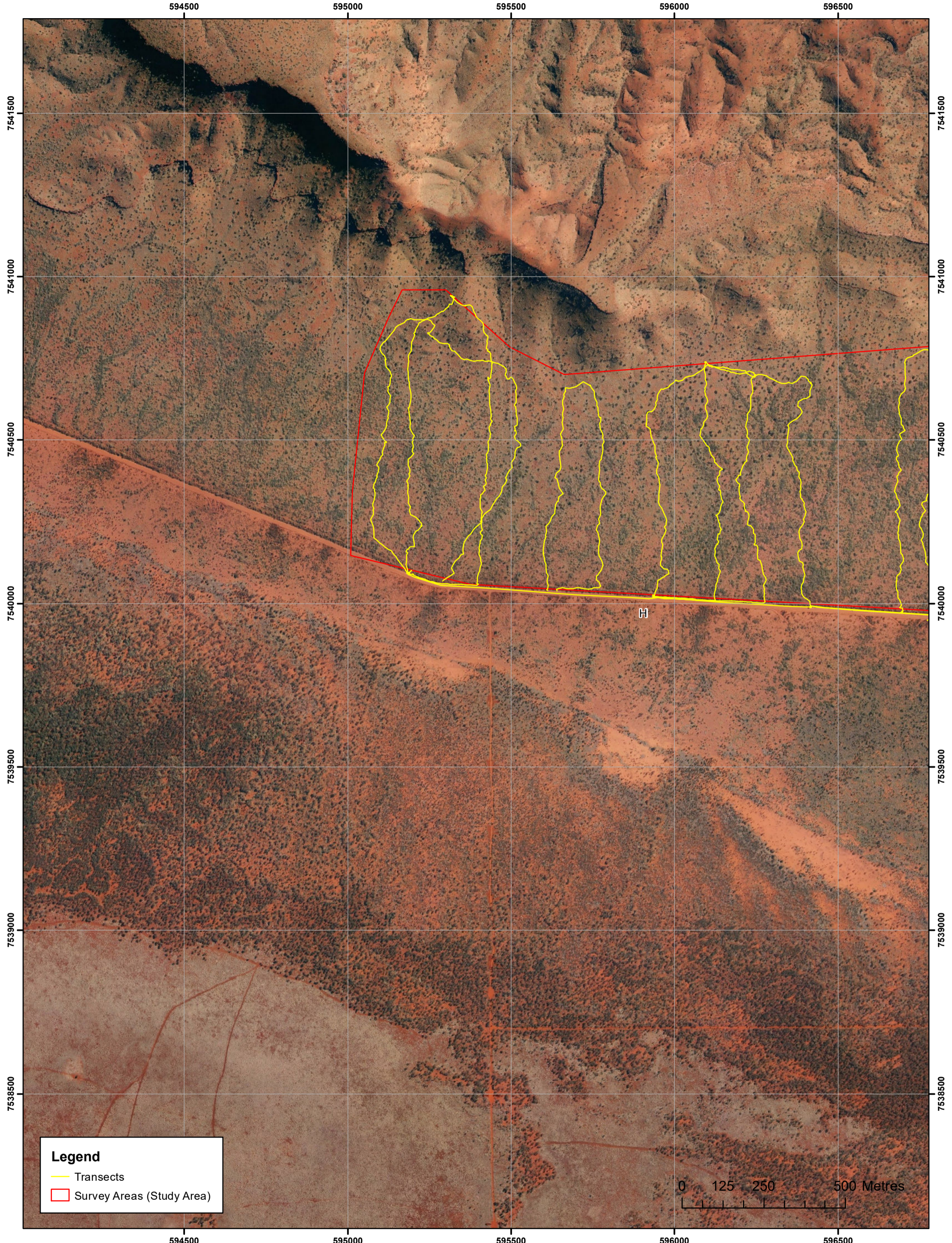
Revision: 0 - 21 Nov 2018      Scale: 1:10,000 (A3)

Author: David Coultas  
 WEC Ref: MR18-34-01  
 Filename: MR18-34-01-App-D.mxd  
 Projection: GDA 1994 MGA Zone 50

**Appendix**

**D6**





**Legend**

- Transects
- Survey Areas (Study Area)



This map should only be used in conjunction with WEC report MR18-34-01.

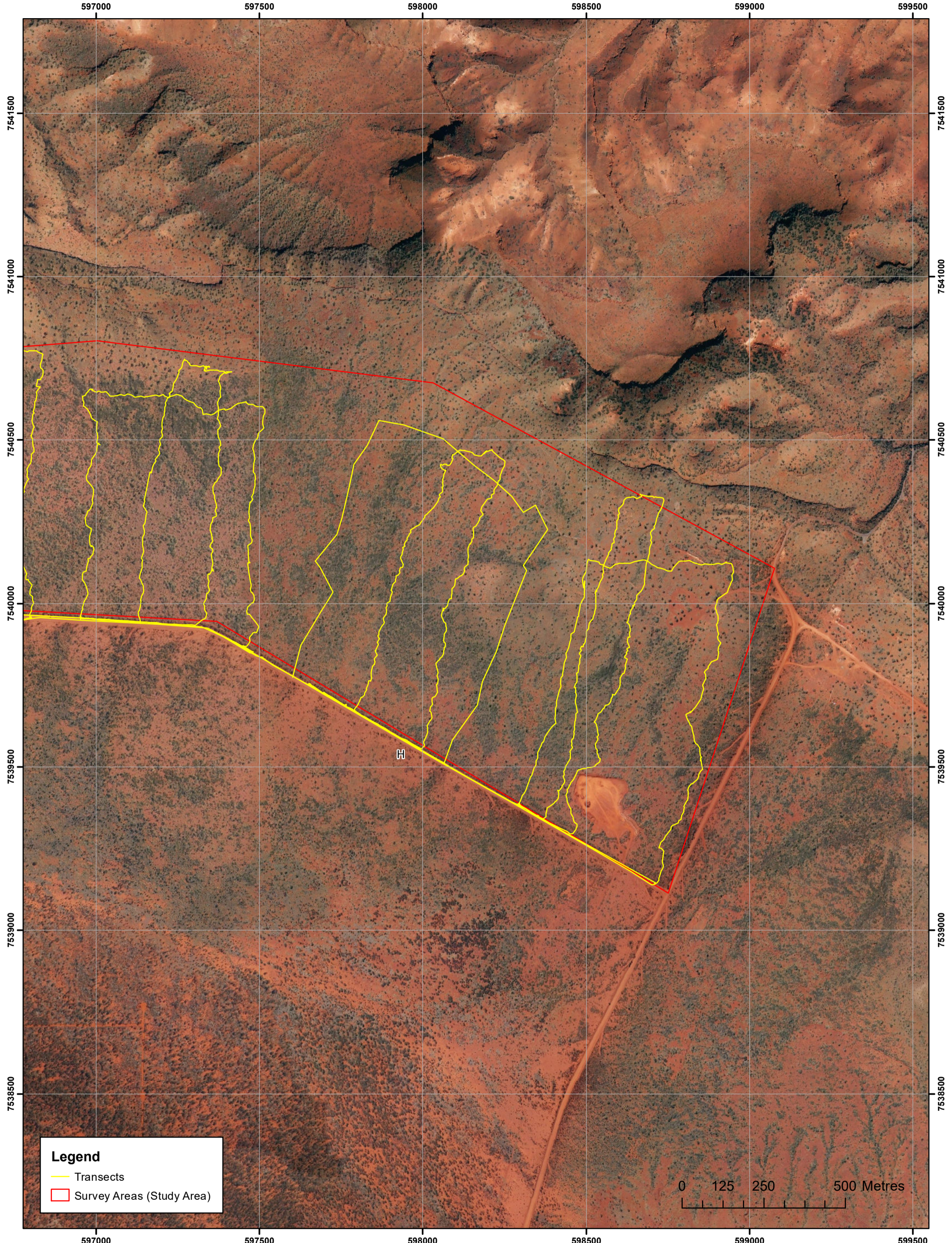
**Fauna Survey Transects Walked Through the Study Area**

Revision: 0 - 21 Nov 2018      Scale: 1:10,000 (A3)

Author: David Coultas  
 WEC Ref: MR18-34-01  
 Filename: MR18-34-01-App-D.mxd  
 Projection: GDA 1994 MGA Zone 50

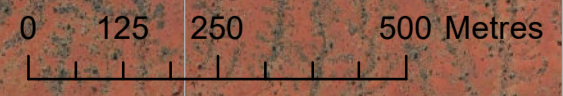
**Appendix**

**D7**



**Legend**

- Transects
- Survey Areas (Study Area)



This map should only be used in conjunction with WEC report MR18-34-01.



**Fauna Survey Transects Walked Through the Study Area**

Revision: 0 - 21 Nov 2018      Scale: 1:10,000 (A3)

Author: David Coultas  
 WEC Ref: MR18-34-01  
 Filename: MR18-34-01-App-D.mxd  
 Projection: GDA 1994 MGA Zone 50

**Appendix**  
  
**D8**

## **Appendix F: Vascular Plant Taxa Recorded in the Study Area**

Family	Taxon	Area							
		A	B	C	D	E	F	G	H
Acanthaceae	<i>Dicladantha forrestii</i>						x		
	<i>Dipteracanthus australasicus</i> subsp. <i>australasicus</i>	x		x	x	x	x	x	
	<i>Rostellularia adscendens</i> var. <i>clementii</i>					x	x	x	
Aizoaceae	<i>Trianthema glossostigmum</i>							x	x
Amaranthaceae	<i>Achyranthes aspera</i>						x		
	<i>Alternanthera denticulata</i>							x	
	<i>Alternanthera nana</i>	x							
	<i>Amaranthus cuspidifolius</i>					x	x		
	<i>Amaranthus undulatus</i>	x							
	<i>Gomphrena cunninghamii</i>	x					x		
	<i>Gomphrena kanisii</i>						x	x	
	<i>Ptilotus aevoides</i>				x	x	x	x	
	<i>Ptilotus astrolasius</i>	x							x
	<i>Ptilotus auriculifolius</i>						x		
	<i>Ptilotus calostachyus</i>	x						x	x
	<i>Ptilotus carinatus</i>					x	x		
	<i>Ptilotus clementii</i>	x	x				x		x
	<i>Ptilotus fusiformis</i>	x					x	x	
	<i>Ptilotus gaudichaudii</i>					x			
	<i>Ptilotus gomphrenoides</i>					x			
	<i>Ptilotus helipteroides</i>				x	x	x	x	x
	<i>Ptilotus macrocephalus</i>					x	x		
	<i>Ptilotus nobilis</i>	x		x	x	x	x	x	x
	<i>Ptilotus obovatus</i>	x	x	x		x	x	x	
<i>Ptilotus roei</i>					x	x			
<i>Ptilotus rotundifolius</i>	x			x	x	x	x		
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	x				x	x	x		
Apocynaceae	<i>Cynanchum viminale</i> subsp. <i>australe</i>	x	x						
	<i>Rhyncharrhena linearis</i>					x	x	x	x
Araliaceae	<i>Trachymene oleracea</i>		x		x		x		
Asteraceae	* <i>Bidens bipinnata</i>	x				x	x		
	<i>Calocephalus knappii</i>						x		
	<i>Calotis hispidula</i>							x	
	<i>Centipeda minima</i>						x	x	
	<i>Chrysocephalum gilesii</i>					x			
	<i>Dichromochlamys dentatifolia</i>							x	
	<i>Minuria integerrima</i>						x		
	<i>Peripleura arida</i>		x			x	x	x	x
	<i>Peripleura obovata</i>				x				
	<i>Peripleura virgata</i>							x	
	<i>Pluchea dentex</i>	x		x					
	<i>Pterocaulon sphacelatum</i>	x			x	x	x	x	
	<i>Rhodanthe charsleyae</i>		x						
	<i>Roebuckiella similis</i>					x			
	* <i>Sonchus oleraceus</i>							x	
	<i>Streptoglossa adscendens</i>			x		x			
	<i>Streptoglossa bubakii</i>			x		x	x	x	
	<i>Streptoglossa decurrens</i>				x				
	<i>Streptoglossa tenuiflora</i>							x	
	Boraginaceae	<i>Heliotropium crispatum</i>					x		x
<i>Heliotropium cunninghamii</i>			x				x		
<i>Heliotropium heteranthum</i>						x	x	x	

Family	Taxon	Area							
		A	B	C	D	E	F	G	H
Boraginaceae cont.	<i>Heliotropium inexplicitum</i>						x		
	<i>Heliotropium ovalifolium</i>	x	x	x					
	<i>Trichodesma zeylanicum</i>	x	x		x		x	x	x
Brassicaceae	<i>Lepidium echinatum</i>					x			
	<i>Lepidium muelleri-ferdinandii</i>							x	
	<i>Lepidium pedicellosum</i>	x		x					
	<i>Lepidium phlebopetalum</i>				x	x	x	x	
	<i>Stenopetalum anfractum</i>						x		
Campanulaceae	<i>Wahlenbergia gracilentia</i>					x			
Capparaceae	<i>Capparis lasiantha</i>	x		x	x		x	x	x
	<i>Capparis spinosa</i> subsp. <i>nummularia</i>	x							
	<i>Capparis umbonata</i>	x							x
Caryophyllaceae	<i>Polycarpaea corymbosa</i>					x	x		
	<i>Polycarpaea holtzei</i>						x		x
	<i>Polycarpaea longiflora</i>	x							x
Celastraceae	<i>Maytenus</i> sp. Mt Windell (S. van Leeuwen 846)								x
	<i>Stackhousia muricata</i>		x	x					
	<i>Stackhousia</i> sp. swollen gynophore (W.R. Barker 2041)								x
Chenopodiaceae	<i>Atriplex bunburyana</i>					x		x	
	<i>Dissocarpus paradoxus</i>						x	x	
	<i>Dysphania plantaginella</i>		x						
	<i>Dysphania rhadinostachya</i>					x	x	x	x
	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	x		x	x	x	x	x	
	<i>Maireana eriosphaera</i>							x	
	<i>Maireana georgei</i>						x	x	
	<i>Maireana melanocoma</i>				x	x	x	x	
	<i>Maireana planifolia</i>					x	x		
	<i>Maireana pyramidata</i>						x	x	
	<i>Maireana thesioides</i>							x	
	<i>Maireana tomentosa</i> subsp. <i>tomentosa</i>			x	x			x	
	<i>Maireana triptera</i>						x	x	
	<i>Rhagodia eremaea</i>			x	x	x	x	x	
	<i>Salsola australis</i>			x	x	x	x	x	
	<i>Sclerolaena bicornis</i> var. <i>bicornis</i>							x	
	<i>Sclerolaena cornishiana</i>						x	x	x
	<i>Sclerolaena cuneata</i>				x			x	x
	<i>Sclerolaena densiflora</i>							x	x
	<i>Sclerolaena eriacantha</i>				x	x	x	x	
<i>Sclerolaena lanicuspis</i>				x	x	x	x		
<i>Sclerolaena minuta</i>				x			x	x	
Cleomaceae	<i>Cleome viscosa</i>	x					x		
Convolvulaceae	<i>Bonamia erecta</i>								x
	<i>Bonamia pilbarensis</i>						x		
	<i>Convolvulus clementii</i>	x				x			
	<i>Duperreya commixta</i>	x	x		x	x	x	x	x
	<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	x	x		x	x	x	x	x
	<i>Operculina aequisejala</i>						x		
	<i>Polymeria ambigua</i>	x							
	<i>Polymeria longifolia</i>							x	
Cucurbitaceae	<i>Austrobryonia pilbarensis</i>							x	
	<i>Cucumis variabilis</i>	x					x		x
Cyperaceae	<i>Bulbostylis barbata</i>					x	x		x

Family	Taxon	Area							
		A	B	C	D	E	F	G	H
Cyperaceae cont.	<i>Cyperus difformis</i>					x		x	
	<i>Fimbristylis dichotoma</i>						x		
	<i>Schoenoplectiella laevis</i>					x			
Elatinaceae	<i>Bergia pedicellaris</i>					x		x	
Euphorbiaceae	<i>Euphorbia australis</i> var. <i>hispidula</i>					x			
	<i>Euphorbia australis</i> var. <i>subtomentosa</i>						x		
	<i>Euphorbia biconvexa</i>	x					x		
	<i>Euphorbia boophthona</i>	x	x		x		x	x	x
	<i>Euphorbia coghlanii</i>			x					
	<i>Euphorbia drummondii</i>					x			
	<i>Euphorbia inappendiculata</i> var. <i>queenslandica</i> (P1)							x	
	<i>Euphorbia trigonosperma</i>							x	
	<i>Euphorbia vaccaria</i> var. <i>vaccaria</i>							x	x
Fabaceae	<i>Acacia adoxa</i> var. <i>adoxo</i>								x
	<i>Acacia ancistrocarpa</i>	x					x	x	x
	<i>Acacia aneura</i>					x	x	x	
	<i>Acacia aptaneura</i>				x	x	x	x	x
	<i>Acacia atkinsiana</i>							x	x
	<i>Acacia ayersiana</i>					x		x	
	<i>Acacia bivenosa</i>	x	x	x	x	x	x	x	x
	<i>Acacia bivenosa</i> x <i>sclerosperma</i> subsp. <i>sclerosperma</i>							x	
	<i>Acacia citrinoviridis</i>	x	x					x	
	<i>Acacia cowleana</i>								x
	<i>Acacia dictyophleba</i>								x
	<i>Acacia exigua</i>				x				
	<i>Acacia inaequilatera</i>						x	x	
	<i>Acacia kempeana</i>	x	x	x		x		x	
	<i>Acacia maitlandii</i>	x	x			x			x
	<i>Acacia marramamba</i>	x							
	<i>Acacia monticola</i>	x					x		x
	<i>Acacia pruinocarpa</i>		x		x	x	x	x	x
	<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	x					x		
	<i>Acacia rhodophloia</i>					x			
	<i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i>				x	x		x	
	<i>Acacia sibirica</i>		x						x
	<i>Acacia synchronicia</i>	x	x	x	x		x	x	
	<i>Acacia tenuissima</i>				x		x		x
	<i>Acacia tetragonophylla</i>	x		x		x	x	x	
	<i>Acacia trudgeniana</i>	x							
	<i>Acacia tumida</i> var. <i>pilbarensis</i>								x
	<i>Acacia wanyu</i>	x							
	<i>Acacia xiphophylla</i>			x	x	x	x	x	
	<i>Crotalaria dissitiflora</i> subsp. <i>benthamiana</i>					x	x	x	
	<i>Crotalaria medicaginea</i> var. <i>neglecta</i>						x		x
	<i>Cullen graveolens</i>					x	x		
	<i>Glycine canescens</i>	x					x		
	<i>Gompholobium oreophilum</i>								x
	<i>Indigofera georgei</i>					x			
	<i>Indigofera monophylla</i>	x	x		x	x	x	x	x
	<i>Lotus cruentus</i>			x		x	x	x	
	<i>Mirbelia viminalis</i>								x
	<i>Neptunia dimorphantha</i>				x	x	x		

Family	Taxon	Area							
		A	B	C	D	E	F	G	H
<b>Fabaceae cont.</b>	<i>Petalostylis labicheoides</i>	x	x						
	<i>Rhynchosia minima</i>	x		x		x	x	x	
	<i>Senna artemisioides</i> subsp. <i>helmsii</i>	x	x				x		x
	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	x	x	x	x	x	x	x	x
	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	x	x		x	x	x	x	x
	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	x	x		x		x	x	x
	<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	x	x	x		x	x	x	
	<i>Senna hamersleyensis</i>			x	x		x	x	x
	<i>Senna notabilis</i>				x			x	x
	<i>Senna</i> sp. Karijini (M.E. Trudgen 10392)			x			x	x	
	<i>Senna stricta</i>	x	x	x		x	x	x	
	<i>Swainsona leeana</i>			x			x		
	<i>Swainsona maccullochiana</i>						x		
	<i>Swainsona thompsoniana</i> (P3)					x	x		
	<i>Tephrosia rosea</i> var. Fortescue creeks (M.I.H. Brooker 2186)	x					x		
	<i>Tephrosia</i> sp. Fortescue (A.A. Mitchell 606)						x		
	<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	x							
* <i>Vachellia farnesiana</i>	x					x	x		
<i>Vigna</i> sp. Hamersley Clay (A.A. Mitchell PRP 113)							x		
<b>Gentianaceae</b>	<i>Schenkia clementii</i>					x			
<b>Goodeniaceae</b>	<i>Dampiera candicans</i>							x	
	<i>Goodenia forrestii</i>	x	x	x					
	<i>Goodenia microptera</i>		x	x	x	x	x	x	
	<i>Goodenia muelleriana</i>	x			x	x	x	x	
	<i>Goodenia nuda</i> (P4)				x	x		x	
	<i>Goodenia pascua</i>			x		x			
	<i>Goodenia pedicellata</i> (P1)	x	x	x					
	<i>Goodenia stellata</i>							x	
	<i>Goodenia stobbsiana</i>	x			x		x	x	
	<i>Goodenia tenuiloba</i>					x	x		
	<i>Goodenia triodiophila</i>							x	
	<i>Scaevola amblyanthera</i> var. <i>centralis</i>	x							
	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>							x	
	<i>Scaevola spinescens</i>	x		x	x	x		x	
	<i>Velleia connata</i>								x
<b>Gyrostemonaceae</b>	<i>Codonocarpus cotinifolius</i>	x			x				
<b>Haloragaceae</b>	<i>Haloragis gossei</i> var. <i>gossei</i>		x	x	x			x	
	<i>Haloragis maierae</i>			x		x			
<b>Lamiaceae</b>	<i>Clerodendrum floribundum</i> var. <i>angustifolium</i>						x		
<b>Lauraceae</b>	<i>Cassytha capillaris</i>	x	x					x	
<b>Loranthaceae</b>	<i>Amyema hilliana</i>	x							
	<i>Amyema</i> sp. Fortescue (M.E. Trudgen 5358)			x	x				
	<i>Lysiana casuarinae</i>	x						x	
<b>Malvaceae</b>	<i>Abutilon cunninghamii</i>	x						x	
	<i>Abutilon fraseri</i> subsp. <i>fraseri</i>	x						x	
	<i>Abutilon lepidum</i>					x	x	x	
	<i>Abutilon malvifolium</i>					x	x		
	<i>Abutilon otocarpum</i>				x	x	x	x	
	<i>Abutilon</i> sp. Pilbara (W.R. Barker 2025)				x		x	x	
	<i>Androcalva luteiflora</i>	x	x						

Family	Taxon	Area							
		A	B	C	D	E	F	G	H
<b>Malvaceae cont.</b>	<i>Corchorus crozophorifolius</i>	x	x						
	<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>	x			x				x
	<i>Corchorus tectus</i>						x		
	<i>Corchorus tridens</i>					x	x	x	
	<i>Gossypium australe</i>	x					x	x	
	<i>Gossypium robinsonii</i>	x					x	x	x
	<i>Hibiscus brachysiphonius</i>							x	
	<i>Hibiscus burtonii</i>				x	x	x	x	x
	<i>Hibiscus coatesii</i>	x			x		x		x
	<i>Hibiscus goldsworthii</i>						x		
	<i>Hibiscus leptocladus</i>	x	x						
	<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	x			x	x	x	x	x
	<i>Hibiscus sturtii</i> var. <i>platyklamys</i>								x
	* <i>Malvastrum americanum</i>			x		x	x	x	
	<i>Melhania oblongifolia</i>	x	x				x		
	<i>Seringia elliptica</i>						x		x
	<i>Sida ?arenicola</i>				x	x	x		x
	<i>Sida arsiniata</i>	x			x				
	<i>Sida echinocarpa</i>	x			x		x	x	
	<i>Sida fibulifera</i>	x		x	x	x	x	x	
	<i>Sida</i> sp. dark green fruits (S. van Leeuwen 2260)					x		x	
	<i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925)								x
	<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)								x
	<i>Sida</i> sp. spiciform panicles (E. Leyland s.n. 14/8/90)	x	x						
	<i>Sida</i> sp. verrucose glands (F.H. Mollemans 2423)						x		x
	<i>Sida spinosa</i>					x	x		
	<i>Sida trichopoda</i>					x			
	<i>Triumfetta clementii</i>								
<i>Triumfetta maconochieana</i>						x			
<i>Waltheria virgata</i>						x			
<b>Marsileaceae</b>	<i>Marsilea hirsuta</i>					x		x	
<b>Molluginaceae</b>	<i>Trigastrotheca molluginea</i>	x							
<b>Montiaceae</b>	<i>Calandrinia ptychosperma</i>					x			
<b>Myrtaceae</b>	<i>Corymbia deserticola</i> subsp. <i>deserticola</i>							x	
	<i>Corymbia hamersleyana</i>	x	x				x	x	x
	<i>Eucalyptus gamophylla</i>							x	x
	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	x	x		x	x	x	x	x
	<i>Eucalyptus socialis</i> subsp. <i>eucentrica</i>	x	x	x				x	
	<i>Eucalyptus xerothermica</i>	x	x					x	x
<i>Melaleuca eleuterostachya</i>	x	x	x	x					
<b>Nyctaginaceae</b>	<i>Boerhavia coccinea</i>						x	x	
<b>Oleaceae</b>	<i>Jasminum didymum</i> subsp. <i>lineare</i>	x	x				x	x	x
<b>Phrymaceae</b>	<i>Mimulus gracilis</i>					x	x	x	
<b>Phyllanthaceae</b>	<i>Notoleptopus decaisnei</i>	x	x						
	<i>Phyllanthus erwinii</i>					x	x		
	<i>Phyllanthus maderaspatensis</i>	x	x	x			x		
<b>Plantaginaceae</b>	<i>Stemodia grossa</i>	x			x				
	<i>Stemodia kingii</i>					x	x	x	
<b>Poaceae</b>	<i>Acrachne racemosa</i>	x							
	<i>Amphipogon sericeus</i>				x			x	
	<i>Aristida burbidgeae</i>						x		
	<i>Aristida contorta</i>	x	x	x	x	x	x	x	



Family	Taxon	Area							
		A	B	C	D	E	F	G	H
Poaceae cont.	<i>Aristida holathera</i> var. <i>holathera</i>			X			X		X
	<i>Aristida inaequiglumis</i>					X	X	X	X
	<i>Aristida jerichoensis</i> var. <i>subspinulifera</i> (P3)							X	
	<i>Aristida latifolia</i>			X	X	X	X	X	
	<i>Astrebula elymoides</i>			X		X	X	X	
	<i>Astrebula lappacea</i> (P3)			X		X		X	
	<i>Astrebula pectinata</i>			X	X	X	X	X	
	<i>Bothriochloa ewartiana</i>			X	X	X	X	X	
	* <i>Cenchrus ciliaris</i>	X	X	X	X	X	X	X	
	* <i>Cenchrus setiger</i>			X					
	<i>Chloris pectinata</i>						X	X	
	<i>Chrysopogon fallax</i>	X			X	X	X	X	X
	<i>Cymbopogon ambiguus</i>	X	X	X	X		X	X	X
	<i>Cymbopogon obtectus</i>	X	X						X
	<i>Cynodon convergens</i>			X					
	<i>Cynodon prostratus</i>	X				X	X	X	
	<i>Dichanthium fecundum</i>			X		X	X	X	
	<i>Dichanthium sericeum</i> subsp. <i>humilius</i>	X		X	X	X	X	X	
	<i>Digitaria ammophila</i>					X			
	<i>Digitaria brownii</i>					X	X		
	<i>Digitaria ctenantha</i>	X							
	<i>Elytrophorus spicatus</i>					X			
	<i>Enneapogon caeruleus</i>	X	X	X	X	X	X	X	
	<i>Enneapogon lindleyanus</i>	X	X					X	
	<i>Enneapogon polyphyllus</i>		X		X	X	X	X	X
	<i>Enteropogon ramosus</i>					X	X	X	
	<i>Eragrostis cumingii</i>					X			
	<i>Eragrostis desertorum</i>	X	X					X	
	<i>Eragrostis falcata</i>			X					
	<i>Eragrostis leptocarpa</i>					X		X	
	<i>Eragrostis pergracilis</i>					X			
	<i>Eragrostis setifolia</i>			X		X			
	<i>Eragrostis tenellula</i>					X	X	X	
	<i>Eragrostis xerophila</i>			X	X	X	X	X	
	<i>Eriachne aristidea</i>						X		
	<i>Eriachne benthamii</i>					X	X	X	
	<i>Eriachne helmsii</i>						X	X	
	<i>Eriachne mucronata</i>	X					X	X	X
	<i>Eriachne pulchella</i> subsp. <i>dominii</i>	X			X	X	X	X	X
	<i>Eriachne tenuiculmis</i>	X					X		X
	<i>Eriochloa pseudoacrotricha</i>							X	
	<i>Eulalia aurea</i>	X						X	X
	<i>Iseilema dolichotrichum</i>					X	X	X	
<i>Iseilema vaginiflorum</i>					X				
<i>Mnesithea formosa</i>						X			
<i>Panicum decompositum</i>			X				X		
<i>Panicum effusum</i>					X				
<i>Panicum laevinode</i>					X	X	X		
<i>Paraneurachne muelleri</i>	X	X	X	X		X	X	X	
<i>Paspalidium basicladum</i>							X		
<i>Paspalidium clementii</i>	X	X			X	X		X	
<i>Paspalidium constrictum</i>							X		

Family	Taxon	Area							
		A	B	C	D	E	F	G	H
Poaceae cont.	<i>Perotis rara</i>					x			
	<i>Schizachyrium fragile</i>						x		x
	* <i>Setaria verticillata</i>	x							
	<i>Sporobolus actinocladus</i>							x	
	<i>Sporobolus australasicus</i>	x	x	x	x	x	x	x	
	<i>Sporobolus caroli</i>							x	
	<i>Themeda triandra</i>	x					x	x	x
	<i>Tragus australianus</i>						x	x	
	<i>Triodia angusta</i>	x	x	x	x				
	<i>Triodia brizoides</i>	x					x		
	<i>Triodia epactia</i>	x			x	x	x	x	
	<i>Triodia longiceps</i>							x	
	<i>Triodia melvillei</i>						x	x	
	<i>Triodia wiseana</i>	x	x	x	x	x	x	x	x
	<i>Tripogonella loliiformis</i>						x		
<i>Urochloa occidentalis</i> var. <i>occidentalis</i>						x	x		
Polygalaceae	<i>Polygala glaucifolia</i>		x			x	x		x
Portulacaceae	<i>Portulaca conspicua</i>					x	x		
	<i>Portulaca oleracea</i>	x				x	x	x	
Proteaceae	<i>Grevillea berryana</i>	x	x			x	x		
	<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>						x		
	<i>Grevillea wickhamii</i>								x
	<i>Hakea chordophylla</i>	x							
	<i>Hakea lorea</i> subsp. <i>lorea</i>						x	x	x
Pteridaceae	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>				x	x		x	
Rubiaceae	<i>Oldenlandia crouchiana</i>		x	x	x		x	x	x
	<i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)			x					
	<i>Psydrax latifolia</i>								x
	<i>Psydrax suaveolens</i>				x	x	x	x	
	<i>Spermacoce brachystema</i>					x			
	<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>					x			
Santalaceae	<i>Anthobolus leptomerioides</i>	x			x	x		x	
	<i>Santalum lanceolatum</i>	x						x	x
	<i>Santalum spicatum</i>	x	x						
Sapindaceae	<i>Dodonaea coriacea</i>								x
	<i>Dodonaea lanceolata</i> var. <i>lanceolata</i>	x							x
	<i>Dodonaea petiolaris</i>	x				x		x	
Scrophulariaceae	<i>Eremophila cuneifolia</i>	x		x	x	x	x	x	
	<i>Eremophila exilifolia</i>		x						
	<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	x		x	x	x	x	x	
	<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	x	x			x	x		
	<i>Eremophila latrobei</i> subsp. <i>filiformis</i>				x	x	x	x	
	<i>Eremophila longifolia</i>	x					x	x	
	<i>Eremophila phyllopoda</i> subsp. <i>obliqua</i>	x	x						
Solanaceae	<i>Nicotiana occidentalis</i> subsp. <i>occidentalis</i>		x						
	<i>Solanum cleistogamum</i>	x	x	x	x		x	x	x
	<i>Solanum diversiflorum</i>	x			x				
	<i>Solanum elatius</i>				x				
	<i>Solanum ferocissimum</i>								x
	<i>Solanum lasiophyllum</i>		x		x	x	x	x	x
	<i>Solanum phlomoides</i>	x					x		

Family	Taxon	Area							
		A	B	C	D	E	F	G	H
<b>Solanaceae cont.</b>	<i>Solanum piceum</i>						x		
<b>Surianaceae</b>	<i>Stylobasium spathulatum</i>	x							
<b>Thymelaeaceae</b>	<i>Pimelea holroydii</i>					x			
<b>Violaceae</b>	<i>Hybanthus aurantiacus</i>	x	x						
<b>Zygophyllaceae</b>	<i>Tribulus hirsutus</i>					x			
	<i>Tribulus suberosus</i>	x				x	x		
	<i>Zygophyllum eichleri</i>		x	x	x	x	x	x	

## Appendix G: Raw Quadrat Data

Site Name: NM01  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 04/06/2018  
 GPS Location: GDA94 Zone 50 552594E 7488071N  
 Community: 1  
 Landform Type: Other, Low rise (other)  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: W  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Calcrete (other), 2-10% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia citrinoviridis</i>	6		15
<i>Acacia tetragonophylla</i>	2.5		0.5
<i>Anthobolus leptomerioides</i>	1.5		0.1
* <i>Bidens bipinnata</i>	0.3		0.1
<i>Corchorus crozophorifolius</i>	1.5		2
<i>Cucumis variabilis</i>			0.1
<i>Cymbopogon obtectus</i>	0.4		0.1
<i>Cynanchum viminale</i> subsp. <i>australe</i>			0.2
<i>Digitaria ctenantha</i>	0.2		0.1
<i>Duperreya commixta</i>			0.1
<i>Enneapogon caeruleus</i>	0.1		0.1
<i>Enneapogon lindleyanus</i>			
<i>Eragrostis desertorum</i>	0.6		0.1
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	1.5		5
<i>Euphorbia biconvexa</i>	0.3		0.1
<i>Euphorbia boophthona</i>	0.2		0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1		0.1

<i>Grevillea berryana</i>	2.5	3
<i>Heliotropium ovalifolium</i>	0.3	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.6	0.1
<i>Melhania oblongifolia</i>	0.1	0.1
<i>Notoleptopus decaisnei</i>	0.1	0.1
<i>Paspalidium clementii</i>	0.1	0.1
<i>Phyllanthus maderaspatensis</i>	0.1	0.1
<i>Ptilotus obovatus</i>	0.6	0.1
<i>Santalum spicatum</i>		
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	0.5	0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.6	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.2	0.1
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	1.6	0.2
<i>Sida</i> sp. spiciform panicles (E. Leyland s.n. 14/8/90)	1.5	0.3
<i>Solanum cleistogamum</i>	0.2	0.1
<i>Solanum phlomoides</i>	0.5	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Triodia wiseana</i>	0.5	40

**PHOTO**

Site Name: NM02  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 04/06/2018  
 GPS Location: GDA94 Zone 50 552330E 7487822N  
 Community: 5  
 Landform Type: Other, Low rise (other)  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: E  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Ironstone, 2-10% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: (other) - Historic ground disturbance  
 Fire: ~ 2 years

### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia bivenosa</i>	0.5		0.2
<i>Acacia kempeana</i>	1		0.2
<i>Acacia maitlandii</i>	1.2		8
<i>Acacia marramamba</i>	1		0.2
<i>Acacia synchronicia</i>	0.1		0.1
<i>Acacia wanyu</i>	0.8		0.5
<i>Aristida contorta</i>	0.3		0.2
<i>Codonocarpus cotinifolius</i>	0.6		0.1
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>	0.2		0.1
<i>Cymbopogon ambiguus</i>	0.8		2
<i>Dodonaea petiolaris</i>	1		0.1
<i>Enneapogon caerulescens</i>	0.1		0.1
<i>Eriachne mucronata</i>	0.3		1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1		0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	6		0.5
<i>Gomphrena cunninghamii</i>	0.1		0.1

<i>Goodenia muelleriana</i>	0.2	0.1
<i>Hibiscus coatesii</i>	0.6	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.3	1
<i>Hybanthus aurantiacus</i>	0.1	0.1
<i>Indigofera monophylla</i>	0.3	0.3
<i>Paraneurachne muelleri</i>	0.5	2
<i>Paspalidium clementii</i>	0.1	0.1
<i>Polycarpaea longiflora</i>	0.3	0.1
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Ptilotus calostachyus</i>	1	0.2
<i>Ptilotus clementii</i>	0.1	0.1
<i>Ptilotus nobilis</i>	0.1	0.1
<i>Ptilotus obovatus</i>	1	0.3
<i>Ptilotus rotundifolius</i>	1.2	3
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.6	0.3
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	0.3	0.1
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	1.2	2
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	0.6	0.1
<i>Sida echinocarpa</i>	0.5	1
<i>Solanum phlomoides</i>	0.4	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Tribulus suberosus</i>	0.3	0.1
<i>Triodia angusta</i>	0.6	0.1
<i>Triodia brizoides</i>	0.3	30
<i>Triodia epactia</i>	0.3	5
<i>Triodia wiseana</i>	0.6	0.2



**PHOTO**



Site Name: NM03  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 04/06/2018  
 GPS Location: GDA94 Zone 50 552106E 7488386N  
 Community: 2  
 Landform Type: Other, Low rise (other)  
 Slope Class: Gently Inclined (3 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Calcrete (other), 2-10% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 2 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia bivenosa</i>	1.5		5
<i>Acacia maitlandii</i>	0.3		0.1
<i>Acacia trudgeniana</i>			
<i>Androcalva luteiflora</i>	1.2		7
<i>Capparis lasiantha</i>	0.4		0.1
<i>Capparis umbonata</i>			
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>	0.2		0.1
<i>Corymbia hamersleyana</i>			
<i>Cymbopogon obtectus</i>	0.4		0.1
<i>Dodonaea lanceolata</i> var. <i>lanceolata</i>	0.6		0.1
<i>Eragrostis desertorum</i>	0.3		0.1
<i>Eremophila longifolia</i>			
<i>Eriachne mucronata</i>	0.3		0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	2		0.4
<i>Eucalyptus xerothermica</i>			
<i>Goodenia pedicellata</i> (P1)	0.1	73	0.1
<i>Heliotropium ovalifolium</i>	0.3		2
<i>Melaleuca eleuterostachya</i>	1.5		0.5
<i>Paraneurachne muelleri</i>	0.3		0.1

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<i>Triodia wiseana</i>	0.3		35
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**PHOTO**



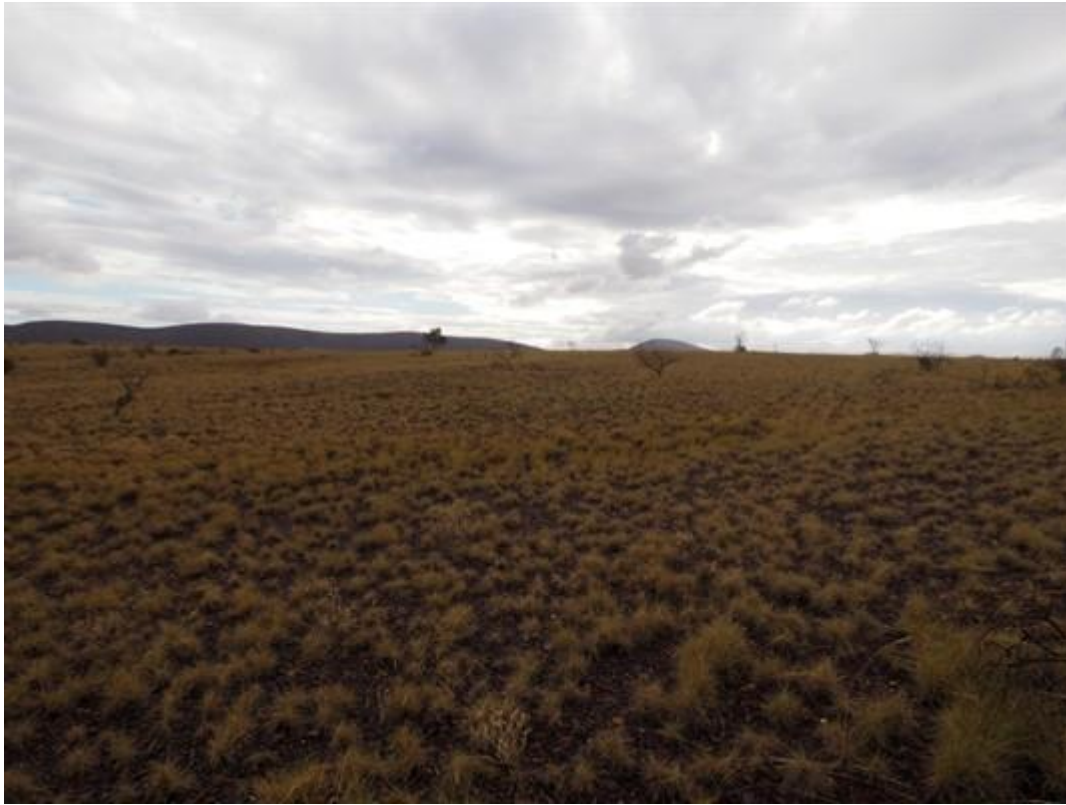
Site Name: NM04  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 05/06/2018  
 GPS Location: GDA94 Zone 50 552731E 7488717N  
 Community: 3  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: W  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 2 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia bivenosa</i>	1		0.3
<i>Acacia synchronicia</i>	1		0.5
<i>Cassytha capillaris</i>			0.1
<i>Codonocarpus cotinifolius</i>	1		0.1
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>	0.5		0.1
<i>Eulalia aurea</i>	0.7		0.1
<i>Goodenia forrestii</i>	0.1		0.1
<i>Goodenia stobbsiana</i>	0.4		0.1
<i>Hibiscus coatesii</i>	0.8		0.1
<i>Paraneurachne muelleri</i>	0.4		0.1
<i>Ptilotus astrolasius</i>	0.4		0.2
<i>Ptilotus calostachyus</i>	1		0.1
<i>Ptilotus nobilis</i>	0.6		0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.5		0.1
<i>Trigastrotheca molluginea</i>	0.1		0.1
<i>Triodia angusta</i>	0.4		0.2
<i>Triodia wiseana</i>	0.2		55

**PHOTO**



Site Name: NM05  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 05/06/2018  
 GPS Location: GDA94 Zone 50 552686E 7488767N  
 Community: 4  
 Landform Type: Drainage Line  
 Slope Class: Level (0 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 20-50%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 2 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia ancistrocarpa</i>	2		3
<i>Acacia bivenosa</i>	2.5		5
<i>Acacia kempeana</i>	1.8		0.1
<i>Acacia maitlandii</i>	1.8		0.1
<i>Acacia monticola</i>	2		0.1
<i>Acacia synchronicia</i>	0.3		0.1
<i>Acacia wanyu</i>	1.2		0.5
<i>Androcalva luteiflora</i>	1		0.1
<i>Aristida contorta</i>	0.1		0.1
* <i>Cenchrus ciliaris</i>	0.4		2
<i>Chrysopogon fallax</i>	0.6		1
<i>Cleome viscosa</i>	0.2		0.1
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>	0.5		0.2
<i>Eragrostis desertorum</i>	0.5		0.1
<i>Eremophila longifolia</i>	2		1
<i>Eriachne tenuiculmis</i>	0.5		1
<i>Eucalyptus socialis</i> subsp. <i>eucentrica</i>			
<i>Eucalyptus xerothermica</i>	6		3
<i>Eulalia aurea</i>	0.8		5

<i>Goodenia forrestii</i>	0.1	0.1
<i>Gossypium australe</i>	0.5	0.1
<i>Gossypium robinsonii</i>	2.5	1
<i>Heliotropium ovalifolium</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.6	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.6	0.1
<i>Notoleptopus decaisnei</i>	0.1	0.1
<i>Paraneurachne muelleri</i>	0.4	1
<i>Petalostylis labicheoides</i>	2.5	5
<i>Polymeria ambigua</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.3	0.2
<i>Rhynchosia minima</i>		0.1
<i>Scaevola amblyanthera</i> var. <i>centralis</i>	0.3	0.1
<i>Scaevola spinescens</i>	0.6	0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.6	0.1
<i>Sida arsinata</i>	0.6	0.2
<i>Sida fibulifera</i>	0.2	0.1
<i>Themeda triandra</i>	1.2	40
<i>Trichodesma zeylanicum</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.2	0.1
<i>Triodia angusta</i>	0.5	0.5
<i>Triodia epactia</i>	0.5	0.5
<i>Triodia wiseana</i>	0.5	5

**PHOTO**





Site Name: NM06  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 05/06/2018  
 GPS Location: GDA94 Zone 50 552237E 7488839N  
 Community: 2  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Gently Inclined (3 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 2 years / > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Abutilon cunninghamii</i>	0.7		0.1
<i>Acacia bivenosa</i>	1.5		8
<i>Acacia synchronicia</i>	0.2		0.1
<i>Androcalva luteiflora</i>	0.5		0.1
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>	0.3		0.1
<i>Duperreya commixta</i>			0.1
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	0.8		0.1
<i>Eucalyptus socialis</i> subsp. <i>eucentrica</i>	2.5		4
<i>Goodenia pedicellata</i> (P1)	0.1	11	0.1
<i>Heliotropium ovalifolium</i>	0.3		5
<i>Hibiscus leptocladus</i>	0.4		0.1
<i>Indigofera monophylla</i>	0.5		0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.7		0.1
<i>Lepidium pedicellosum</i>	0.5		0.1
<i>Melaleuca eleuterostachya</i>	1.5		1
<i>Paraneurachne muelleri</i>	0.3		0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.5		0.5
<i>Sida echinocarpa</i>	0.5		0.1
<i>Triodia wiseana</i>	0.5		35

**PHOTO**



Site Name: NM07  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 05/06/2018  
 GPS Location: GDA94 Zone 50 552305E 7488417N  
 Community: 4  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Ironstone, Calcrete, Colluvium (other)  
 Vegetation Condition: Northern Vegetation Condition - VG - Very Good  
 Disturbance: Exotic Weeds - *Cenchrus ciliaris*  
 Fire: ~ 2 years

### **DOMINANT TAXA IN VEGETATION STRATA**

### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Abutilon cunninghamii</i>	0.6		0.1
<i>Acacia bivenosa</i>	2.5		10
<i>Acacia citrinoviridis</i>	0.8		0.1
<i>Acacia maitlandii</i>	1		0.2
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	2.5		5
<i>Alternanthera nana</i>	0.2		0.1
<i>Androcalva luteiflora</i>	1		0.2
<i>Capparis lasiantha</i>	0.5		0.1
<i>Capparis spinosa</i> subsp. <i>nummularia</i>	0.3		0.1
* <i>Cenchrus ciliaris</i>	1		12
<i>Corchorus crozophorifolius</i>	0.8		0.1
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>	0.6		0.1
<i>Corymbia hamersleyana</i>	6		0.5
<i>Cucumis variabilis</i>			0.1
<i>Cymbopogon ambiguus</i>	0.5		0.1
<i>Dipteracanthus australasicus</i> subsp. <i>australasicus</i>			

<i>Dodonaea lanceolata</i> var. <i>lanceolata</i>	1.5	0.2
<i>Duperreya commixta</i>		0.1
<i>Enneapogon lindleyanus</i>	0.4	0.1
<i>Eragrostis desertorum</i>	0.4	0.1
<i>Eremophila longifolia</i>	2.5	5
<i>Eriachne tenuiculmis</i>	0.5	3
<i>Eucalyptus xerothermica</i>	8	8
<i>Eulalia aurea</i>	0.8	5
<i>Euphorbia biconvexa</i>	0.2	0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1	0.1
<i>Goodenia forrestii</i>	0.2	0.1
<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Gossypium robinsonii</i>	2	0.3
<i>Heliotropium ovalifolium</i>	0.3	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	1	0.1
<i>Notoleptopus decaisnei</i>	0.1	0.1
<i>Paraneurachne muelleri</i>	0.4	2
<i>Petalostylis labicheoides</i>	3	5
<i>Phyllanthus maderaspatensis</i>	0.6	0.1
<i>Polymeria ambigua</i>	0.1	0.1
<i>Pterocaulon sphacelatum</i>	0.4	0.1
<i>Ptilotus nobilis</i>	0.1	0.1
<i>Ptilotus obovatus</i>	0.5	0.1
<i>Rhynchosia minima</i>		0.2
<i>Santalum lanceolatum</i>	2	0.3
<i>Scaevola amblyanthera</i> var. <i>centralis</i>	0.3	0.1
<i>Scaevola spinescens</i>	1	0.1
<i>Sida fibulifera</i>	0.3	0.2
<i>Tephrosia rosea</i> var. Fortescue creeks (M.I.H. Brooker 2186)	1	8
<i>Themeda triandra</i>	1.2	15
<i>Triodia angusta</i>	0.5	0.2
<i>Triodia epactia</i>	0.6	3

**PHOTO**



Site Name: NM08  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 05/06/2018  
 GPS Location: GDA94 Zone 50 552340E 7488073N  
 Community: 1  
 Landform Type: Other, Low rise (other)  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: S  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Calcrete (other), 20-50% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Abutilon fraseri</i> subsp. <i>fraseri</i>	0.3		0.1
<i>Acacia citrinoviridis</i>	5		15
<i>Acacia maitlandii</i>	1		0.1
<i>Acacia tetragonophylla</i>	2.5		0.5
<i>Amyema hilliana</i>			0.1
<i>Androcalva luteiflora</i>	1		0.1
<i>Capparis spinosa</i> subsp. <i>nummularia</i>	0.7		0.1
<i>Corchorus crozophorifolius</i>	0.7		0.5
<i>Cucumis variabilis</i>			0.1
<i>Cymbopogon obtectus</i>	0.5		0.1
<i>Cynanchum viminale</i> subsp. <i>australe</i>	0.7		0.1
<i>Duperreya commixta</i>			0.1
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	0.3		0.1
<i>Enneapogon caeruleus</i>	0.1		0.1
<i>Enneapogon lindleyanus</i>	0.4		0.1
<i>Eragrostis desertorum</i>	0.4		0.1
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	1.5		6

<i>Euphorbia biconvexa</i>	0.2		0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1		0.1
<i>Grevillea berryana</i>	3		7
<i>Heliotropium ovalifolium</i>	0.2		0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	2.2		0.1
<i>Lysiana casuarinae</i>			0.1
<i>Notoleptopus decaisnei</i>	0.1		0.1
<i>Paraneurachne muelleri</i>	0.4		0.1
<i>Paspalidium clementii</i>	0.1		0.1
<i>Phyllanthus maderaspatensis</i>	0.1		0.1
<i>Portulaca oleracea</i>	0.1		0.1
<i>Ptilotus nobilis</i>	0.1		0.1
<i>Ptilotus obovatus</i>	1		0.2
<i>Ptilotus rotundifolius</i>	1		0.2
<i>Santalum spicatum</i>	2.5		0.3
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	0.6		0.2
<i>Sida</i> sp. spiciform panicles (E. Leyland s.n. 14/8/90)	0.1		0.1
<i>Solanum cleistogamum</i>	0.2		0.1
<i>Solanum phlomoides</i>	0.5		0.2
<i>Sporobolus australasicus</i>	0.1		0.1
<i>Triodia epactia</i>	0.5		5
<i>Triodia wiseana</i>	0.4		15

**PHOTO**





Site Name: NM09  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 05/06/2018  
 GPS Location: GDA94 Zone 50 552437E 7488147N  
 Community: 4  
 Landform Type: Flat  
 Slope Class: Level (0 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 10-20%  
 CF Sizes: 2-6mm, 6-20mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 2 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Abutilon fraseri</i> subsp. <i>fraseri</i>	0.4		0.1
<i>Acacia bivenosa</i>	1.5		5
<i>Acacia wanyu</i>	0.2		0.1
<i>Acrachne racemosa</i>	0.3		0.1
<i>Aristida contorta</i>	0.2		0.1
<i>Capparis lasiantha</i>	1		0.1
* <i>Cenchrus ciliaris</i>	0.4		0.3
<i>Convolvulus clementii</i>			0.1
<i>Cucumis variabilis</i>			0.1
<i>Cymbopogon ambiguus</i>	0.6		0.1
<i>Dichanthium sericeum</i> subsp. <i>humilius</i>	0.2		0.1
<i>Enneapogon caerulescens</i>	0.2		0.1
<i>Eragrostis desertorum</i>	0.4		15
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	0.4		0.1
<i>Eremophila longifolia</i>	0.4		0.1
<i>Eucalyptus xerothermica</i>	5		1.5
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1		0.1
<i>Goodenia forrestii</i>	0.2		0.1
<i>Hakea chordophylla</i>	2		0.1

<i>Hibiscus leptocladus</i>	0.3		0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.2		0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.8		0.1
<i>Paraneurachne muelleri</i>	0.4		0.2
<i>Ptilotus obovatus</i>	0.5		0.3
<i>Rhynchosia minima</i>	0.2		0.1
<i>Scaevola spinescens</i>	0.6		0.5
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.4		0.2
* <i>Setaria verticillata</i>	0.3		0.1
<i>Sida fibulifera</i>	0.2		0.2
<i>Sporobolus australasicus</i>	0.2		0.1
<i>Themeda triandra</i>	1		0.3
<i>Triodia angusta</i>	0.4		15
<i>Triodia wiseana</i>	0.4		5

**PHOTO**

Site Name: NM10  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 05/06/2018  
 GPS Location: GDA94 Zone 50 552392E 7487978N  
 Community: 3  
 Landform Type: Flat  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 2 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia ancistrocarpa</i>	1		0.1
<i>Acacia bivenosa</i>	2		6
<i>Acacia kempeana</i>	0.5		0.2
<i>Acacia maitlandii</i>	0.5		0.1
<i>Acacia synchronicia</i>	0.5		0.2
<i>Acacia tetragonophylla</i>	0.1		0.1
<i>Acacia wanyu</i>	0.8		0.4
<i>Aristida contorta</i>	0.1		0.1
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>	0.8		0.1
<i>Cymbopogon ambiguus</i>	0.8		0.1
<i>Cynodon prostratus</i>	0.1		0.1
<i>Enneapogon caeruleus</i>	0.1		0.1
<i>Eremophila cuneifolia</i>	0.5		0.2
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	0.5		0.1
<i>Eremophila longifolia</i>	0.5		0.1
<i>Eriachne tenuiculmis</i>	0.4		0.2
<i>Goodenia stobbsiana</i>	0.5		0.1
<i>Gossypium robinsonii</i>	2		0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.4		0.1

<i>Paraneurachne muelleri</i>	0.4		0.2
<i>Paspalidium clementii</i>	0.2		0.1
<i>Ptilotus astrolasius</i>	0.4		0.2
<i>Ptilotus fusiformis</i>	0.2		0.1
<i>Ptilotus obovatus</i>	0.6		0.1
<i>Scaevola spinescens</i>	0.5		0.1
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	0.6		0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.4		0.2
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	0.6		0.1
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	0.8		0.1
<i>Senna stricta</i>	0.6		0.1
<i>Sida echinocarpa</i>	0.4		0.3
<i>Sida fibulifera</i>	0.2		0.1
<i>Solanum diversiflorum</i>	0.5		0.1
<i>Sporobolus australasicus</i>	0.1		0.1
<i>Themeda triandra</i>	1		0.1
<i>Triodia epactia</i>	0.5		0.5
<i>Triodia wiseana</i>	0.3		40

**PHOTO**

Site Name: NM11  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 05/06/2018  
 GPS Location: GDA94 Zone 50 552922E 7488317N  
 Community: 4  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 20-50%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Ironstone, Calcrete, Colluvium (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 2 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Abutilon cunninghamii</i>	0.6		0.1
<i>Acacia bivenosa</i>	2.5		8
<i>Acacia citrinoviridis</i>	3		5
<i>Acacia maitlandii</i>	1.2		0.1
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	2.5		3
<i>Amaranthus undulatus</i>	0.2		0.1
<i>Androcalva luteiflora</i>	2		3
<i>Capparis lasiantha</i>	0.3		0.1
* <i>Cenchrus ciliaris</i>	0.5		10
<i>Chrysopogon fallax</i>	0.5		0.2
<i>Codonocarpus cotinifolius</i>	5.5		0.5
<i>Corchorus crozophorifolius</i>	0.5		0.1
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>	0.5		0.1
<i>Corymbia hamersleyana</i>	6		0.5
<i>Cymbopogon ambiguus</i>	0.8		0.1
<i>Dodonaea lanceolata</i> var. <i>lanceolata</i>	1		0.2
<i>Duperreya commixta</i>			0.1
<i>Enneapogon lindleyanus</i>	0.5		0.1
<i>Eragrostis desertorum</i>	0.5		0.1

<i>Eremophila longifolia</i>	1.2	1
<i>Eriachne tenuiculmis</i>	0.5	2
<i>Eucalyptus xerothermica</i>	6	2
<i>Eulalia aurea</i>	0.6	3
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1	0.1
<i>Glycine canescens</i>		0.1
<i>Gossypium robinsonii</i>	2	0.2
<i>Heliotropium ovalifolium</i>	0.3	0.1
<i>Indigofera monophylla</i>	0.5	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	1	0.1
<i>Notoleptopus decaisnei</i>	0.1	0.1
<i>Paraneurachne muelleri</i>	0.4	0.2
<i>Petalostylis labicheoides</i>	3	10
<i>Phyllanthus maderaspatensis</i>	0.4	0.1
<i>Pluchea dentex</i>	0.6	0.1
<i>Polymeria ambigua</i>	0.2	0.1
<i>Pterocaulon sphacelatum</i>	0.2	0.1
<i>Ptilotus astrolasius</i>	0.2	0.1
<i>Ptilotus obovatus</i>	0.6	0.1
<i>Scaevola amblyanthera</i> var. <i>centralis</i>	0.1	0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1.2	0.1
<i>Sida arsinjata</i>	0.3	0.1
<i>Sida echinocarpa</i>	0.7	0.2
<i>Sida fibulifera</i>	0.3	0.1
<i>Stemodia grossa</i>	0.3	0.1
<i>Stylobasium spathulatum</i>	0.6	3
<i>Tephrosia rosea</i> var. Fortescue creeks (M.I.H. Brooker 2186)	1	4
<i>Themeda triandra</i>	1.2	10
<i>Trichodesma zeylanicum</i>	0.3	0.1
<i>Triodia angusta</i>	0.4	5
<i>Triodia brizoides</i>	0.3	0.1
<i>Triodia epactia</i>	0.4	3
* <i>Vachellia farnesiana</i>	0.8	0.1

**PHOTO**



Site Name: NM12  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 23/07/2018  
 GPS Location: GDA94 Zone 50 555501E 7488826N  
 Community: 3  
 Landform Type: Lower Slope  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: N  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: (other) - Dust from adjacent road  
 Fire: > 3 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia bivenosa</i>	1.8		0.3
<i>Acacia synchronicia</i>	0.3		0.1
<i>Corymbia hamersleyana</i>	4.5		0.3
<i>Cymbopogon obtectus</i>	0.5		0.1
<i>Goodenia forrestii</i>	0.2		0.1
<i>Heliotropium ovalifolium</i>	0.4		0.1
<i>Melaleuca eleuterostachya</i>	1.5		0.4
<i>Paraneurachne muelleri</i>	0.3		0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.5		0.3
<i>Senna stricta</i>	0.5		0.1
<i>Triodia angusta</i>	0.5		20
<i>Triodia wiseana</i>	0.5		30
<i>Zygophyllum eichleri</i>	0.1		0.1



**PHOTO**



Site Name: NM13  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 23/07/2018  
 GPS Location: GDA94 Zone 50 555030E 7488514N  
 Community: 1  
 Landform Type: Crest  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Calcrete (other), 2-10% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia bivenosa</i>	1.2		0.2
<i>Acacia citrinoviridis</i>	5		6
<i>Acacia maitlandii</i>	2		0.1
<i>Acacia pruinocarpa</i>	5		6
<i>Aristida contorta</i>	0.3		0.1
* <i>Cenchrus ciliaris</i>	0.4		0.1
<i>Corchorus crozophorifolius</i>	1		3
<i>Cymbopogon ambiguus</i>	0.8		0.1
<i>Cymbopogon obtectus</i>	0.5		0.1
<i>Cynanchum viminale</i> subsp. <i>australe</i>	1		0.2
<i>Duperreya commixta</i>			0.2
<i>Enneapogon caeruleus</i>	0.1		0.3
<i>Enneapogon lindleyanus</i>	0.4		0.1
<i>Enneapogon polyphyllus</i>	0.2		0.1
<i>Eremophila exilifolia</i>			
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	1		3.5
<i>Eremophila phyllopoda</i> subsp. <i>obliqua</i>	1		0.3
<i>Eucalyptus xerothermica</i>	4.5		0.4
<i>Euphorbia boophthona</i>	0.1		0.1

<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1	0.1
<i>Goodenia forrestii</i>	0.2	0.1
<i>Goodenia microptera</i>	0.2	0.1
<i>Grevillea berryana</i>	3	0.3
<i>Heliotropium cunninghamii</i>	0.1	0.1
<i>Heliotropium ovalifolium</i>	0.3	0.1
<i>Hybanthus aurantiacus</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.5	0.3
<i>Jasminum didymum</i> subsp. <i>lineare</i>	1	0.2
<i>Melhania oblongifolia</i>	0.1	0.1
<i>Notoleptopus decaisnei</i>	0.1	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Paspalidium clementii</i>	0.1	0.1
<i>Peripleura arida</i>	0.1	0.1
<i>Phyllanthus maderaspatensis</i>	0.1	0.1
<i>Ptilotus clementii</i>	0.1	0.1
<i>Ptilotus obovatus</i>	0.6	0.2
<i>Rhodanthe charsleyae</i>	0.1	0.1
<i>Santalum spicatum</i>	2	0.4
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	1	0.2
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.8	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1	0.1
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	1	0.2
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	1	0.1
<i>Sida</i> sp. spiciform panicles (E. Leyland s.n. 14/8/90)	1	0.5
<i>Solanum cleistogamum</i>	0.2	0.1
<i>Solanum lasiophyllum</i>	0.8	0.1
<i>Sporobolus australasicus</i>	0.2	0.1
<i>Triodia angusta</i>	0.4	3
<i>Triodia wiseana</i>	0.5	32
<i>Zygophyllum eichleri</i>	0.1	0.1

**PHOTO**



Site Name: NM14  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 23/07/2018  
 GPS Location: GDA94 Zone 50 555918E 7488979N  
 Community: 2  
 Landform Type: Lower Slope  
 Slope Class: Gently Inclined (3 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Calcrete (other), 2-10% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia bivenosa</i>	1.5		2
<i>Acacia maitlandii</i>	1.5		0.2
<i>Androcalva luteiflora</i>	1		0.5
<i>Cassytha capillaris</i>			0.1
<i>Corymbia hamersleyana</i>	4		1.5
<i>Cymbopogon ambiguus</i>	0.8		0.1
<i>Enneapogon caerulescens</i>	0.1		0.1
<i>Eragrostis desertorum</i>	0.3		0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	4		0.5
<i>Eucalyptus socialis</i> subsp. <i>eucentrica</i>	2.5		0.5
<i>Goodenia pedicellata</i> (P1)	0.1	81	0.1
<i>Heliotropium ovalifolium</i>	0.2		0.2
<i>Indigofera monophylla</i>	0.6		0.1
<i>Melaleuca eleuterostachya</i>	1.5		2
<i>Petalostylis labicheoides</i>	2		0.2
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.4		0.1
<i>Triodia angusta</i>	0.5		1
<i>Triodia wiseana</i>	0.5		40

**PHOTO**



Site Name: NM15  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 24/07/2018  
 GPS Location: GDA94 Zone 50 598743E 7539565N  
 Community: 11  
 Landform Type: Lower Slope  
 Slope Class: Gently Inclined (3 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Limited Clearing - Adjacent ground disturbance/clearing  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Abutilon cunninghamii</i>	0.1		0.1
<i>Acacia adoxa</i> var. <i>adoxo</i>	0.5		0.1
<i>Acacia ancistrocarpa</i>			
<i>Acacia atkinsiana</i>	4		5
<i>Acacia bivenosa</i>	2.5		0.5
<i>Acacia cowleana</i>	4		0.5
<i>Acacia monticola</i>	3		0.5
<i>Aristida holathera</i> var. <i>holathera</i>	0.5		0.3
<i>Aristida inaequiglumis</i>	0.6		0.1
<i>Capparis umbonata</i>	4.5		0.5
<i>Corymbia deserticola</i> subsp. <i>deserticola</i>	4.5		1
<i>Corymbia hamersleyana</i>	4.5		1
<i>Cucumis variabilis</i>			0.1
<i>Cymbopogon ambiguus</i>	0.6		0.1
<i>Cymbopogon obtectus</i>	0.3		0.1
<i>Dampiera candidans</i>	0.1		0.1
<i>Duperreya commixta</i>			0.1

<i>Dysphania rhadinostachya</i>	0.1		0.1
<i>Enneapogon polyphyllus</i>	0.1		0.1
<i>Eriachne mucronata</i>	0.3		0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1		0.1
<i>Eucalyptus gamophylla</i>	4.5		4
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	4.5		4
<i>Euphorbia vaccaria</i> var. <i>vaccaria</i>	0.1		0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1		0.1
<i>Goodenia microptera</i>	0.4		0.1
<i>Goodenia stobbsiana</i>	0.4		0.2
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.1		0.1
<i>Hibiscus sturtii</i> var. <i>platyklamys</i>	0.4		0.1
<i>Indigofera monophylla</i>	0.3		0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>			0.1
<i>Lysiana casuarinae</i>			0.1
<i>Paspalidium clementii</i>	0.1		0.1
<i>Polycarpaea holtzei</i>	0.1		0.1
<i>Ptilotus calostachyus</i>	0.5		0.1
<i>Rhyncharrhena linearis</i>			
<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	0.3		0.1
<i>Schizachyrium fragile</i>	0.2		0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.8		0.2
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.8		0.1
<i>Senna notabilis</i>	0.1		0.1
<i>Seringia elliptica</i>	0.5		0.3
<i>Sida</i> ? <i>arenicola</i>	0.8		0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.2		0.1
<i>Sida</i> sp. verrucose glands (F.H. Mollemans 2423)	0.1		0.1
<i>Stackhousia</i> sp. swollen gynophore (W.R. Barker 2041)	0.2		0.1
<i>Themeda triandra</i>	0.6		0.1
<i>Trichodesma zeylanicum</i>	0.2		0.1
<i>Triodia wiseana</i>	0.6		40



**PHOTO**



Site Name: NM16  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 24/07/2018  
 GPS Location: GDA94 Zone 50 598475E 7540065N  
 Community: 12  
 Landform Type: Lower Slope  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: S  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Ironstone, <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia bivenosa</i>	1.5		0.2
<i>Bulbostylis barbata</i>	0.1		0.1
<i>Capparis lasiantha</i>	0.8		0.1
<i>Cassytha capillaris</i>			0.1
<i>Eriachne mucronata</i>	0.3		0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1		0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	4		4
<i>Hakea lorea</i> subsp. <i>lorea</i>	0.6		0.1
<i>Polycarpaea holtzei</i>	0.1		0.1
<i>Polygala glaucifolia</i>	0.1		0.1
<i>Ptilotus astrolasius</i>	0.4		0.1
<i>Rhyncharrhena linearis</i>	0.3		0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1		0.1
<i>Themeda triandra</i>	0.4		0.1
<i>Triodia wiseana</i>	0.5		45

**PHOTO**



Site Name: NM17  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 24/07/2018  
 GPS Location: GDA94 Zone 50 596736E 7540761N  
 Community: 12  
 Landform Type: Lower Slope  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: S  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Ironstone, <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Cassytha capillaris</i>			0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1		0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	4		6
<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.3		0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.8		0.1
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	2		0.1
<i>Triodia wiseana</i>	0.5		50

**PHOTO**



Site Name: NM18  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 24/07/2018  
 GPS Location: GDA94 Zone 50 597167E 7540484N  
 Community: 11  
 Landform Type: Lower Slope  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Abutilon otocarpum</i>	0.2		0.1
<i>Acacia adoxa</i> var. <i>adoxoidea</i>	0.5		0.1
<i>Acacia aptaneura</i>	4.5		0.2
<i>Acacia atkinsiana</i>	4.5		30
<i>Acacia bivenosa</i>	1		0.3
<i>Aristida holathera</i> var. <i>holathera</i>	0.5		0.5
<i>Aristida inaequiglumis</i>	0.7		0.2
<i>Bonamia erecta</i>	0.4		0.1
<i>Capparis lasiantha</i>	0.5		0.1
<i>Capparis umbonata</i>	3		0.3
<i>Corymbia deserticola</i> subsp. <i>deserticola</i>	5		0.5
<i>Cymbopogon ambiguus</i>	0.4		0.1
<i>Dodonaea lanceolata</i> var. <i>lanceolata</i>	0.9		0.1
<i>Dysphania rhadinostachya</i>	0.2		0.1
<i>Enneapogon polyphyllus</i>	0.3		0.1
<i>Eriachne mucronata</i>	0.5		0.1
<i>Eucalyptus gamophylla</i>	5		4
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	8		3
<i>Eulalia aurea</i>	0.6		0.1

<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1	0.1
<i>Gompholobium oreophilum</i>	0.1	0.1
<i>Goodenia microptera</i>	0.3	0.1
<i>Goodenia muelleriana</i>	0.2	0.1
<i>Goodenia stellata</i>	0.1	0.1
<i>Grevillea wickhamii</i>	0.1	0.1
<i>Hibiscus burtonii</i>	0.2	0.1
<i>Hibiscus coatesii</i>	0.8	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.1	0.1
<i>Indigofera monophylla</i>	0.2	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>		0.1
<i>Maytenus</i> sp. Mt Windell (S. van Leeuwen 846)	2	0.2
<i>Paraneurachne muelleri</i>	0.3	0.1
<i>Peripleura arida</i>	0.2	0.1
<i>Ptilotus astrolasius</i>	0.5	0.1
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Ptilotus nobilis</i>	0.1	0.1
<i>Rhyncharrhena linearis</i>	0.2	0.1
<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	0.3	0.1
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	0.8	0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1	0.1
<i>Seringia elliptica</i>	0.4	0.1
<i>Sida</i> sp. verrucose glands (F.H. Mollemans 2423)	0.3	0.2
<i>Solanum cleistogamum</i>	0.2	0.1
<i>Solanum lasiophyllum</i>	0.2	0.1
<i>Themeda triandra</i>	0.6	0.1
<i>Triodia wiseana</i>	0.5	25
<i>Velleia connata</i>	0.2	0.1

**PHOTO**





Site Name: NM19  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 24/07/2018  
 GPS Location: GDA94 Zone 50 595391E 7540771N  
 Community: 12  
 Landform Type: Lower Slope  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: S  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Ironstone, 2-10% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 2 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia adoxa</i> var. <i>adoxo</i>	0.3		0.2
<i>Acacia atkinsiana</i>	0.4		0.1
<i>Acacia dictyophleba</i>	0.3		0.1
<i>Acacia maitlandii</i>	0.4		0.1
<i>Acacia monticola</i>	1.2		0.5
<i>Acacia tenuissima</i>	0.2		0.2
<i>Amphipogon sericeus</i>	0.3		0.1
<i>Aristida holathera</i> var. <i>holathera</i>	0.3		0.1
<i>Capparis lasiantha</i>	0.3		0.1
<i>Cassytha capillaris</i>			0.1
<i>Cymbopogon ambiguus</i>	0.5		0.1
<i>Dodonaea coriacea</i>	0.5		0.1
<i>Eriachne mucronata</i>	0.3		0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1		0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	6		5
<i>Goodenia microptera</i>	0.2		0.1
<i>Goodenia stobbsiana</i>	0.2		0.1

<i>Goodenia triodiophila</i>	0.3		0.1
<i>Hibiscus coatesii</i>	0.2		0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>			0.1
<i>Mirbelia viminalis</i>	0.6		4
<i>Oldenlandia crouchiana</i>	0.2		0.1
<i>Paraneurachne muelleri</i>	0.4		0.1
<i>Polycarpaea holtzei</i>	0.1		0.1
<i>Ptilotus calostachyus</i>	0.5		0.1
<i>Ptilotus nobilis</i>	0.1		0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	0.6		0.1
<i>Sida</i> ? <i>arenicola</i>	0.8		0.1
<i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925)	0.3		0.1
<i>Themeda triandra</i>	0.5		0.2
<i>Triodia wiseana</i>	0.4		30

**PHOTO**

Site Name: NM20  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 24/07/2018  
 GPS Location: GDA94 Zone 50 595210E 7540381N  
 Community: 11  
 Landform Type: Lower Slope  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia adoxa</i> var. <i>adoxo</i>	0.6		0.3
<i>Acacia atkinsiana</i>	5.5		7
<i>Acacia bivenosa</i>	1.5		0.3
<i>Acacia monticola</i>	2.5		1
<i>Acacia pruinocarpa</i>	3		0.2
<i>Acacia tenuissima</i>	2.2		0.3
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2		1
<i>Aristida holathera</i> var. <i>holathera</i>	0.2		0.1
<i>Aristida inaequiglumis</i>	0.8		0.1
<i>Bonamia erecta</i>	0.4		0.1
<i>Corymbia deserticola</i> subsp. <i>deserticola</i>	6		0.3
<i>Cymbopogon ambiguus</i>	0.8		0.1
<i>Duperreya commixta</i>			0.2
<i>Enneapogon polyphyllus</i>	0.3		0.1
<i>Eriachne mucronata</i>	0.4		0.1
<i>Eucalyptus gamophylla</i>	5.5		4
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	8		3
<i>Euphorbia boophthona</i>	0.2		0.1
<i>Gompholobium oreophilum</i>	0.3		0.1

<i>Goodenia stobbsiana</i>	0.2		0.2
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.3		0.1
<i>Indigofera monophylla</i>	0.3		0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>			0.1
<i>Ptilotus calostachyus</i>	0.5		0.1
<i>Ptilotus clementii</i>	0.3		0.1
<i>Ptilotus nobilis</i>	0.1		0.1
<i>Rhyncharrhena linearis</i>			0.1
<i>Santalum lanceolatum</i>	2.5		0.1
<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	0.4		0.2
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.5		0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	3		0.2
<i>Seringia elliptica</i>	0.5		1.5
<i>Sida ?arenicola</i>	1.2		0.1
<i>Themeda triandra</i>	0.8		0.3
<i>Triodia wiseana</i>	0.6		45

**PHOTO**

Site Name: NM21  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 25/07/2018  
 GPS Location: GDA94 Zone 50 582454E 7517095N  
 Community: 8  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: Laterised Ironstone (other), <2% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Laterised ironstone (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia aneura</i>	3		1
<i>Acacia aptaneura</i>	4		8
<i>Acacia atkinsiana</i>	4		1.5
<i>Acacia ayersiana</i>	3		0.1
<i>Acacia pruinocarpa</i>	4		5
<i>Cassytha capillaris</i>			0.1
<i>Eremophila cuneifolia</i>	0.1		0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1		0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	8		5
<i>Hibiscus burtonii</i>	0.3		0.1
<i>Ptilotus calostachyus</i>			
<i>Ptilotus helipteroides</i>	0.2		0.1
<i>Rhyncharrhena linearis</i>	0.1		0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.5		0.1
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	1.8		0.2
<i>Triodia wiseana</i>	0.4		20

**PHOTO**



Site Name: NM22  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 25/07/2018  
 GPS Location: GDA94 Zone 50 582828E 7517017N  
 Community: 6  
 Landform Type: Flat  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: Dolerite, <2% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Dolerite, Laterised ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia aneura</i>	5		1
<i>Acacia aptaneura</i>	5		4
<i>Acacia synchronicia</i>	2		0.3
<i>Acacia xiphophylla</i>	2		12
<i>Anthobolus leptomerioides</i>	1.8		0.1
<i>Capparis lasiantha</i>	0.6		0.1
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	0.1		0.1
<i>Cynodon prostratus</i>	0.1		0.1
<i>Dodonaea petiolaris</i>	0.3		0.1
<i>Duperreya commixta</i>			0.1
<i>Enneapogon polyphyllus</i>	0.1		0.1
<i>Enteropogon ramosus</i>	0.3		0.1
<i>Eremophila cuneifolia</i>	1		1
<i>Eriachne helmsii</i>	0.4		0.1
<i>Gomphrena kanisii</i>	0.1		0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	1		0.1
<i>Maireana georgei</i>	0.7		0.1
<i>Maireana melanocoma</i>	0.3		0.1
<i>Maireana thesioides</i>	1.5		0.1

<i>Maireana triptera</i>	0.5		0.5
<i>Paspalidium constrictum</i>	0.3		0.1
<i>Ptilotus aervoides</i>	0.1		0.1
<i>Ptilotus helipteroides</i>	0.1		0.1
<i>Ptilotus nobilis</i>	0.2		0.1
<i>Ptilotus obovatus</i>	0.5		0.1
<i>Rhagodia eremaea</i>	1	1	0.1
<i>Sclerolaena eriacantha</i>	0.1		0.1
<i>Sclerolaena minuta</i>	0.1		0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	2		1
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	2		2
<i>Senna stricta</i>	1		2
<i>Sida</i> sp. dark green fruits (S. van Leeuwen 2260)	0.5		0.1
<i>Sporobolus australasicus</i>	0.1		0.1
<i>Trianthema glossostigmum</i>	0.1		0.1
<i>Triodia longiceps</i>			
<i>Triodia wiseana</i>	0.4		5

**PHOTO**



Site Name: NM23  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 25/07/2018  
 GPS Location: GDA94 Zone 50 581302E 7516560N  
 Community: 15  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Light brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Calcrete, Laterised ironstone (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia bivenosa</i>	2		1
<i>Acacia inaequilatera</i>			
<i>Acacia kempeana</i>	0.8		0.1
<i>Acacia pruinocarpa</i>	2		0.5
<i>Anthobolus leptomerioides</i>	1.8		0.2
<i>Capparis lasiantha</i>	1.3		0.2
<i>Duperreya commixta</i>			0.1
<i>Enneapogon caeruleus</i>	0.2		0.1
<i>Eragrostis desertorum</i>	0.3		0.1
<i>Eremophila cuneifolia</i>	0.5		0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1		0.1
<i>Eucalyptus socialis</i> subsp. <i>eucentrica</i>	4		8
<i>Euphorbia boophthona</i>	0.3		0.1
<i>Haloragis gossei</i> var. <i>gossei</i>	0.1		0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>			0.2
<i>Paraneurachne muelleri</i>	0.3		0.1
<i>Ptilotus obovatus</i>	0.5		0.2
<i>Ptilotus rotundifolius</i>	0.5		0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.6		0.5

<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	2		1
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	2		1
<i>Senna stricta</i>	0.6		0.1
<i>Triodia wiseana</i>	0.5		45

**PHOTO**

Site Name: NM24  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 25/07/2018  
 GPS Location: GDA94 Zone 50 581270E 7516383N  
 Community: 16  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Calcrete, Laterised ironstone (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia bivenosa</i>	3		8
<i>Acacia inaequilatera</i>	2.5		0.5
<i>Acacia kempeana</i>	3		2
<i>Acacia pruinocarpa</i>	1.5		0.2
<i>Acacia synchronicia</i>	0.3		0.1
<i>Acacia tetragonophylla</i>			
<i>Anthobolus leptomerioides</i>	2		0.2
<i>Aristida inaequiglumis</i>	0.4		0.1
<i>Chrysopogon fallax</i>	0.6		0.1
<i>Corymbia hamersleyana</i>	5		3
<i>Cymbopogon ambiguus</i>	0.6		0.1
<i>Duperreya commixta</i>			0.1
<i>Eremophila longifolia</i>			
<i>Euphorbia boophthona</i>	0.3		0.1
<i>Goodenia muelleriana</i>	0.3		0.1
<i>Haloragis gossei</i> var. <i>gossei</i>	0.1		0.1
<i>Indigofera monophylla</i>	0.3		0.3
<i>Jasminum didymum</i> subsp. <i>lineare</i>			0.1
<i>Paraneurachne muelleri</i>	0.3		0.1

<i>Ptilotus helipteroides</i>	0.2		0.1
<i>Scaevola spinescens</i>	0.5		0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.7		1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	2		0.1
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	0.4		0.1
<i>Solanum cleistogamum</i>	0.2		0.1
<i>Solanum lasiophyllum</i>	0.2		0.1
<i>Themeda triandra</i>	0.6		0.1
<i>Trichodesma zeylanicum</i>	0.4		0.1
<i>Triodia wiseana</i>	0.5		45
<i>Zygophyllum eichleri</i>	0.1		0.1

**PHOTO**

Site Name: NM25  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 25/07/2018  
 GPS Location: GDA94 Zone 50 581752E 7516363N  
 Community: 13  
 Landform Type: Flat  
 Slope Class: Level (0 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Dolerite, Laterised ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Abutilon fraseri</i> subsp. <i>fraseri</i>	0.3		0.1
<i>Abutilon lepidum</i>	0.6		0.1
<i>Abutilon otocarpum</i>	0.1		0.1
<i>Abutilon</i> sp. Pilbara (W.R. Barker 2025)	0.1		0.1
<i>Acacia bivenosa</i>	1.5		0.5
<i>Acacia synchronicia</i>	2.5		1
<i>Acacia xiphophylla</i>	2		0.5
<i>Aristida contorta</i>	0.1		0.1
<i>Aristida latifolia</i>	0.5		0.1
<i>Atriplex bunburyana</i>	0.3		0.1
<i>Capparis lasiantha</i>	0.5		0.1
* <i>Cenchrus ciliaris</i>	0.5		0.1
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	0.1		0.1
<i>Chloris pectinata</i>	0.2		0.1
<i>Chrysopogon fallax</i>	0.5		0.1
<i>Cymbopogon ambiguus</i>	1.5		0.1
<i>Cynodon prostratus</i>	0.1		0.1
<i>Dichanthium sericeum</i> subsp. <i>humilius</i>	0.3		0.1
<i>Dysphania rhadinostachya</i>	0.1		0.1

<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	0.6	0.1
<i>Enneapogon polyphyllus</i>	0.2	0.1
<i>Eremophila cuneifolia</i>	0.6	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia trigonosperma</i>	0.3	0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1	0.1
<i>Goodenia muelleriana</i>	0.2	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.2	0.1
<i>Iseilema dolichotrichum</i>	0.2	0.1
<i>Maireana eriosphaera</i>	0.2	0.1
<i>Maireana melanocoma</i>		
<i>Maireana pyramidata</i>	1.4	0.2
<i>Maireana tomentosa</i> subsp. <i>tomentosa</i>	0.4	0.1
<i>Maireana triptera</i>	0.5	0.2
<i>Paspalidium basicladum</i>	0.2	0.1
<i>Peripleura arida</i>	0.4	0.1
<i>Peripleura virgata</i>	0.3	0.1
<i>Pterocaulon sphacelatum</i>	0.1	0.1
<i>Ptilotus nobilis</i>	0.6	0.1
<i>Ptilotus obovatus</i>	0.6	0.1
<i>Sclerolaena cuneata</i>	0.2	0.1
<i>Sclerolaena densiflora</i>	0.2	0.1
<i>Sclerolaena eriacantha</i>	0.3	0.1
<i>Sclerolaena lanicuspis</i>	0.1	0.1
<i>Sclerolaena minuta</i>	0.1	0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.4	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	2	0.5
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	2	0.5
<i>Senna hamersleyensis</i>	0.3	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Senna stricta</i>	0.5	0.1
<i>Sida fibulifera</i>	0.1	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Streptoglossa bubakii</i>	0.4	0.1
<i>Triodia longiceps</i>	0.6	60
<i>Triodia wiseana</i>	0.4	0.2

**PHOTO**



Site Name: NM26  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 25/07/2018  
 GPS Location: GDA94 Zone 50 581730E 7516187N  
 Community: 7  
 Landform Type: Flat  
 Slope Class: Level (0 degrees)  
 Soil Type: Light Clay  
 Soil Colour: Red  
 Rock Outcrop: Dolerite, <2% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Dolerite, Laterised ironstone (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia aptaneura</i>	4		0.3
<i>Acacia synchronicia</i>	2.5		0.3
<i>Acacia xiphophylla</i>	4		30
<i>Aristida contorta</i>	0.2		0.1
<i>Aristida jerichoensis</i> var. <i>subspinulifera</i> (P3)	0.4		0.1
<i>Aristida latifolia</i>	0.6		0.1
<i>Astrebla elymoides</i>	0.5		0.1
<i>Astrebla lappacea</i> (P3)	0.4	30	0.1
<i>Astrebla pectinata</i>	0.4		0.1
<i>Atriplex bunburyana</i>	0.5		0.1
<i>Boerhavia coccinea</i>			0.1
* <i>Cenchrus ciliaris</i>	0.5		0.1
<i>Chloris pectinata</i>	0.1		0.1
<i>Chrysopogon fallax</i>	0.5		0.2
<i>Corchorus tridens</i>			
<i>Crotalaria dissitiflora</i> subsp. <i>benthamiana</i>	0.2		0.1
<i>Dipteracanthus australasicus</i> subsp. <i>australasicus</i>	0.3		0.1
<i>Dissocarpus paradoxus</i>	0.3		0.3



<i>Duperreya commixta</i>		0.1
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	0.4	0.1
<i>Enneapogon caerulescens</i>	0.1	0.1
<i>Enneapogon polyphyllus</i>	0.2	0.1
<i>Enteropogon ramosus</i>	0.3	0.1
<i>Eragrostis xerophila</i>	0.3	0.5
<i>Eremophila cuneifolia</i>	1	0.3
<i>Eremophila longifolia</i>	0.5	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Gomphrena kanisii</i>	0.1	0.1
<i>Maireana pyramidata</i>	0.8	0.4
<i>Maireana triptera</i>	0.4	2
* <i>Malvastrum americanum</i>	0.2	0.1
<i>Paspalidium constrictum</i>	0.3	0.1
<i>Portulaca oleracea</i>	0.1	0.1
<i>Ptilotus nobilis</i>	0.5	0.1
<i>Rhagodia eremaea</i>	1.6	0.3
<i>Rhynchosia minima</i>	0.1	0.1
<i>Rostellularia adscendens</i> var. <i>clementii</i>	0.1	0.1
<i>Salsola australis</i>	0.3	0.1
<i>Sclerolaena cuneata</i>	0.2	0.2
<i>Sclerolaena eriacantha</i>	0.1	0.1
<i>Sclerolaena minuta</i>	0.1	0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.6	0.2
<i>Senna</i> sp. Karijini (M.E. Trudgen 10392)	0.5	0.1
<i>Sida fibulifera</i>	0.1	0.1
<i>Solanum lasiophyllum</i>	0.3	0.1
* <i>Sonchus oleraceus</i>		
<i>Sporobolus actinocladus</i>	0.3	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Sporobolus caroli</i>	0.3	0.1
<i>Streptoglossa bubakii</i>	0.4	0.1
<i>Triodia longiceps</i>	0.5	5
<i>Triodia wiseana</i>	0.4	2

**PHOTO**



Site Name: NM27  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 25/07/2018  
 GPS Location: GDA94 Zone 50 581462E 7516773N  
 Community: 8  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm  
 CF Types: Laterised ironstone (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia ancistrocarpa</i>	2.5		3
<i>Acacia aneura</i>	2.5		0.2
<i>Acacia aptaneura</i>	4		6
<i>Acacia atkinsiana</i>	3		4
<i>Acacia bivenosa</i>	2		0.5
<i>Acacia pruinocarpa</i>	3.5		4
<i>Acacia synchronicia</i>	0.6		0.1
<i>Eucalyptus gamophylla</i>	5		2
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1		0.1
<i>Ptilotus calostachyus</i>	0.8		0.1
<i>Ptilotus fusiformis</i>	0.2		0.1
<i>Ptilotus helipteroides</i>	0.1		0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.5		0.1
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	1.5		0.1
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	1.5		0.1
<i>Senna notabilis</i>	0.1		0.1
<i>Senna stricta</i>	1		0.1
<i>Triodia wiseana</i>	0.4		35

**PHOTO**



Site Name: NM28  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 26/07/2018  
 GPS Location: GDA94 Zone 50 582731E 7516453N  
 Community: 6  
 Landform Type: Flat  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: E  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: Dolerite, <2% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Dolerite, Laterised ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia aptaneura</i>	4		0.4
<i>Acacia synchronicia</i>	0.5		0.1
<i>Acacia xiphophylla</i>	3.5		15
<i>Anthobolus leptomerioides</i>	0.5		0.1
<i>Aristida contorta</i>	0.1		0.1
<i>Cynodon prostratus</i>	0.1		0.1
<i>Dipteracanthus australasicus</i> subsp. <i>australasicus</i>	0.2		0.1
<i>Duperreya commixta</i>			0.2
<i>Enteropogon ramosus</i>	0.3		0.2
<i>Eremophila cuneifolia</i>	1		2
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1		0.1
<i>Hibiscus burtonii</i>	0.4		0.1
<i>Maireana pyramidata</i>	0.5		0.2
<i>Maireana triptera</i>	0.5		2
<i>Ptilotus nobilis</i>	0.1		0.1
<i>Ptilotus obovatus</i>	0.5		0.1

<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	0.2		0.1
<i>Rhagodia eremaea</i>	1.2	2	0.1
<i>Sclerolaena cuneata</i>	0.1		0.1
<i>Sclerolaena eriacantha</i>	0.1		0.2
<i>Sclerolaena lanicuspis</i>	0.1		0.1
<i>Sclerolaena minuta</i>	0.1		0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.3		0.1
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	0.2		0.1
<i>Senna</i> sp. Karijini (M.E. Trudgen 10392)	0.2		0.1
<i>Senna stricta</i>	1.6		0.3
<i>Sida</i> sp. dark green fruits (S. van Leeuwen 2260)	0.5		0.1
<i>Sporobolus australasicus</i>	0.1		0.1
<i>Triodia epactia</i>			
<i>Triodia melvillei</i>		1	
<i>Triodia wiseana</i>	0.4		5

**PHOTO**

Site Name: NM29  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 26/07/2018  
 GPS Location: GDA94 Zone 50 582364E 7516133N  
 Community: 14  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Dolerite, <2% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Dolerite, Laterised ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Abutilon lepidum</i>	0.4		0.1
<i>Abutilon otocarpum</i>	0.2		0.1
<i>Abutilon</i> sp. Pilbara (W.R. Barker 2025)	0.1		0.1
<i>Acacia bivenosa</i>	2		4
<i>Acacia bivenosa</i> x <i>sclerosperma</i> subsp. <i>sclerosperma</i>	1		0.1
<i>Acacia pruinocarpa</i>	4		1
<i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i>	1.5		0.1
<i>Acacia sibirica</i>	2.2		0.1
<i>Acacia synchronicia</i>	1.6		0.1
<i>Anthobolus leptomerioides</i>	1.8		0.1
<i>Aristida contorta</i>	0.2		0.1
<i>Calotis hispidula</i>	0.1		0.1
<i>Capparis lasiantha</i>	0.8		0.1
* <i>Cenchrus ciliaris</i>	0.6		0.2
<i>Chrysopogon fallax</i>	0.6		0.1
<i>Dichromochlamys dentatifolia</i>	0.1		0.1
<i>Duperreya commixta</i>			0.1
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	0.5		0.1

<i>Enneapogon caerulescens</i>	0.1		0.1
<i>Enneapogon lindleyanus</i>	0.4		0.1
<i>Enneapogon polyphyllus</i>	0.3		0.1
<i>Eremophila cuneifolia</i>	0.4		0.1
<i>Eremophila longifolia</i>	1.5		0.1
<i>Eriachne mucronata</i>	0.2		0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	5		0.5
<i>Euphorbia boophthona</i>	0.3		0.1
<i>Euphorbia vaccaria</i> var. <i>vaccaria</i>	0.1		0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1		0.1
<i>Gomphrena kanisii</i>	0.1		0.1
<i>Goodenia muelleriana</i>	0.1		0.1
<i>Lepidium phlebopetalum</i>	0.1		0.1
<i>Maireana melanocoma</i>	0.3		0.1
<i>Maireana triptera</i>	0.3		0.1
<i>Oldenlandia crouchiana</i>	0.1		0.1
<i>Paraneurachne muelleri</i>	0.3		0.1
<i>Peripleura arida</i>	0.1		0.1
<i>Pterocaulon sphacelatum</i>	0.1		0.1
<i>Ptilotus aervoides</i>	0.1		0.1
<i>Ptilotus helipteroides</i>	0.2		0.1
<i>Ptilotus nobilis</i>	0.2		0.1
<i>Ptilotus obovatus</i>	0.1		0.1
<i>Ptilotus rotundifolius</i>	1		0.3
<i>Rhagodia eremaea</i>	0.8	1	0.1
<i>Salsola australis</i>	0.2		0.1
<i>Sclerolaena densiflora</i>	0.2		0.1
<i>Sclerolaena eriacantha</i>	0.2		0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.7		0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1		0.2
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	2		3
<i>Senna notabilis</i>	0.1		0.1
<i>Sida fibulifera</i>	0.2		0.1
<i>Solanum lasiophyllum</i>	0.3		0.1
<i>Sporobolus australasicus</i>	0.1		0.1
<i>Themeda triandra</i>	1		0.1
<i>Tragus australianus</i>	0.1		0.1
<i>Triodia wiseana</i>	0.5		45
<i>Zygophyllum eichleri</i>	0.1		0.1



**PHOTO**



Site Name: NM30  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 26/07/2018  
 GPS Location: GDA94 Zone 50 581854E 7516924N  
 Community: 8  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Gently Inclined (3 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: Laterised Ironstone (other), <2% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Laterised ironstone (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia aneura</i>	4.5		1
<i>Acacia aptaneura</i>	6		5
<i>Acacia atkinsiana</i>	2.5		0.5
<i>Acacia ayersiana</i>	3		1
<i>Acacia bivenosa</i>	2		0.3
<i>Acacia pruinocarpa</i>	5		8
<i>Acacia synchronicia</i>	3		0.3
<i>Acacia tetragonophylla</i>	3		0.3
<i>Capparis lasiantha</i>	0.8		0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	7		2
<i>Goodenia muelleriana</i>	0.1		0.1
<i>Goodenia stobbsiana</i>	0.4		0.1
<i>Hibiscus burtonii</i>	0.3		0.1
<i>Ptilotus helipteroides</i>	0.1		0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.2		0.1
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	1.2		0.1
<i>Triodia melvillei</i>	0.6	5	0.2
<i>Triodia wiseana</i>	0.5		35

**PHOTO**



Site Name: NM31  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 26/07/2018  
 GPS Location: GDA94 Zone 50 578041E 7515082N  
 Community: 8  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Laterised ironstone (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Abutilon otocarpum</i>	0.3		0.1
<i>Acacia aneura</i>	2.5		0.5
<i>Acacia aptaneura</i>	4		3
<i>Acacia pruinocarpa</i>	4		4
<i>Acacia synchronicia</i>	2		0.2
<i>Aristida contorta</i>	0.1		0.1
<i>Enneapogon caerulescens</i>	0.1		0.1
<i>Enneapogon polyphyllus</i>	0.2		0.1
<i>Eremophila cuneifolia</i>	0.5		0.2
<i>Eremophila latrobei</i> subsp. <i>filiformis</i>	2.5		0.1
<i>Eriachne helmsii</i>	0.5		0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1		0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>			
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1		0.1
<i>Goodenia microptera</i>	0.1		0.1
<i>Goodenia muelleriana</i>	0.1		0.1
<i>Goodenia tenuiloba</i>	0.2		0.1
<i>Heliotropium heteranthum</i>	0.1		0.1
<i>Hibiscus burtonii</i>	0.3		0.1

<i>Hibiscus coatesii</i>	0.3		0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.2		0.1
<i>Indigofera monophylla</i>	0.3		0.1
<i>Oldenlandia crouchiana</i>	0.1		0.1
<i>Paraneurachne muelleri</i>	0.4		0.1
<i>Peripleura arida</i>	0.1		0.1
<i>Polycarpaea holtzei</i>	0.1		0.1
<i>Ptilotus aervoides</i>	0.1		0.1
<i>Ptilotus clementii</i>	0.3		0.1
<i>Ptilotus helipteroides</i>	0.2		0.1
<i>Ptilotus roei</i>	0.1		0.1
<i>Ptilotus rotundifolius</i>	0.6		0.2
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	0.4		0.1
<i>Schizachyrium fragile</i>	0.2		0.1
<i>Sclerolaena densiflora</i>	0.1		0.1
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	2		2
<i>Sida ?arenicola</i>	2		0.1
<i>Sida echinocarpa</i>	0.4		0.1
<i>Solanum lasiophyllum</i>	0.5		0.1
<i>Sporobolus australasicus</i>	0.1		0.1
<i>Trachymene oleracea</i>	0.6		0.1
<i>Trichodesma zeylanicum</i>	1.5		0.1
<i>Triodia epactia</i>	0.4		0.1
<i>Triodia melvillei</i>	0.4	1	0.1
<i>Triodia wiseana</i>	0.4		35

**PHOTO**



Site Name: NM32  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 26/07/2018  
 GPS Location: GDA94 Zone 50 578982E 7515299N  
 Community: 18  
 Landform Type: Crest  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Dolerite, 10-20% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Dolerite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 3 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia aptaneura</i>	2.5		1
<i>Acacia monticola</i>	2.5		1.5
<i>Acacia tenuissima</i>	1		0.1
<i>Acacia tetragonophylla</i>	2		0.2
<i>Aristida contorta</i>	0.2		10
<i>Aristida holathera</i> var. <i>holathera</i>	0.2		0.1
<i>Corchorus tectus</i>	0.6		0.1
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	0.1		0.1
<i>Cucumis variabilis</i>			0.1
<i>Cymbopogon ambiguus</i>	0.6		0.2
<i>Digitaria brownii</i>	0.5		0.1
<i>Dysphania rhadinostachya</i>	0.1		0.1
<i>Enneapogon polyphyllus</i>	0.2		0.3
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	0.5		0.1
<i>Eriachne aristidea</i>	0.1		0.1
<i>Eriachne mucronata</i>	0.5		0.2
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	4		1
<i>Euphorbia boophthona</i>	0.3		0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1		0.1

<i>Fimbristylis dichotoma</i>	0.2	0.1
<i>Gomphrena cunninghamii</i>	0.2	0.1
<i>Goodenia microptera</i>	0.2	0.1
<i>Goodenia muelleriana</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Goodenia tenuiloba</i>	0.1	0.1
<i>Gossypium robinsonii</i>	2.5	1
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	0.3	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	2.5	0.2
<i>Heliotropium inexplicitum</i>	0.1	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Iseilema dolichotrichum</i>	0.1	0.1
<i>Melhantha oblongifolia</i>	0.1	0.1
<i>Mnesithea formosa</i>	0.2	0.5
<i>Paraneurachne muelleri</i>	0.3	0.1
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.3	0.1
<i>Ptilotus clementii</i>	0.2	0.1
<i>Ptilotus fusiformis</i>	0.2	0.1
<i>Ptilotus helipteroides</i>	0.1	0.1
<i>Ptilotus rotundifolius</i>	1	2
<i>Schizachyrium fragile</i>	0.1	0.1
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	0.3	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	2	0.5
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	2	0.2
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	0.5	0.1
<i>Sida echinocarpa</i>	0.5	0.2
<i>Sida</i> sp. verrucose glands (F.H. Mollemans 2423)	0.1	0.1
<i>Solanum lasiophyllum</i>	0.4	0.1
<i>Solanum phlomoides</i>	0.4	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Themeda triandra</i>	0.5	0.2
<i>Trachymene oleracea</i>	0.2	0.1
<i>Tribulus suberosus</i>		
<i>Triodia brizoides</i>	0.4	30
<i>Triodia epactia</i>	0.4	3
<i>Triodia wiseana</i>	0.4	2
<i>Triumfetta maconochieana</i>	0.5	0.1
<i>Waltheria virgata</i>	0.5	0.1



**PHOTO**



Site Name: NM33  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 26/07/2018  
 GPS Location: GDA94 Zone 50 578543E 7515436N  
 Community: 17  
 Landform Type: Lower Slope  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: SW  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Dolerite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 3 years / > 5 years

### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Abutilon lepidum</i>	0.3		0.1
<i>Abutilon otocarpum</i>	0.2		0.1
<i>Acacia bivenosa</i>	1.5		0.2
<i>Acacia pruinocarpa</i>	6		3
<i>Acacia synchronicia</i>	3.5		1
<i>Aristida contorta</i>	0.1		0.2
* <i>Bidens bipinnata</i>	0.2		0.1
* <i>Cenchrus ciliaris</i>	0.5		0.1
<i>Chrysopogon fallax</i>	0.1		0.1
<i>Cucumis variabilis</i>			0.1
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	1		0.1
<i>Enneapogon caeruleus</i>	0.1		0.1
<i>Enneapogon polyphyllus</i>	0.1		0.1
<i>Eremophila cuneifolia</i>	0.6		0.1
<i>Eremophila longifolia</i>	2.5		0.3
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1		0.1
<i>Euphorbia biconvexa</i>	0.1		0.1

<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1		0.1
<i>Gomphrena kanisii</i>	0.2		0.1
<i>Goodenia muelleriana</i>	0.1		0.1
<i>Gossypium australe</i>	1		0.1
<i>Heliotropium cunninghamii</i>	0.1		0.1
<i>Heliotropium inexplicitum</i>	0.1		0.1
<i>Indigofera monophylla</i>	0.5		0.1
<i>Iseilema dolichotrichum</i>	0.1		0.1
* <i>Malvastrum americanum</i>	0.4		0.1
<i>Melhania oblongifolia</i>	0.2		0.1
<i>Paraneurachne muelleri</i>	0.4		0.2
<i>Paspalidium clementii</i>	0.1		0.1
<i>Phyllanthus erwinii</i>	0.1		0.1
<i>Portulaca oleracea</i>	0.1		0.1
<i>Psyrdrax suaveolens</i>	0.8		0.1
<i>Ptilotus aervoides</i>	0.1		0.1
<i>Ptilotus helipteroides</i>	0.2		0.1
<i>Ptilotus nobilis</i>	0.5		1
<i>Rhagodia eremaea</i>	0.8	1	0.1
<i>Rhyncharrhena linearis</i>			0.1
<i>Rhynchosia minima</i>			0.1
<i>Salsola australis</i>	0.3		0.1
<i>Schizachyrium fragile</i>	0.1		0.1
<i>Sclerolaena cornishiana</i>	0.4		0.1
<i>Sclerolaena eriacantha</i>	0.2		0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.5		0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1		0.2
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	1.5		2
<i>Seringia elliptica</i>	0.8		0.1
<i>Sida echinocarpa</i>	1		0.5
<i>Sida</i> sp. verrucose glands (F.H. Mollemans 2423)	0.1		0.1
<i>Solanum cleistogamum</i>	0.1		0.1
<i>Solanum lasiophyllum</i>	0.5		0.1
<i>Solanum phlomoides</i>	0.3		0.1
<i>Sporobolus australasicus</i>	0.1		0.1
<i>Streptoglossa bubakii</i>	0.3		0.1
<i>Swainsona maccullochiana</i>	1.2		0.1
<i>Tragus australianus</i>	0.1		0.1
<i>Triodia epactia</i>	0.6		40
<i>Urochloa occidentalis</i> var. <i>occidentalis</i>	0.2		0.1
<i>Zygophyllum eichleri</i>	0.1		0.1

**PHOTO**



Site Name: NM34  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 27/07/2018  
 GPS Location: GDA94 Zone 50 578548E 7514266N  
 Community: 17  
 Landform Type: Lower Slope  
 Slope Class: Gently Inclined (3 degrees)  
 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: Dolerite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 3 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Abutilon otocarpum</i>	0.1		0.1
<i>Acacia ancistrocarpa</i>	1.8		0.3
<i>Acacia aptaneura</i>	1.8		0.3
<i>Acacia bivenosa</i>	1.6		0.2
<i>Acacia inaequilatera</i>	3		1.5
<i>Acacia pruinocarpa</i>	2		0.3
<i>Acacia synchronicia</i>	3		0.3
<i>Acacia tenuissima</i>	1		0.1
<i>Aristida contorta</i>	0.2		0.1
<i>Aristida holathera</i> var. <i>holathera</i>	0.2		0.1
<i>Corymbia hamersleyana</i>			
<i>Duperreya commixta</i>			0.1
<i>Enneapogon caeruleus</i>	0.1		0.1
<i>Enneapogon polyphyllus</i>	0.1		0.1
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	1.5		0.2
<i>Eremophila longifolia</i>	1		0.2
<i>Eriachne aristidea</i>	0.2		0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1		0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1		0.1

<i>Gomphrena kanisii</i>	0.1	0.1
<i>Goodenia tenuiloba</i>	0.3	0.1
<i>Gossypium australe</i>	1	0.1
<i>Heliotropium inexplicitum</i>	0.2	0.1
<i>Iseilema dolichotrichum</i>	0.1	0.1
<i>Maireana georgei</i>	0.3	0.1
<i>Paraneurachne muelleri</i>	0.3	0.1
<i>Paspalidium clementii</i>	0.1	0.1
<i>Peripleura arida</i>	0.1	0.1
<i>Psydrax suaveolens</i>	0.6	0.1
<i>Ptilotus aervoides</i>	0.1	0.1
<i>Ptilotus helipteroides</i>	0.2	0.2
<i>Ptilotus nobilis</i>	0.5	0.1
<i>Ptilotus rotundifolius</i>	0.8	0.6
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	0.3	0.1
<i>Rhyncharrhena linearis</i>		0.1
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	1	0.2
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.6	0.2
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1	0.2
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	1	0.3
<i>Sida echinocarpa</i>	0.5	0.1
<i>Solanum lasiophyllum</i>	0.5	0.1
<i>Solanum piceum</i>	0.5	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Triodia epactia</i>	0.4	50

**PHOTO**



Site Name: NM35  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 27/07/2018  
 GPS Location: GDA94 Zone 50 579078E 7513762N  
 Community: 18  
 Landform Type: Crest  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: W  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Dolerite, 10-20% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Dolerite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 3 years

### **DOMINANT TAXA IN VEGETATION STRATA**

### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia aptaneura</i>	3		1
<i>Acacia bivenosa</i>	1		0.1
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	2		0.2
<i>Acacia tenuissima</i>	1		0.1
<i>Aristida contorta</i>	0.2		3
<i>Aristida holathera</i> var. <i>holathera</i>	0.3		0.1
<i>Bonamia pilbarensis</i>	0.1		0.1
<i>Cleome viscosa</i>	0.3		0.1
<i>Clerodendrum floribundum</i> var. <i>angustifolium</i>			
<i>Corchorus tectus</i>	0.6		0.1
<i>Corymbia hamersleyana</i>	3		0.3
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	0.3		0.1
<i>Cymbopogon ambiguus</i>	0.5		0.3
<i>Duperreya commixta</i>			0.1
<i>Dysphania rhadinostachya</i>	0.2		0.1
<i>Enneapogon caerulescens</i>	0.1		0.1



<i>Enneapogon polyphyllus</i>	0.3	0.1
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	0.4	0.1
<i>Eremophila longifolia</i>	1	0.1
<i>Eriachne aristidea</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.2	0.2
<i>Euphorbia boophthona</i>	0.2	0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1	0.1
<i>Fimbristylis dichotoma</i>	0.3	0.2
<i>Gomphrena cunninghamii</i>	0.2	0.1
<i>Goodenia muelleriana</i>	0.3	0.1
<i>Goodenia tenuiloba</i>	0.2	0.1
<i>Gossypium australe</i>	0.5	0.2
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>		
<i>Hakea lorea</i> subsp. <i>lorea</i>	1	0.1
<i>Hibiscus goldsworthii</i>	0.6	0.1
<i>Indigofera monophylla</i>	0.4	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>		0.1
<i>Melhania oblongifolia</i>	0.2	0.1
<i>Mnesithea formosa</i>	0.3	1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Paraneurachne muelleri</i>	0.3	0.2
<i>Phyllanthus erwinii</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Pterocaulon sphacelatum</i>	0.4	0.1
<i>Ptilotus fusiformis</i>	0.3	0.1
<i>Ptilotus obovatus</i>	0.6	0.1
<i>Ptilotus rotundifolius</i>	0.6	1
<i>Rhynchosia minima</i>		0.1
<i>Schizachyrium fragile</i>	0.1	0.1
<i>Sclerolaena cornishiana</i>	0.4	0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.5	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1	1
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	1	0.5
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	1	0.5
<i>Seringia elliptica</i>	0.6	0.1
<i>Sida echinocarpa</i>	0.5	0.1
<i>Solanum cleistogamum</i>	0.3	0.1
<i>Solanum lasiophyllum</i>	0.5	0.1
<i>Themeda triandra</i>	0.5	4
<i>Tribulus suberosus</i>	0.6	0.1
<i>Trichodesma zeylanicum</i>	1.5	0.1
<i>Triodia brizoides</i>	0.4	30
<i>Triodia epactia</i>	0.4	3
<i>Tripogonella loliiformis</i>	0.2	0.1

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<i>Triumfetta maconochieana</i>	0.4	0.1
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**PHOTO**



Site Name: NM36  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 27/07/2018  
 GPS Location: GDA94 Zone 50 578277E 7513711N  
 Community: 17  
 Landform Type: Lower Slope  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Dolerite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 3 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Abutilon</i> sp. Pilbara (W.R. Barker 2025)	0.1		0.1
<i>Acacia ancistrocarpa</i>	1.5		0.2
<i>Acacia aptaneura</i>	3.5		0.5
<i>Acacia bivenosa</i>	0.5		0.1
<i>Acacia inaequilatera</i>	2		0.1
<i>Acacia pruinocarpa</i>	4.5		1
<i>Acacia synchronicia</i>	3		1
<i>Aristida contorta</i>	0.2		2
<i>Cymbopogon ambiguus</i>	0.3		0.1
<i>Duperreya commixta</i>			0.1
<i>Enneapogon caeruleus</i>	0.1		0.1
<i>Enneapogon polyphyllus</i>	0.2		0.1
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	0.5		0.1
<i>Eremophila longifolia</i>	0.5		0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1		0.1
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1		0.1
<i>Euphorbia boophthona</i>	0.2		0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1		0.1
<i>Goodenia muelleriana</i>	0.1		0.1

<i>Goodenia tenuiloba</i>	0.2	0.1
<i>Gossypium australe</i>	0.4	0.1
<i>Heliotropium heteranthum</i>	0.1	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.1	0.1
<i>Iseilema dolichotrichum</i>	0.1	0.1
<i>Lepidium phlebopetalum</i>	0.1	0.1
<i>Maireana triptera</i>	0.1	0.1
<i>Paspalidium clementii</i>	0.2	0.1
<i>Phyllanthus erwinii</i>	0.1	0.1
<i>Portulaca oleracea</i>	0.1	0.1
<i>Ptilotus aervoides</i>	0.1	0.1
<i>Ptilotus clementii</i>	0.4	0.1
<i>Ptilotus helipteroides</i>	0.3	0.3
<i>Ptilotus nobilis</i>	0.3	0.1
<i>Ptilotus rotundifolius</i>	0.8	1
<i>Salsola australis</i>	0.3	0.1
<i>Schizachyrium fragile</i>	0.3	0.1
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	0.4	0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.8	0.3
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.5	0.3
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	1.5	0.3
<i>Sida echinocarpa</i>	0.6	0.1
<i>Solanum lasiophyllum</i>	0.5	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Stenopetalum anfractum</i>	0.1	0.1
<i>Triodia epactia</i>	0.6	25

**PHOTO**



Site Name: NM37  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 27/07/2018  
 GPS Location: GDA94 Zone 50 577675E 7514352N  
 Community: 6  
 Landform Type: Flat  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Dolerite, Laterised ironstone (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Pig/Animal Disturbance - Cattle activity  
 Fire: > 5 years

### **DOMINANT TAXA IN VEGETATION STRATA**

### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia synchronicia</i>	3		0.5
<i>Acacia tetragonophylla</i>	2		0.2
<i>Acacia xiphophylla</i>	2.5		10
<i>Bothriochloa ewartiana</i>	0.5		0.2
* <i>Cenchrus ciliaris</i>	0.3		0.1
<i>Cynodon prostratus</i>	0.1		0.1
<i>Dipteracanthus australasicus</i> subsp. <i>australasicus</i>	0.3		0.1
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	0.8		0.1
<i>Enneapogon caeruleus</i>	0.1		0.1
<i>Enneapogon polyphyllus</i>	0.1		0.1
<i>Enteropogon ramosus</i>	0.4		0.1
<i>Eremophila cuneifolia</i>	1		2
<i>Eremophila longifolia</i>	0.5		0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1		0.1
<i>Gomphrena kanisii</i>	0.1		0.1
<i>Goodenia muelleriana</i>	0.1		0.1

<i>Maireana melanocoma</i>	0.3		0.1
<i>Maireana planifolia</i>	0.4		0.1
* <i>Malvastrum americanum</i>	0.2		0.1
<i>Ptilotus aervoides</i>	0.1		0.1
<i>Ptilotus helipteroides</i>	0.1		0.1
<i>Ptilotus nobilis</i>	0.2		0.1
<i>Rhagodia eremaea</i>	1.5	2	0.2
<i>Salsola australis</i>	0.1		0.1
<i>Sclerolaena cuneata</i>	0.2		0.2
<i>Sclerolaena eriacantha</i>	0.2		0.3
<i>Sclerolaena lanicuspis</i>	0.1		0.1
<i>Sclerolaena minuta</i>	0.1		0.1
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	1.8		0.2
<i>Senna stricta</i>	1		0.3
<i>Sida fibulifera</i>	0.2		0.1
<i>Sporobolus australasicus</i>	0.1		0.1
<i>Triodia epactia</i>			
<i>Tripogonella loliiformis</i>	0.1		0.1

**PHOTO**

Site Name:	NM38
Site Type:	QUADRAT
Dimensions:	50m x 50m
Survey Date:	27/07/2018
GPS Location:	GDA94 Zone 50 577289E 7513758N
Community:	18
Landform Type:	Crest
Slope Class:	Moderately Inclined (10 degrees)
Soil Type:	Clay Loam
Soil Colour:	Red-brown (other)
Rock Outcrop:	Dolerite, 10-20% bedrock exposed
CF Abundance:	50-90%
CF Sizes:	2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm
CF Types:	Dolerite
Vegetation Condition:	Northern Vegetation Condition - E - Excellent
Fire:	~ 3 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Abutilon lepidum</i>	0.2		0.1
<i>Acacia aptaneura</i>	3		2
<i>Acacia inaequilatera</i>	2.5		0.2
<i>Acacia pruinocarpa</i>	3		1.5
<i>Acacia tetragonophylla</i>	1.5		0.1
<i>Achyranthes aspera</i>	0.2		0.1
<i>Amaranthus cuspidifolius</i>	0.1		0.1
<i>Aristida burbridgeae</i>	0.5		0.2
<i>Aristida contorta</i>	0.2		0.1
<i>Bonamia pilbarensis</i>	0.1		0.1
<i>Bulbostylis barbata</i>	0.1		0.1
<i>Cleome viscosa</i>	0.2		0.1
<i>Clerodendrum floribundum</i> var. <i>angustifolium</i>	2		0.1
<i>Corchorus tectus</i>	0.6		0.1
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	0.2		0.1
<i>Cucumis variabilis</i>			0.1
<i>Cymbopogon ambiguus</i>	0.5		0.2
<i>Duperreya commixta</i>			0.1



<i>Dysphania rhadinostachya</i>	0.1	0.1
<i>Enneapogon polyphyllus</i>	0.1	0.1
<i>Eremophila cuneifolia</i>	0.4	0.1
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	0.6	0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.2	0.1
<i>Goodenia microptera</i>	0.1	0.1
<i>Goodenia muelleriana</i>	0.1	0.1
<i>Gossypium australe</i>	1.2	0.2
<i>Indigofera monophylla</i>	0.2	0.1
<i>Mnesithea formosa</i>	0.2	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Paraneurachne muelleri</i>	0.3	0.1
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus aervoides</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.2	0.1
<i>Ptilotus helipteroides</i>	0.2	0.1
<i>Ptilotus rotundifolius</i>	0.5	1
<i>Rhynchosia minima</i>		0.1
<i>Schizachyrium fragile</i>	0.1	0.1
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	0.4	0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.5	0.2
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.5	0.2
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	1.5	0.2
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	1.5	0.2
<i>Sida echinocarpa</i>	0.5	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Themeda triandra</i>	0.6	2
<i>Trachymene oleracea</i>	0.1	0.1
<i>Trichodesma zeylanicum</i>	1	0.1
<i>Triodia brizoides</i>	0.4	35
<i>Triodia epactia</i>	0.4	5
<i>Tripogonella loliiformis</i>	0.1	0.1

**PHOTO**



Site Name: NM39  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 27/07/2018  
 GPS Location: GDA94 Zone 50 577449E 7514283N  
 Community: 7  
 Landform Type: Flat  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Light Clay, Clay Loam (other)  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Dolerite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Abutilon malvifolium</i>	0.1		0.1
<i>Acacia aptaneura</i>	6		1.5
<i>Acacia synchronicia</i>	1.8		0.2
<i>Acacia xiphophylla</i>	3.5		25
<i>Aristida inaequiglumis</i>	0.4		0.1
<i>Aristida latifolia</i>	0.5		0.3
<i>Astrebla elymoides</i>	0.5		0.5
<i>Astrebla pectinata</i>	0.4		0.1
<i>Boerhavia coccinea</i>	0.1		0.1
<i>Bothriochloa ewartiana</i>	0.5		0.3
<i>Capparis lasiantha</i>	0.4		0.2
* <i>Cenchrus ciliaris</i>	0.2		0.5
<i>Chloris pectinata</i>	0.2		0.1
<i>Chrysopogon fallax</i>	0.3		0.5
<i>Corchorus tridens</i>	0.1		0.1
<i>Crotalaria dissitiflora</i> subsp. <i>benthamiana</i>	0.2		0.1
<i>Dichanthium sericeum</i> subsp. <i>humilius</i>	0.2		0.1
<i>Dipteracanthus australasicus</i> subsp. <i>australasicus</i>	0.2		0.2

<i>Dissocarpus paradoxus</i>	0.3		0.1
<i>Duperreya commixta</i>			0.1
<i>Enneapogon caerulescens</i>	0.1		0.1
<i>Enteropogon ramosus</i>	0.3		0.1
<i>Eragrostis xerophila</i>	0.3		0.5
<i>Eremophila cuneifolia</i>	0.8		0.5
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	0.6		0.1
<i>Eriachne benthamii</i>	0.3		0.5
<i>Eriachne helmsii</i>	0.4		0.2
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1		0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1		0.1
<i>Goodenia muelleriana</i>	0.1		0.1
<i>Maireana pyramidata</i>	0.8		0.2
* <i>Malvastrum americanum</i>	0.3		0.1
<i>Neptunia dimorphantha</i>	0.3		0.2
<i>Operculina aequisejala</i>	0.1		0.1
<i>Panicum laevinode</i>	0.3		0.1
<i>Peripleura arida</i>	0.3		0.1
<i>Phyllanthus maderaspatensis</i>	0.2		0.1
<i>Ptilotus aervoides</i>	0.1		0.1
<i>Ptilotus carinatus</i>	0.2		0.1
<i>Ptilotus helipteroides</i>	0.1		0.1
<i>Ptilotus nobilis</i>	0.3		0.1
<i>Rhagodia eremaea</i>	0.8	3	0.2
<i>Rhynchosia minima</i>			0.1
<i>Rostellularia adscendens</i> var. <i>clementii</i>	0.1		0.1
<i>Sclerolaena bicornis</i> var. <i>bicornis</i>	0.2		0.1
<i>Sclerolaena densiflora</i>	0.2		0.1
<i>Sclerolaena eriacantha</i>	0.1		0.3
<i>Sclerolaena lanicuspis</i>	0.1		0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.4		0.1
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	0.1		0.1
<i>Senna hamersleyensis</i>	0.1		0.1
<i>Senna</i> sp. Karijini (M.E. Trudgen 10392)	0.4		0.1
<i>Sida fibulifera</i>	0.2		0.2
<i>Sida spinosa</i>	0.4		0.1
<i>Solanum lasiophyllum</i>	0.5		0.1
<i>Sporobolus australasicus</i>	0.1		0.1
<i>Stemodia kingii</i>	0.2		0.1
<i>Swainsona thompsoniana</i> (P3)	0.1	20	0.1
<i>Triodia epactia</i>	0.3		0.1
<i>Triodia wiseana</i>	0.3		0.1

**PHOTO**



Site Name: NM40  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 28/07/2018  
 GPS Location: GDA94 Zone 50 568546E 7510489N  
 Community: 10  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Laterised ironstone (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Abutilon otocarpum</i>	0.2		0.1
<i>Acacia aneura</i>	3		6
<i>Acacia aptaneura</i>	5		9
<i>Acacia ayersiana</i>	5		6
<i>Acacia pruinocarpa</i>	5		6
<i>Anthobolus leptomerioides</i>	2		0.2
<i>Aristida contorta</i>	0.2		0.1
<i>Aristida inaequiglumis</i>	0.5		0.1
* <i>Bidens bipinnata</i>	0.2		0.1
<i>Bulbostylis barbata</i>	0.1		0.1
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	0.1		0.1
<i>Digitaria ammophila</i>	0.4		0.1
<i>Dodonaea petiolaris</i>	1		0.1
<i>Duperreya commixta</i>			0.1
<i>Enneapogon caerulescens</i>	0.1		0.1
<i>Enneapogon polyphyllus</i>	0.2		0.1
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	0.8		0.1
<i>Eremophila latrobei</i> subsp. <i>filiformis</i>	2		0.3
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1		0.1

<i>Euphorbia australis</i> var. <i>hispidula</i>	0.1		0.1
<i>Euphorbia drummondii</i>	0.1		0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1		0.1
<i>Goodenia microptera</i>	0.1		0.1
<i>Goodenia muelleriana</i>	0.1		0.1
<i>Goodenia tenuiloba</i>	0.1		0.1
<i>Grevillea berryana</i>	5		0.3
<i>Hibiscus burtonii</i>	0.2		0.1
<i>Indigofera georgei</i>	0.6		0.1
<i>Paspalidium clementii</i>	0.1		0.1
<i>Peripleura arida</i>	0.3		0.1
<i>Perotis rara</i>	0.1		0.1
<i>Polycarpaea corymbosa</i>	0.1		0.1
<i>Polygala glaucifolia</i>	0.1		0.1
<i>Portulaca oleracea</i>	0.1		0.1
<i>Psyrax suaveolens</i>	1		0.1
<i>Ptilotus helipteroides</i>	0.3		0.1
<i>Ptilotus macrocephalus</i>	0.2		0.1
<i>Ptilotus roei</i>	0.1		0.1
<i>Rhyncharrhena linearis</i>			0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	2		0.2
<i>Sida fibulifera</i>	0.1		0.1
<i>Sida</i> sp. dark green fruits (S. van Leeuwen 2260)	0.4		0.1
<i>Solanum lasiophyllum</i>	0.5		0.1
<i>Tribulus hirsutus</i>	1.5		0.2
<i>Triodia epactia</i>	0.5		30
<i>Triodia wiseana</i>			

**PHOTO**





Site Name: NM41  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 28/07/2018  
 GPS Location: GDA94 Zone 50 568917E 7510437N  
 Community: 10  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Laterised ironstone (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Abutilon lepidum</i>	0.3		0.1
<i>Acacia aneura</i>	5		0.5
<i>Acacia aptaneura</i>	5		35
<i>Acacia ayersiana</i>	5		1
<i>Acacia maitlandii</i>	0.1		0.1
<i>Acacia pruinocarpa</i>	5		5
<i>Acacia tetragonophylla</i>	3		0.2
<i>Anthobolus leptomerioides</i>	1		0.1
<i>Aristida contorta</i>	0.2		0.1
* <i>Bidens bipinnata</i>	0.2		0.5
<i>Bulbostylis barbata</i>	0.1		0.1
<i>Calandrinia ptychosperma</i>	0.1		0.1
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	0.2		0.2
<i>Chrysocephalum gilesii</i>	0.2		0.1
<i>Chrysopogon fallax</i>	0.5		0.2
<i>Convolvulus clementii</i>			0.1
<i>Dichanthium sericeum</i> subsp. <i>humilius</i>	0.2		0.1
<i>Dodonaea petiolaris</i>	1		0.1
<i>Dysphania rhadinostachya</i>	0.3		0.1

<i>Enneapogon polyphyllus</i>	0.2		0.2
<i>Eragrostis cumingii</i>	0.2		0.1
<i>Eragrostis pergracilis</i>	0.1		0.1
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	3		0.2
<i>Eremophila latrobei</i> subsp. <i>filiformis</i>	1.6		0.2
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	9		2
<i>Euphorbia drummondii</i>	0.1		0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1		0.1
<i>Goodenia muelleriana</i>	0.1		0.1
<i>Goodenia nuda</i> (P4)	0.2		0.1
<i>Goodenia tenuiloba</i>	0.2		0.1
<i>Grevillea berryana</i>	5		1
<i>Hibiscus burtonii</i>	0.5		0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.2		0.1
<i>Iseilema dolichotrichum</i>	0.1		0.1
<i>Lepidium phlebopetalum</i>	0.1		0.1
<i>Maireana planifolia</i>	0.4		0.2
<i>Paspalidium clementii</i>	0.1		0.1
<i>Peripleura arida</i>	0.3		0.2
<i>Perotis rara</i>	0.1		0.1
<i>Phyllanthus erwinii</i>	0.1		0.1
<i>Polygala glaucifolia</i>	0.1		0.1
<i>Portulaca oleracea</i>	0.1		0.1
<i>Psyrax suaveolens</i>	1		0.1
<i>Pterocaulon sphacelatum</i>	0.3		0.1
<i>Ptilotus carinatus</i>	0.2		0.1
<i>Ptilotus gaudichaudii</i>	0.5		0.1
<i>Ptilotus helipteroides</i>	0.2		0.1
<i>Ptilotus nobilis</i>	0.6		0.1
<i>Ptilotus rotundifolius</i>	0.6		0.3
<i>Rhagodia eremaea</i>	1.6	2	0.2
<i>Rhyncharrhena linearis</i>			0.1
<i>Roebuckiella similis</i>	0.1		0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.8		0.2
<i>Sida</i> ? <i>arenicola</i>	0.2		0.1
<i>Sida fibulifera</i>	0.2		0.1
<i>Sida</i> sp. dark green fruits (S. van Leeuwen 2260)	0.4		0.1
<i>Spermacoce brachystema</i>	0.2		0.1
<i>Sporobolus australasicus</i>	0.1		0.1
<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>	0.1		0.1
<i>Triodia epactia</i>	0.5		25

**PHOTO**



Site Name: NM42  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 28/07/2018  
 GPS Location: GDA94 Zone 50 569134E 7510771N  
 Community: 7  
 Landform Type: Flat  
 Slope Class: Gently Inclined (3 degrees)  
 Soil Type: Light Clay, Clay Loam (other)  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 20-50%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Dolerite, Laterised ironstone (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Pig/Animal Disturbance - Cattle activity  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Abutilon malvifolium</i>	0.1		0.1
<i>Acacia tetragonophylla</i>	1.8		0.2
<i>Acacia xiphophylla</i>	4.5		25
<i>Aristida contorta</i>	0.1		0.1
<i>Aristida latifolia</i>	0.4		0.5
<i>Astrebla elymoides</i>	0.5		3
<i>Astrebla pectinata</i>	0.5		0.1
<i>Atriplex bunburyana</i>	0.3		0.1
<i>Bergia pedicellaris</i>	0.1		0.1
<i>Bothriochloa ewartiana</i>	0.5		0.2
* <i>Cenchrus ciliaris</i>	0.5		0.1
<i>Chrysopogon fallax</i>	0.5		3
<i>Corchorus tridens</i>	0.1		0.1
<i>Crotalaria dissitiflora</i> subsp. <i>benthamiana</i>	0.2		0.2
<i>Cullen graveolens</i>	0.1		0.1
<i>Cynodon prostratus</i>	0.1		0.1
<i>Cyperus difformis</i>	0.3		0.1

<i>Dichanthium fecundum</i>	0.5	0.3
<i>Dichanthium sericeum</i> subsp. <i>humilius</i>	0.3	0.3
<i>Dipteracanthus australasicus</i> subsp. <i>australasicus</i>	0.3	0.1
<i>Duperreya commixta</i>		0.1
<i>Elytrophorus spicatus</i>	0.1	0.1
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	1.2	0.2
<i>Enneapogon caerulescens</i>	0.1	0.1
<i>Enteropogon ramosus</i>	0.3	0.1
<i>Eragrostis leptocarpa</i>	0.4	0.3
<i>Eragrostis setifolia</i>	0.3	0.1
<i>Eragrostis tenellula</i>	0.2	0.1
<i>Eragrostis xerophila</i>	0.4	0.2
<i>Eremophila cuneifolia</i>	0.8	0.2
<i>Eriachne benthamii</i>	0.5	7
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Goodenia muelleriana</i>	0.1	0.1
<i>Goodenia pascua</i>	0.2	0.1
<i>Haloragis maierae</i>	0.1	0.1
<i>Heliotropium crispatum</i>	0.1	0.1
<i>Iseilema vaginiflorum</i>	0.4	0.5
<i>Lotus cruentus</i>	0.2	0.1
* <i>Malvastrum americanum</i>	0.4	0.1
<i>Marsilea hirsuta</i>	0.1	0.1
<i>Mimulus gracilis</i>	0.1	0.1
<i>Neptunia dimorphantha</i>	0.1	0.1
<i>Panicum laevinode</i>	0.5	0.2
<i>Pimelea holroydii</i>	0.1	0.1
<i>Portulaca conspicua</i>	0.1	0.1
<i>Portulaca oleracea</i>	0.1	0.1
<i>Ptilotus aevoides</i>	0.1	0.3
<i>Ptilotus carinatus</i>	0.2	0.1
<i>Ptilotus gomphrenoides</i>	0.1	0.2
<i>Ptilotus helipteroides</i>	0.1	0.1
<i>Rhagodia eremaea</i>	1.7	0.2
<i>Rhynchosia minima</i>		0.2
<i>Rostellularia adscendens</i> var. <i>clementii</i>	0.1	0.1
<i>Salsola australis</i>	0.2	0.1
<i>Scaevola spinescens</i>	1.3	0.2
<i>Schenkia clementii</i>	0.1	0.1
<i>Schoenoplectiella laevis</i>	0.1	0.1
<i>Sclerolaena cornishiana</i>	0.2	0.1
<i>Sclerolaena eriacantha</i>	0.2	0.1
<i>Sclerolaena lanicuspis</i>	0.1	0.1

<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1		2
<i>Sida fibulifera</i>	0.2		0.1
<i>Sida spinosa</i>	0.3		0.1
<i>Sida trichopoda</i>	0.4		0.1
<i>Sporobolus australasicus</i>	0.1		0.1
<i>Stemodia kingii</i>	0.3		0.2
<i>Streptoglossa adscendens</i>	0.2		0.1
<i>Streptoglossa bubakii</i>	0.2		0.1
<i>Swainsona thompsoniana</i> (P3)	0.2	73	0.1
<i>Triodia epactia</i>	0.5		0.5
<i>Wahlenbergia gracilentia</i>	0.1		0.1
<i>Zygophyllum eichleri</i>	0.1		0.1

**PHOTO**

Site Name: NM43  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 28/07/2018  
 GPS Location: GDA94 Zone 50 569263E 7510618N  
 Community: 10  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Dolerite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: (other) - Historical disturbance - pushed up mounds of dirt  
 Fire: > 5 years

### **DOMINANT TAXA IN VEGETATION STRATA**

### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Abutilon lepidum</i>	0.4		0.1
<i>Abutilon otocarpum</i>	0.3		0.1
<i>Acacia aptaneura</i>	5		7
<i>Acacia kempeana</i>	2		0.4
<i>Acacia pruinocarpa</i>	4		5
<i>Acacia rhodophloia</i>			
<i>Acacia tetragonophylla</i>	3		0.2
<i>Amaranthus cuspidifolius</i>	0.1		0.1
<i>Anthobolus leptomerioides</i>	2		0.2
<i>Aristida contorta</i>	0.2		4
<i>Aristida inaequiglumis</i>	1		0.1
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	0.4		0.1
<i>Chrysopogon fallax</i>	0.4		0.1
<i>Digitaria brownii</i>	0.4		0.1
<i>Duperreya commixta</i>			0.2
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	0.4		0.1
<i>Enneapogon polyphyllus</i>	0.1		0.1

<i>Eremophila latrobei</i> subsp. <i>filiformis</i>	1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia australis</i> var. <i>hispidula</i>	0.1	0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1	0.1
<i>Goodenia muelleriana</i>	0.1	0.1
<i>Goodenia tenuiloba</i>	0.3	0.2
<i>Heliotropium heteranthum</i>	0.1	0.1
<i>Hibiscus burtonii</i>	1.6	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.3	0.1
<i>Indigofera monophylla</i>	0.4	0.1
<i>Maireana melanocoma</i>	0.4	0.1
<i>Peripleura arida</i>	0.1	0.1
<i>Psyrax suaveolens</i>	1	0.1
<i>Ptilotus helipteroides</i>	0.3	0.4
<i>Ptilotus roei</i>	0.1	0.1
<i>Ptilotus rotundifolius</i>	1	0.1
<i>Sclerolaena cornishiana</i>	0.2	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.5	0.2
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	1.8	0.3
<i>Sida</i> sp. dark green fruits (S. van Leeuwen 2260)	0.2	0.1
<i>Solanum lasiophyllum</i>	0.8	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Triodia epactia</i>	0.6	30



**PHOTO**



Site Name: NM44  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 29/07/2018  
 GPS Location: GDA94 Zone 50 568917E 7510665N  
 Community: 10  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Dolerite, Laterised ironstone (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia aptaneura</i>	5		5
<i>Acacia ayersiana</i>	2		0.3
<i>Acacia bivenosa</i>	2		0.2
<i>Acacia pruinocarpa</i>	3		4
<i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i>	1.8		0.7
<i>Acacia tetragonophylla</i>	3		1
<i>Anthobolus leptomerioides</i>	2		0.2
<i>Aristida contorta</i>	0.2		0.1
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	0.1		0.1
<i>Duperreya commixta</i>			0.1
<i>Dysphania rhadinostachya</i>	0.1		0.1
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	0.2		0.1
<i>Enneapogon polyphyllus</i>	0.2		0.1
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	1		0.2
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1		0.3
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	3		0.3
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.2		0.1
<i>Goodenia tenuiloba</i>	0.3		0.1
<i>Hibiscus burtonii</i>	1.2		0.1

<i>Maireana melanocoma</i>	0.2		0.1
<i>Maireana planifolia</i>	0.3		0.1
<i>Peripleura arida</i>	0.2		0.1
<i>Portulaca oleracea</i>	0.1		0.1
<i>Psydrax suaveolens</i>	0.8		0.1
<i>Ptilotus helipteroides</i>	0.2		0.1
<i>Ptilotus nobilis</i>	0.1		0.1
<i>Ptilotus obovatus</i>	0.8		0.1
<i>Ptilotus rotundifolius</i>	0.5		0.2
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	0.3		0.1
<i>Sclerolaena cornishiana</i>	0.2		0.1
<i>Sclerolaena lanicuspis</i>	0.1		0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.5		0.1
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	1.5		0.2
<i>Senna stricta</i>	1.2		0.5
<i>Solanum lasiophyllum</i>	0.4		0.1
<i>Sporobolus australasicus</i>	0.1		0.1
<i>Tribulus suberosus</i>	1.2		0.1
<i>Triodia epactia</i>	0.7		30

**PHOTO**

Site Name: NM45  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 29/07/2018  
 GPS Location: GDA94 Zone 50 565969E 7508849N  
 Community: 7  
 Landform Type: Other, Flat/Minor drainage line (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: L (other)  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Dolerite, Laterised ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Pig/Animal Disturbance - Some cattle activity  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia aptaneura</i>	3		1
<i>Acacia xiphophylla</i>	4		12
<i>Aristida contorta</i>	0.2		0.1
<i>Aristida latifolia</i>	0.3		0.2
<i>Astrebla pectinata</i>	0.4		0.2
<i>Bothriochloa ewartiana</i>	0.4		2
<i>Capparis lasiantha</i>			0.1
<i>Chrysopogon fallax</i>	0.4		2
<i>Dipteracanthus australasicus</i> subsp. <i>australasicus</i>	0.3		0.3
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	0.4		0.1
<i>Enneapogon caeruleus</i>	0.1		0.1
<i>Enneapogon polyphyllus</i>	0.2		0.1
<i>Eragrostis xerophila</i>	0.2		0.2
<i>Eremophila cuneifolia</i>	1		2
<i>Goodenia muelleriana</i>	0.2		0.1
<i>Lepidium phlebopetalum</i>	0.1		0.1

<i>Maireana melanocoma</i>	0.3		0.2
<i>Maireana tomentosa</i> subsp. <i>tomentosa</i>	0.3		0.1
<i>Neptunia dimorphantha</i>	0.2		0.1
<i>Ptilotus aervoides</i>	0.1		0.1
<i>Ptilotus helipteroides</i>	0.3		0.1
<i>Ptilotus nobilis</i>	0.3		0.1
<i>Rhagodia eremaea</i>	1.5	17	0.3
<i>Salsola australis</i>	0.3		0.1
<i>Scaevola spinescens</i>	0.6		0.1
<i>Sclerolaena cuneata</i>	0.2		0.1
<i>Sclerolaena eriacantha</i>	0.2		0.3
<i>Sclerolaena lanicuspis</i>	0.1		0.3
<i>Sclerolaena minuta</i>	0.2		0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1		2
<i>Senna hamersleyensis</i>	0.3		0.2
<i>Sida fibulifera</i>	0.1		0.1
<i>Sporobolus australasicus</i>	0.1		0.1
<i>Triodia epactia</i>	0.6		3
<i>Triodia wiseana</i>	0.4		1
<i>Zygophyllum eichleri</i>	0.1		0.1

**PHOTO**

Site Name: NM46  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 29/07/2018  
 GPS Location: GDA94 Zone 50 565836E 7508825N  
 Community: 8  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Gently Inclined (3 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: Laterised Ironstone (other), <2% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Laterised ironstone (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Abutilon otocarpum</i>	0.3		0.1
<i>Acacia aptaneura</i>	3		0.3
<i>Acacia bivenosa</i>	0.3		0.1
<i>Acacia exigua</i>	5		2
<i>Acacia pruinocarpa</i>	4		4
<i>Acacia synchronicia</i>	1.5		0.2
<i>Amphipogon sericeus</i>	0.5		0.1
<i>Codonocarpus cotinifolius</i>	1.5		0.1
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>	0.3		0.1
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	0.6		0.1
<i>Eremophila cuneifolia</i>	1		0.1
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	0.4		0.1
<i>Goodenia microptera</i>	0.2		0.1
<i>Goodenia stobbsiana</i>	0.5		0.1
<i>Hibiscus burtonii</i>	0.6		0.1
<i>Hibiscus coatesii</i>	0.4		0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.2		0.1
<i>Oldenlandia crouchiana</i>	0.1		0.1
<i>Paraneurachne muelleri</i>	0.4		0.1

<i>Rhagodia eremaea</i>	0.4	1	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	2		0.2
<i>Senna notabilis</i>	0.4		0.1
<i>Solanum cleistogamum</i>	0.3		0.1
<i>Triodia epactia</i>	0.4		0.2
<i>Triodia wiseana</i>	0.5		50

**PHOTO**

Site Name: NM47  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 29/07/2018  
 GPS Location: GDA94 Zone 50 565697E 7508697N  
 Community: 8  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Gently Inclined (3 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Laterised ironstone (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia aptaneura</i>	5		10
<i>Acacia pruinocarpa</i>	5		5
<i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i>	2.2		0.2
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	0.3		0.1
<i>Cymbopogon ambiguus</i>	1		0.1
<i>Duperreya commixta</i>			0.1
<i>Enneapogon polyphyllus</i>	0.2		0.1
<i>Eremophila cuneifolia</i>	1.5		0.1
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	0.8		0.1
<i>Eremophila latrobei</i> subsp. <i>filiformis</i>	1.5		0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1		0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.3		0.1
<i>Goodenia microptera</i>	0.2		0.1
<i>Hibiscus burtonii</i>	0.5		0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.2		0.1
<i>Indigofera monophylla</i>	0.3		0.1
<i>Paraneurachne muelleri</i>	0.4		0.1
<i>Psyrdrax suaveolens</i>	1		0.1
<i>Ptilotus helipteroides</i>	0.2		0.1



<i>Ptilotus rotundifolius</i>	1	0.2
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.5	0.3
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	1.5	0.1
<i>Sida echinocarpa</i>	0.6	0.1
<i>Solanum elatius</i>	1.5	0.1
<i>Solanum lasiophyllum</i>	0.5	0.1
<i>Triodia epactia</i>	0.5	16
<i>Triodia wiseana</i>	0.5	16

**PHOTO**

Site Name: NM48  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 29/07/2018  
 GPS Location: GDA94 Zone 50 566172E 7508306N  
 Community: 9  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Gently Inclined (3 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Metamorphic (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Abutilon</i> sp. Pilbara (W.R. Barker 2025)	0.5		0.1
<i>Acacia aptaneura</i>	3		0.3
<i>Acacia bivenosa</i>	1.8		1
<i>Acacia synchronicia</i>	1		0.1
<i>Acacia tenuissima</i>	0.6		0.1
<i>Amyema</i> sp. Fortescue (M.E. Trudgen 5358)			
<i>Anthobolus leptomerioides</i>	2		0.3
* <i>Cenchrus ciliaris</i>	0.3		0.1
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	0.3		0.1
<i>Cymbopogon ambiguus</i>	0.4		0.1
<i>Dichanthium sericeum</i> subsp. <i>humilius</i>	0.1		0.1
<i>Duperreya commixta</i>			0.1
<i>Enneapogon polyphyllus</i>	0.2		0.1
<i>Eremophila cuneifolia</i>	0.3		0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	3		0.3
<i>Euphorbia boophthona</i>	0.3		0.1
<i>Goodenia microptera</i>	0.2		0.1
<i>Haloragis gossei</i> var. <i>gossei</i>	0.1		0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.3		0.1

<i>Maireana melanocoma</i>	0.5		0.1
<i>Melaleuca eleuterostachya</i>	1.8		3
<i>Peripleura obovata</i>	0.6		0.1
<i>Pterocaulon sphacelatum</i>	0.4		0.1
<i>Sclerolaena eriacantha</i>	0.2		0.5
<i>Sclerolaena lanicuspis</i>	0.2		0.2
<i>Sclerolaena minuta</i>	0.2		0.2
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	0.4		0.1
<i>Sida</i> ? <i>arenicola</i>	2		0.1
<i>Sida echinocarpa</i>	0.5		0.1
<i>Solanum lasiophyllum</i>	0.3		0.1
<i>Stemodia grossa</i>	1.4		0.1
<i>Streptoglossa decurrens</i>	0.3		0.1
<i>Trachymene oleracea</i>	0.8		0.1
<i>Trichodesma zeylanicum</i>	0.2		0.1
<i>Triodia angusta</i>	0.6		30
<i>Triodia wiseana</i>	0.6		10

**PHOTO**

Site Name: NM49  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 30/07/2018  
 GPS Location: GDA94 Zone 50 557062E 7489825N  
 Community: 7  
 Landform Type: Flat  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Light Clay  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - VG - Very Good  
 Disturbance: Limited Clearing - Partial clearing, Pig/Animal Disturbance - Cattle activity, (other) - Vehicle tracks  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia bivenosa</i>	2		0.2
<i>Acacia synchronicia</i>	1		0.1
<i>Acacia xiphophylla</i>	4		8
<i>Amyema</i> sp. Fortescue (M.E. Trudgen 5358)			0.1
<i>Aristida latifolia</i>	0.6		3
<i>Astrebla elymoides</i>	0.5		5
<i>Astrebla lappacea</i> (P3)	0.3	2	0.1
<i>Astrebla pectinata</i>	0.5		5
<i>Bothriochloa ewartiana</i>	0.7		0.5
<i>Capparis lasiantha</i>	0.5		0.1
* <i>Cenchrus ciliaris</i>	0.5		1
* <i>Cenchrus setiger</i>	0.5		0.1
<i>Cynodon convergens</i>	0.2		0.1
<i>Dichanthium fecundum</i>	0.4		3
<i>Dichanthium sericeum</i> subsp. <i>humilius</i>	0.2		0.1
<i>Dipteracanthus australasicus</i> subsp.	0.3		0.3

<i>australasicus</i>			
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	1		0.2
<i>Enneapogon caeruleus</i>	0.1		0.1
<i>Eragrostis falcata</i>	0.1		0.1
<i>Eragrostis setifolia</i>	0.3		0.1
<i>Eragrostis xerophila</i>	0.4		2
<i>Eremophila cuneifolia</i>	0.6		0.1
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	0.8		0.1
<i>Goodenia pascua</i>	0.2		0.1
<i>Haloragis maierae</i>	0.1		0.1
<i>Lepidium pedicellosum</i>	0.5		0.1
<i>Maireana tomentosa</i> subsp. <i>tomentosa</i>	0.5		0.1
* <i>Malvastrum americanum</i>	0.2		0.1
<i>Panicum decompositum</i>	0.4		0.2
<i>Phyllanthus maderaspatensis</i>	0.2		0.1
<i>Ptilotus nobilis</i>	0.5		0.2
<i>Ptilotus obovatus</i>	1		0.1
<i>Rhagodia eremaea</i>	1	17	0.2
<i>Rhynchosia minima</i>			0.1
<i>Salsola australis</i>	0.2		0.1
<i>Scaevola spinescens</i>	1		0.2
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1		0.1
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	2		0.2
<i>Senna</i> sp. Karijini (M.E. Trudgen 10392)	0.5		0.5
<i>Senna stricta</i>	0.3		0.1
<i>Sida fibulifera</i>	0.2		3
<i>Solanum cleistogamum</i>	0.2		0.1
<i>Sporobolus australasicus</i>	0.1		0.1
<i>Streptoglossa adscendens</i>	0.1		0.1
<i>Streptoglossa bubakii</i>	0.3		0.2
<i>Swainsona leeana</i>	0.1		0.1
<i>Triodia angusta</i>	0.5		5
<i>Triodia wiseana</i>	0.3		0.2
<i>Zygophyllum eichleri</i>	0.1		0.1

**PHOTO**



Site Name: NM50  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 30/07/2018  
 GPS Location: GDA94 Zone 50 556957E 7489689N  
 Community: 2  
 Landform Type: Other, Low rise (other)  
 Slope Class: Moderately Inclined (10 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Light brown (other)  
 Rock Outcrop: Calcrete (other), 2-10% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia bivenosa</i>	2.5		1
<i>Acacia kempeana</i>	1		0.2
<i>Acacia synchronicia</i>	1		0.1
<i>Acacia tetragonophylla</i>	0.8		0.1
<i>Aristida contorta</i>	0.2		0.1
<i>Aristida holathera</i> var. <i>holathera</i>	0.2		0.1
<i>Capparis lasiantha</i>	0.8		0.1
<i>Cymbopogon ambiguus</i>	1.2		0.1
<i>Eucalyptus socialis</i> subsp. <i>eucentrica</i>	5		1
<i>Goodenia forrestii</i>	0.2		0.1
<i>Goodenia microptera</i>	0.2		0.1
<i>Goodenia pedicellata</i> (P1)	0.1	6	0.1
<i>Haloragis gossei</i> var. <i>gossei</i>	0.2		0.1
<i>Heliotropium ovalifolium</i>	0.3		0.1
<i>Melaleuca eleuterostachya</i>	2		5
<i>Oldenlandia crouchiana</i>	0.1		0.1
<i>Paraneurachne muelleri</i>	0.3		0.1
<i>Pluchea dentex</i>	0.5		0.1
<i>Salsola australis</i>	0.3		0.1

<i>Scaevola spinescens</i>	0.5		0.2
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1.5		0.3
<i>Senna</i> sp. Karijini (M.E. Trudgen 10392)	0.2		0.1
<i>Stackhousia muricata</i>	0.3		0.1
<i>Streptoglossa bubakii</i>	0.4		0.1
<i>Triodia angusta</i>	0.5		25
<i>Triodia wiseana</i>	0.4		25

**PHOTO**



Site Name: NMR01  
 Site Type: RELEVE  
 Survey Date: 26/07/2018  
 GPS Location: GDA94 Zone 50 581119E 7516725N  
 Community: 7  
 Landform Type: Other, Clay pan (other)  
 Slope Class: Level (0 degrees)  
 Soil Type: Light Clay  
 Soil Colour: Brown  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 0%  
 Vegetation Condition: Northern Vegetation Condition - VG - Very Good  
 Disturbance: Exotic Weeds - Some weeds, Pig/Animal Disturbance - Cattle activity  
 Fire: > 5 years

#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Acacia aptaneura</i>	4		1
<i>Acacia bivenosa</i>	2		2
<i>Acacia pruinocarpa</i>	4		1
<i>Acacia tetragonophylla</i>	1		0.1
<i>Alternanthera denticulata</i>	0.2		0.1
<i>Aristida latifolia</i>	0.5		0.2
<i>Astrebla elymoides</i>	0.5		1
<i>Astrebla lappacea</i> (P3)	0.5	20	1
<i>Austrobryonia pilbarensis</i>			0.1
<i>Bergia pedicellaris</i>	0.1		0.1
<i>Bothriochloa ewartiana</i>	0.4		0.2
* <i>Cenchrus ciliaris</i>	0.4		0.2
<i>Centipeda minima</i>	0.1		0.1
<i>Chloris pectinata</i>	0.2		0.1
<i>Chrysopogon fallax</i>	0.5		0.5
<i>Corchorus tridens</i>	0.2		0.1
<i>Corymbia hamersleyana</i>	5		2
<i>Cyperus difformis</i>	0.1		0.1
<i>Dichanthium fecundum</i>	0.5		0.5
<i>Dichanthium sericeum</i> subsp. <i>humilius</i>	0.3		0.1
<i>Dipteracanthus australasicus</i> subsp.	0.2		0.2

<i>australasicus</i>			
<i>Eragrostis tenellula</i>	0.1		0.1
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	1		0.1
<i>Eriachne benthamii</i>	0.5		45
<i>Eucalyptus xerothermica</i>	6		2
<i>Eulalia aurea</i>	0.6		2
<i>Euphorbia inappendiculata</i> var. <i>queenslandica</i> (P1)	0.1		0.1
<i>Heliotropium crispatum</i>	0.1		0.1
<i>Lepidium muelleri-ferdinandii</i>	0.1		0.1
<i>Lotus cruentus</i>	0.1	10	0.1
* <i>Malvastrum americanum</i>	0.3		0.1
<i>Marsilea hirsuta</i>	0.1		0.1
<i>Mimulus gracilis</i>	0.1		0.1
<i>Panicum decompositum</i>	0.4		0.1
<i>Panicum laevinode</i>	0.2		0.1
<i>Portulaca oleracea</i>	0.1		0.1
<i>Pterocaulon sphacelatum</i>	0.1		0.1
<i>Ptilotus nobilis</i>	0.2		0.1
<i>Rhagodia eremaea</i>	1.5	5	0.2
<i>Rhynchosia minima</i>			0.1
<i>Rostellularia adscendens</i> var. <i>clementii</i>	0.1		0.1
<i>Santalum lanceolatum</i>	1.5		0.2
<i>Sclerolaena cornishiana</i>	0.3		0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1		0.3
<i>Senna notabilis</i>	0.2		0.1
<i>Sida fibulifera</i>	0.2		0.1
<i>Solanum cleistogamum</i>	0.1		0.1
<i>Solanum lasiophyllum</i>	0.2		0.1
* <i>Sonchus oleraceus</i>	0.2		0.1
<i>Stemodia kingii</i>	0.2		0.1
<i>Themeda triandra</i>	0.6		2
* <i>Vachellia farnesiana</i>	3		2
<i>Vigna</i> sp. Hamersley Clay (A.A. Mitchell PRP 113)	0.1		0.1
<i>Zygophyllum eichleri</i>	0.1		0.1

**PHOTO**



Site Name: NMR02  
 Site Type: RELEVE  
 Survey Date: 27/07/2018  
 GPS Location: GDA94 Zone 50 577503E 7514303N  
 Community: 7  
 Landform Type: Other, Clay pan (other)  
 Slope Class: Level (0 degrees)  
 Soil Type: Light Clay  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 0%  
 Vegetation Condition: Northern Vegetation Condition - VG - Very Good  
 Disturbance: Exotic Weeds - Some weeds, Pig/Animal Disturbance - Cattle activity  
 Fire: > 5 years

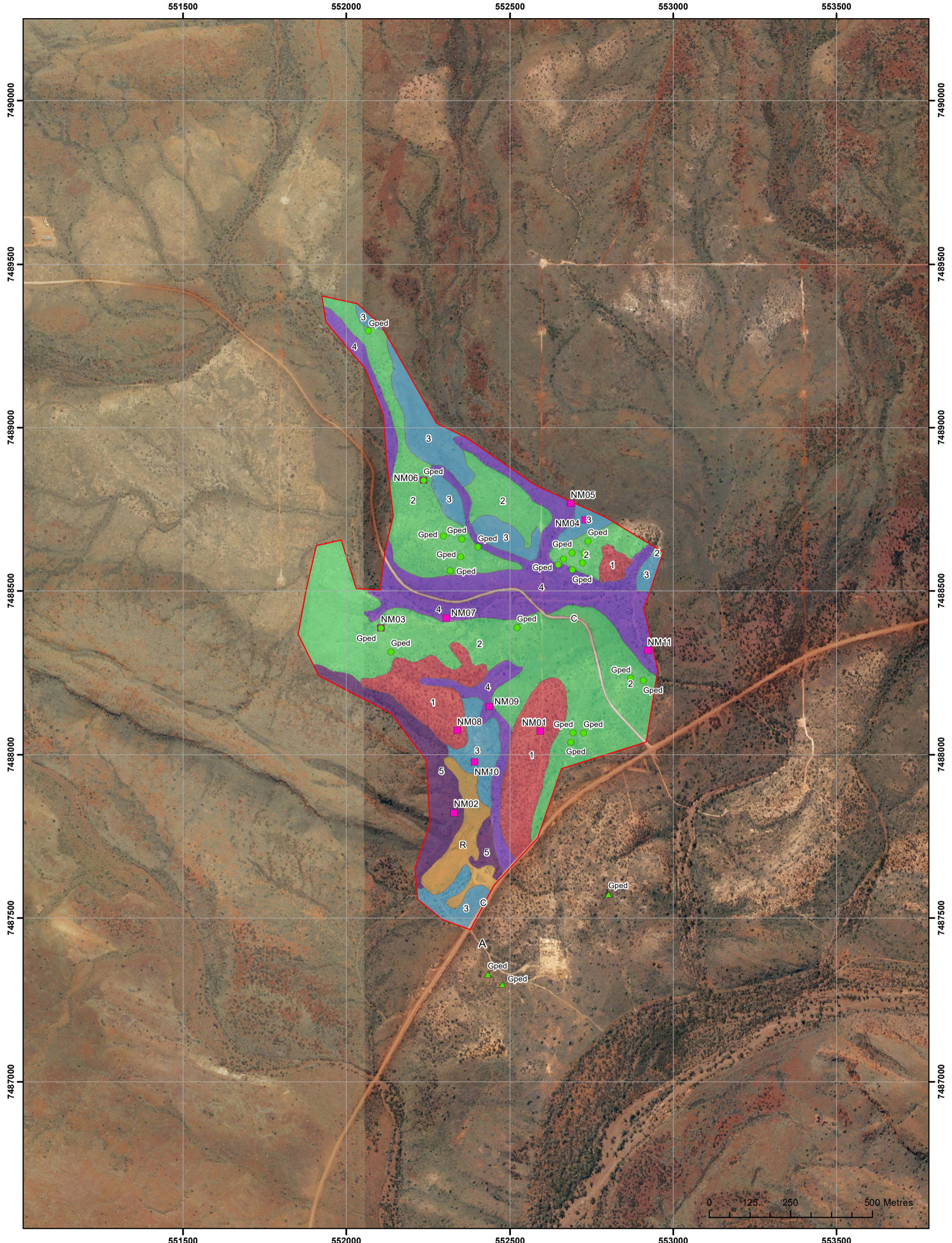
#### **DOMINANT TAXA IN VEGETATION STRATA**

#### **SPECIES LIST**

Taxon Name	Avg. Height	Count Alive	Cover Alive
<i>Abutilon malvifolium</i>			
<i>Astrebla elymoides</i>			
<i>Bothriochloa ewartiana</i>			
<i>Centipeda minima</i>			
<i>Chrysopogon fallax</i>			
<i>Dichanthium fecundum</i>			
<i>Eragrostis tenellula</i>			
<i>Eriachne benthamii</i>			
<i>Indigofera monophylla</i>			
<i>Lotus cruentus</i>		4	
<i>Mimulus gracilis</i>			
<i>Stemodia kingii</i>			
* <i>Vachellia farnesiana</i>			

**PHOTO**





This map should only be used internally with WEC report MR18-34-01.

### Vegetation Units and Significant Flora

Revision: 0 - 21 Nov 2018

Scale: 1:10,000 (A3)

Author: David Coultas

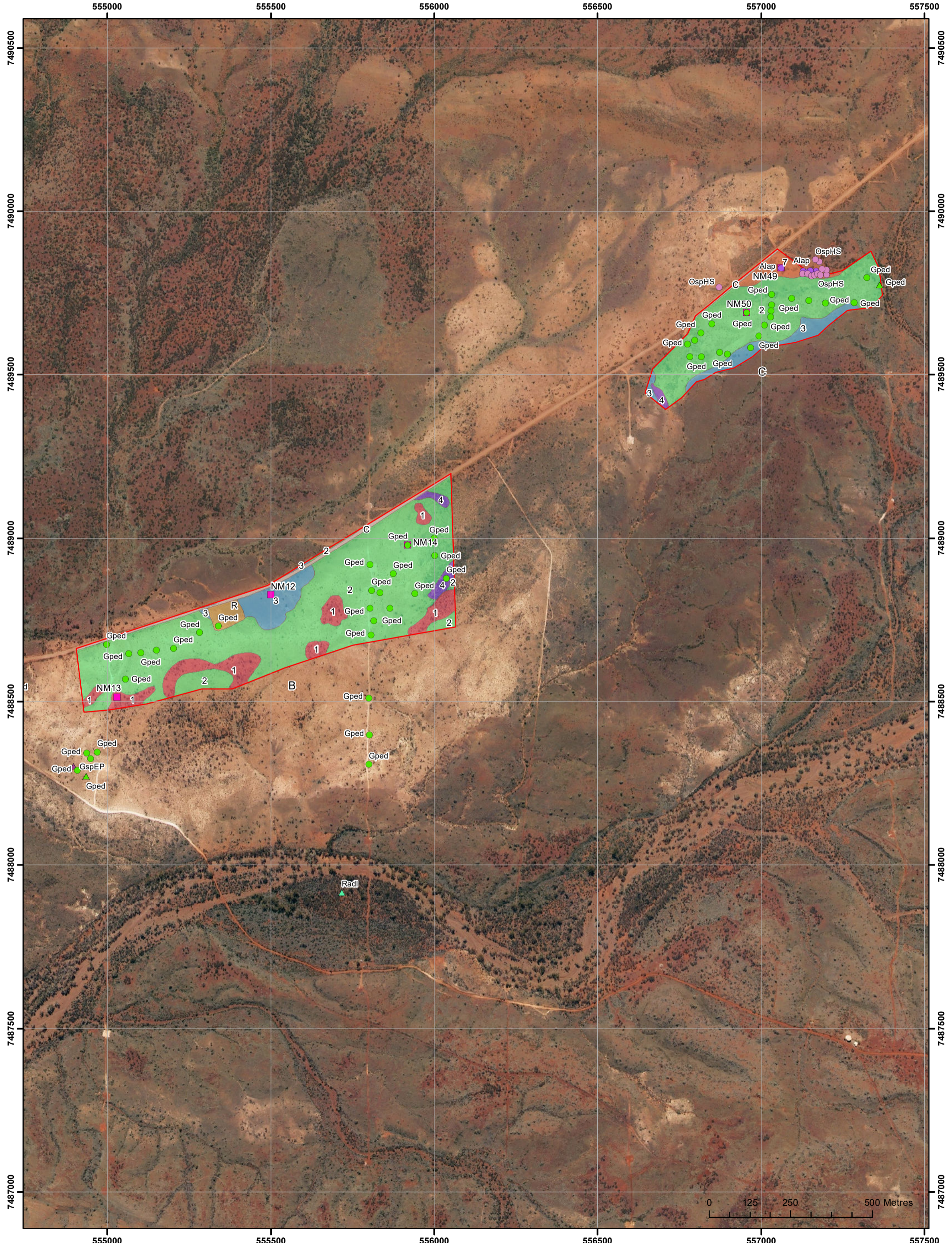
WEC Ref: MR18-34-01

Filename: MR18-34-01-App-H

Projection: GDA 1994 MGA Zone 50

**Appendix**

**H1**



This map should only be used internally with WEC report MR18-34-01.

**Vegetation Units and Significant Flora**

Revision: 0 - 21 Nov 2018

Scale: 1:10,000 (A3)

Author: David Coultas

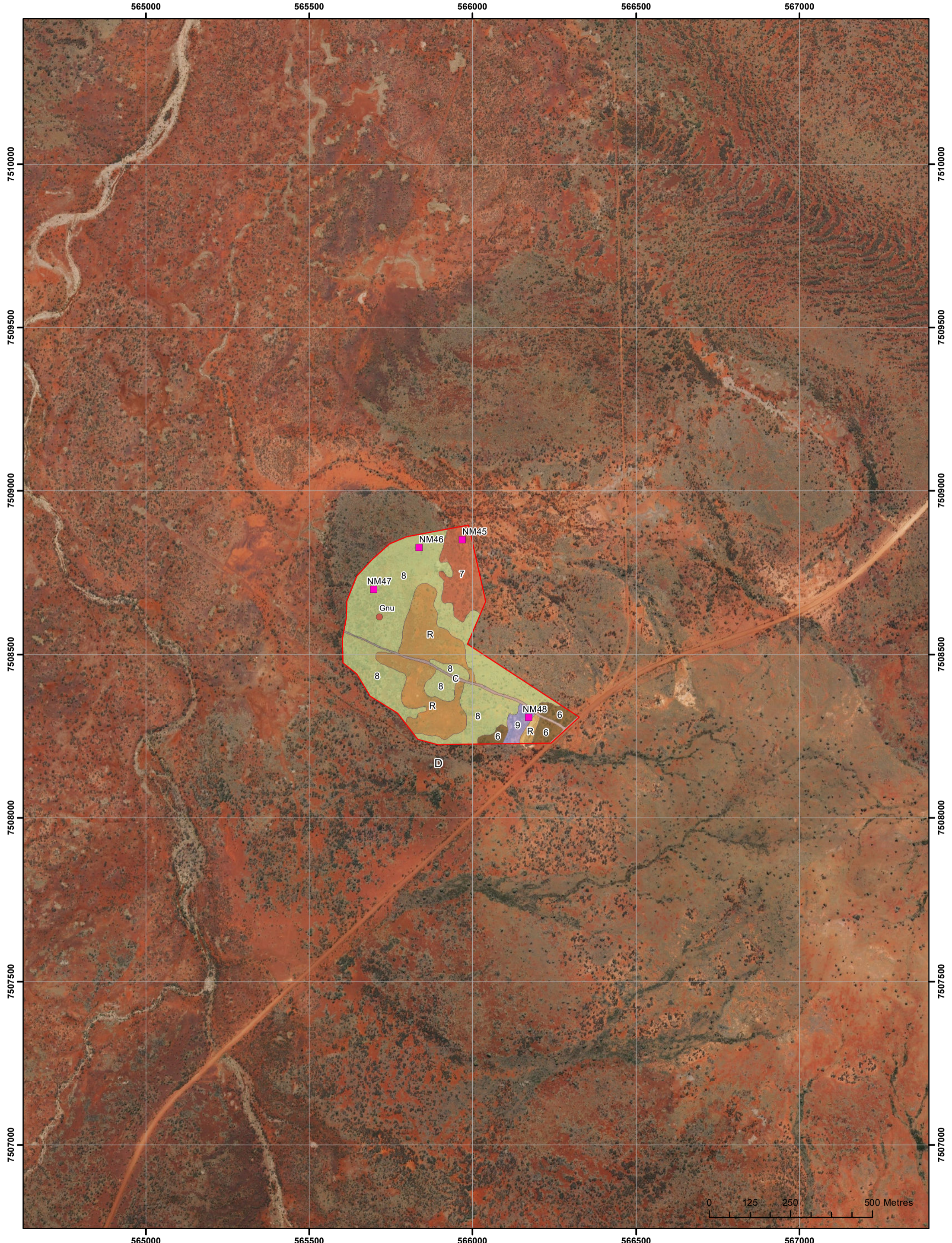
WEC Ref: MR18-34-01

Filename: MR18-34-01-App-H

Projection: GDA 1994 MGA Zone 50

**Appendix**

**H2**



This map should only be used internally with WEC report MR18-34-01.



**Vegetation Units and Significant Flora**

Revision: 0 - 21 Nov 2018

Scale: 1:10,000 (A3)

Author: David Coultas

WEC Ref: MR18-34-01

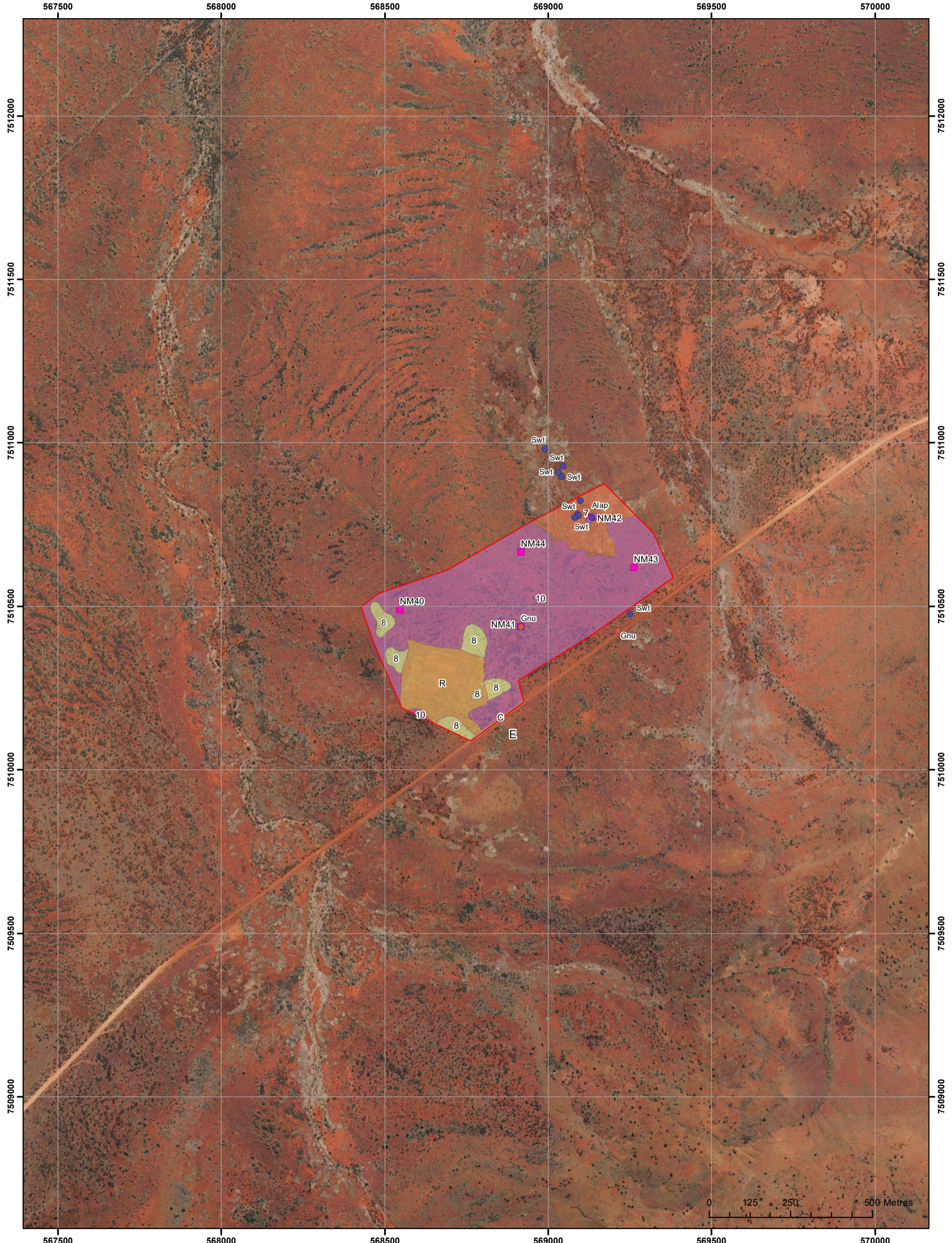
Filename: MR18-34-01-App-H

Projection: GDA 1994 MGA Zone 50

**Appendix**

**H3**





This map should only be used internally with WEC report MR18-34-01.



**Vegetation Units and Significant Flora**

Revision: 0 - 21 Nov 2018

Scale: 1:10,000 (A3)

Author: David Coultas

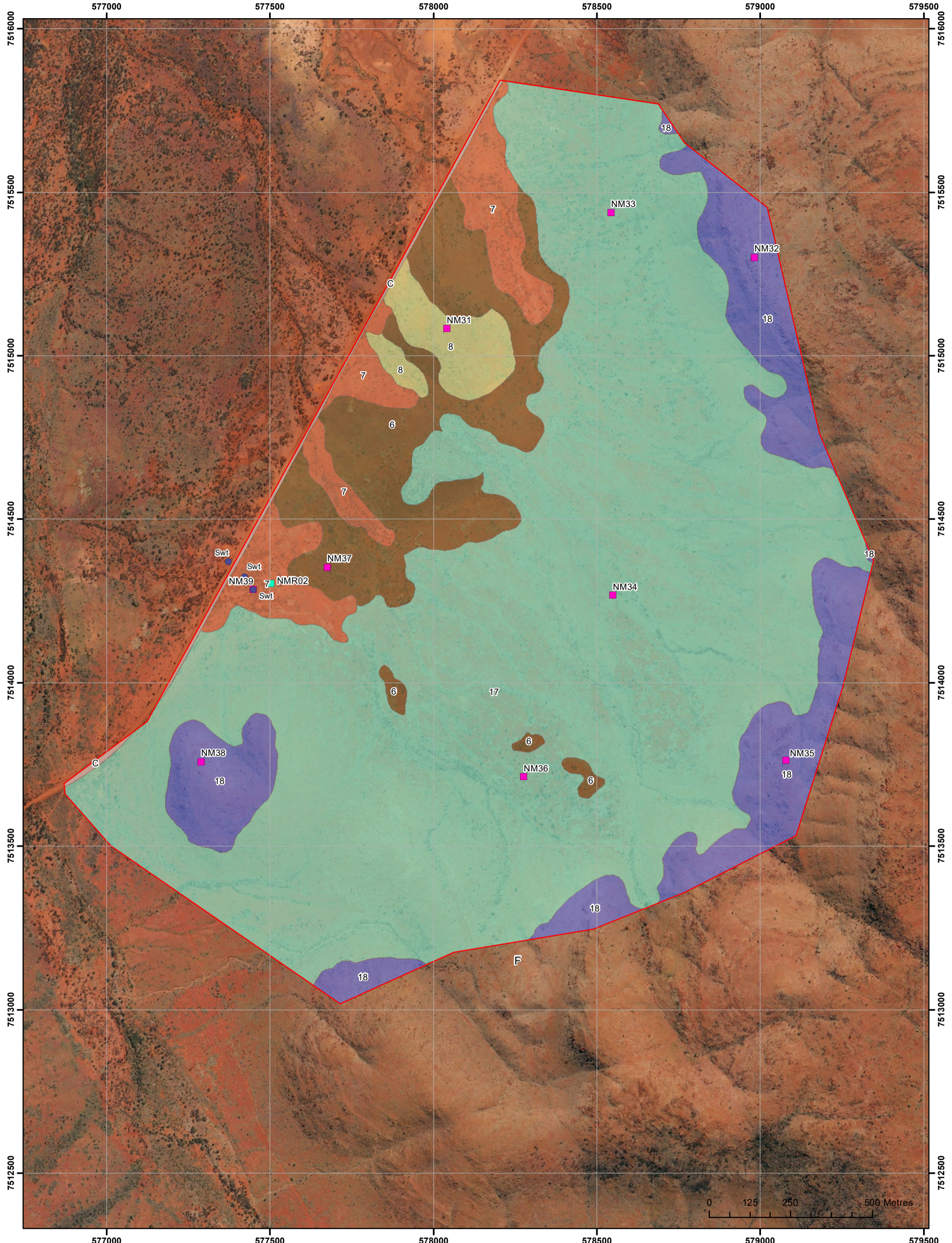
WEC Ref: MR18-34-01

Filename: MR18-34-01-App-H

Projection: GDA 1994 MGA Zone 50

**Appendix**

**H4**



This map should only be used internally with WEC report MR18-34-01.



**Vegetation Units and Significant Flora**

Revision: 0 - 21 Nov 2018

Scale: 1:10,000 (A3)

Author: David Coultas

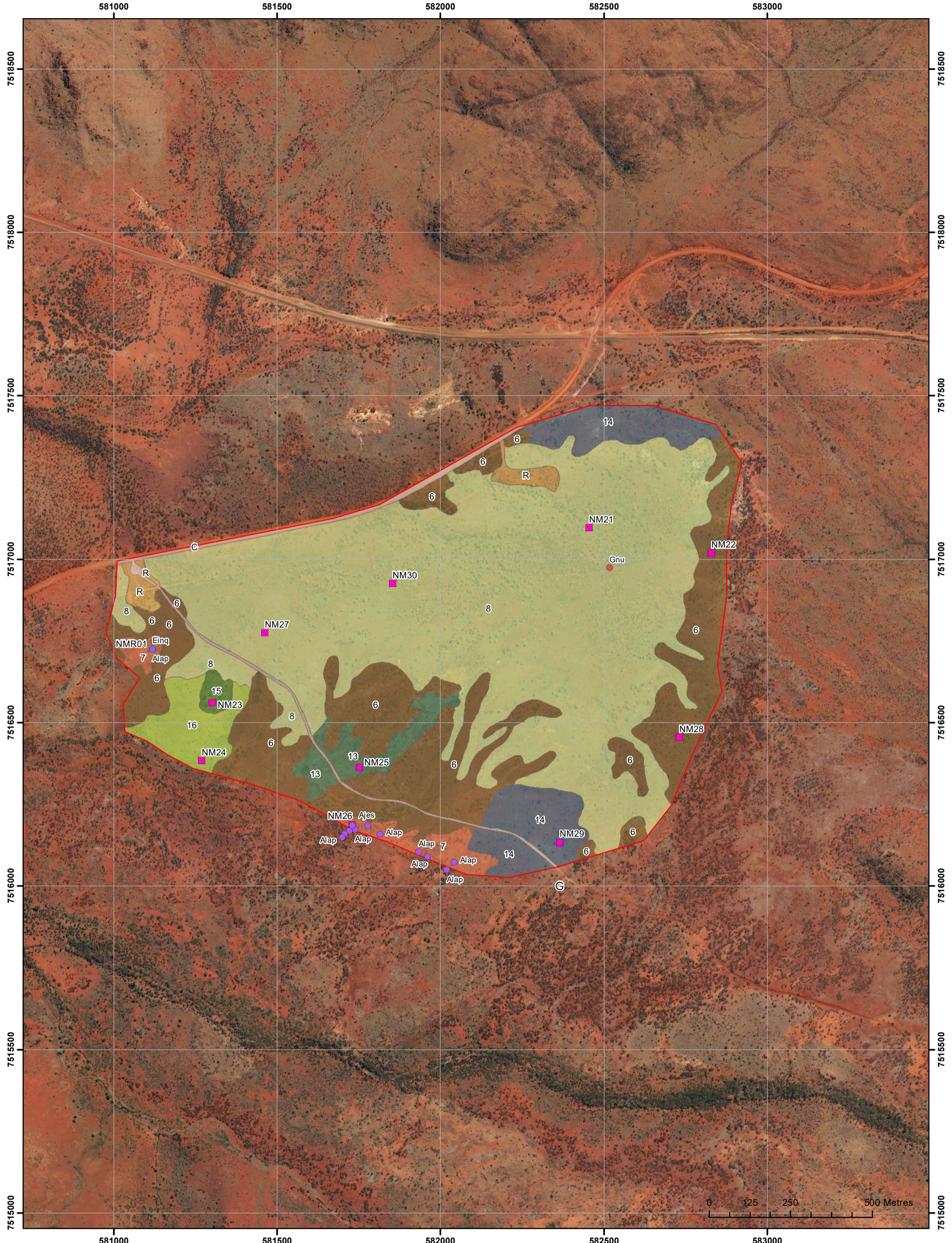
WEC Ref: MR18-34-01

Filename: MR18-34-01-App-H

Projection: GDA 1994 MGA Zone 50

**Appendix**

**H5**



This map should only be used internally with WEC report MR18-34-01.



**Vegetation Units and Significant Flora**

Revision: 0 - 21 Nov 2018

Scale: 1:10,000 (A3)

Author: David Coultas

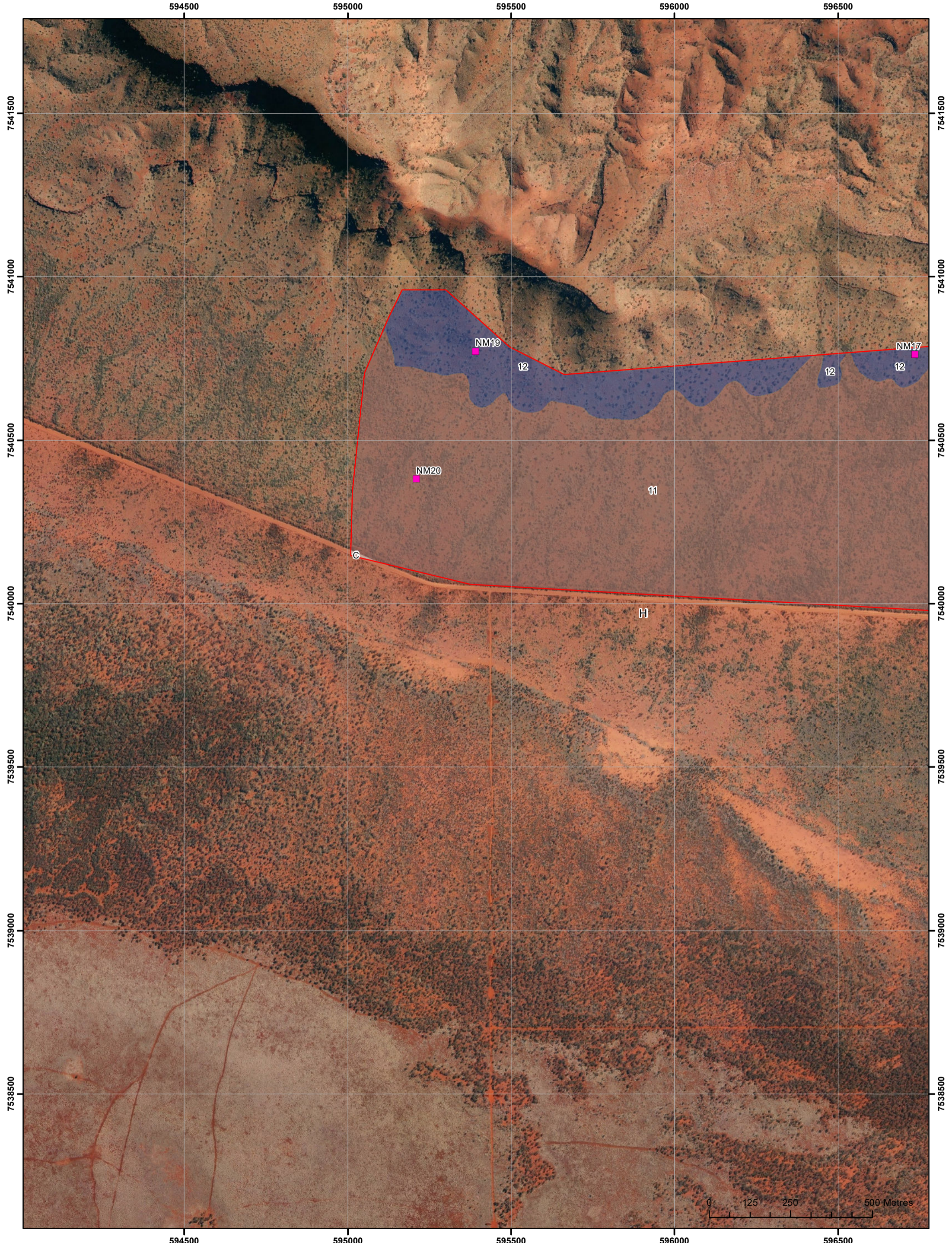
WEC Ref: MR18-34-01

Filename: MR18-34-01-App-H

Projection: GDA 1994 MGA Zone 50

**Appendix**

**H6**



This map should only be used internally with WEC report MR18-34-01.



**Vegetation Units and Significant Flora**

Revision: 0 - 21 Nov 2018

Scale: 1:10,000 (A3)

Author: David Coultas

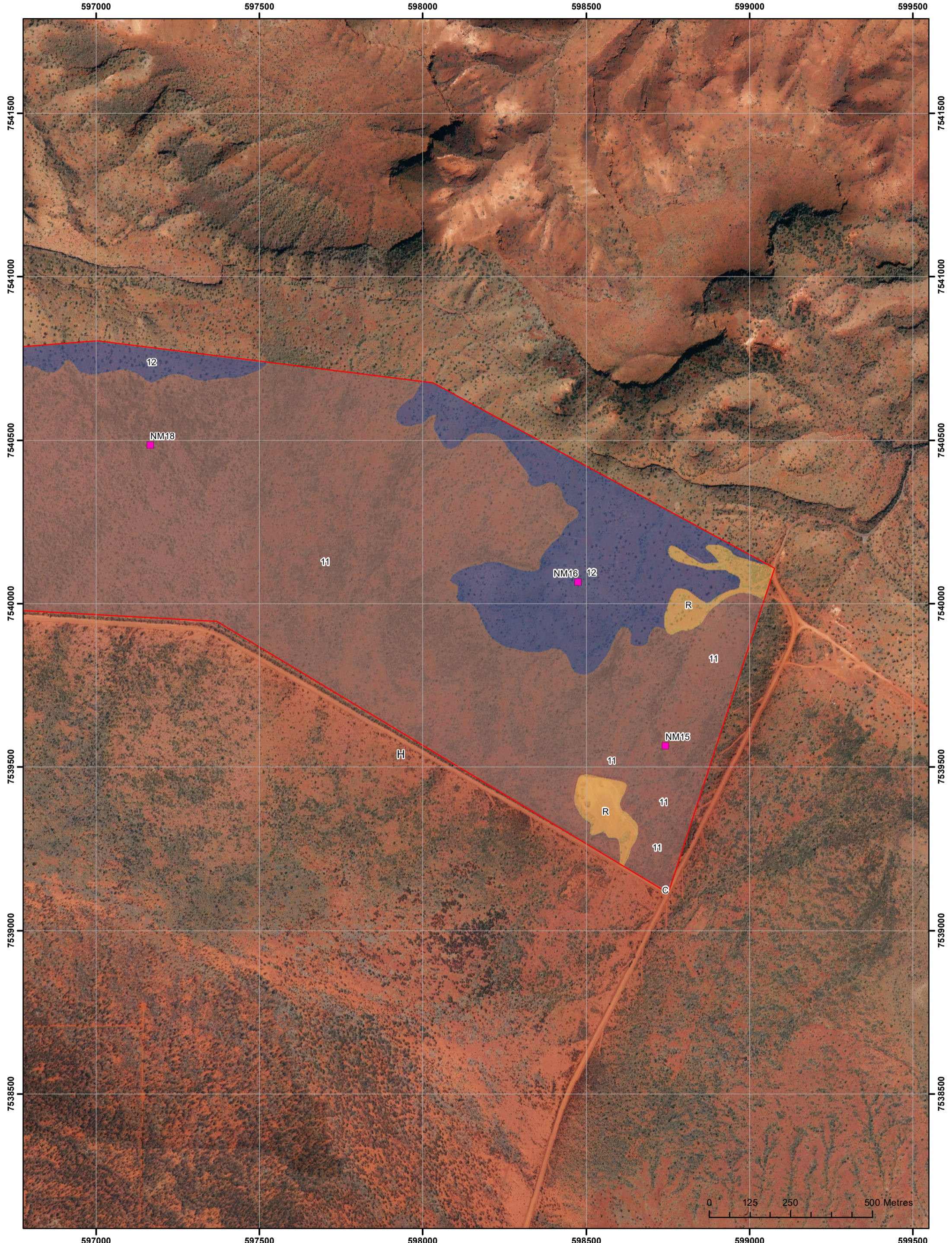
WEC Ref: MR18-34-01

Filename: MR18-34-01-App-H

Projection: GDA 1994 MGA Zone 50

**Appendix**

**H7**



This map should only be used internally with WEC report MR18-34-01.



**Vegetation Units and Significant Flora**

Revision: 0 - 21 Nov 2018

Scale: 1:10,000 (A3)

Author: David Coultas

WEC Ref: MR18-34-01


Filename: MR18-34-01-App-H

Projection: GDA 1994 MGA Zone 50

**Appendix**

**H8**





















## Legend

 Survey Areas (Study Area)








 Quadrat

 Releve




## Vegetation

-  1 Tall open shrubland dominated by *Acacia citrinoviridis* and occasionally *Grevillea berryana* and *Acacia pruinoarpa* over mid sparse shrubland of mixed species dominated by *Eremophila fraseri* subsp. *fraseri*, *Corchorus crozophorifolius* and *Sida* sp. spiciform panicles (E. Leyland s.n. 14/8/90) over low hummock grassland dominated by *Triodia wiseana* on brown or red-brown clay loam with calcrete stones and large areas of calcrete outcropping on crests of low ridges.
-  2 Low isolated trees/mallees to low open woodland/mallee woodland of mixed species dominated by *Eucalyptus xerothermica*, *Eucalyptus socialis* subsp. *eucentrica* and *Eucalyptus leucophloia* subsp. *leucophloia* over mid sparse shrubland of mixed species dominated by *Acacia bivenosa* and *Melaleuca eleuterostachya* over low shrubland sparse shrubland of mixed species dominated by *Heliotropium ovalifolium* and *Androcalva luteiflora* over low hummock grassland dominated by *Triodia wiseana* and occasionally *Triodia angusta* on brown clay loam with calcrete stones and often calcrete outcropping on slopes of low ridges and low rises.
-  3 Mid sparse shrubland of mixed species dominated by *Acacia bivenosa* and occasionally *Acacia synchronicia* over low sparse shrubland of mixed species including *Senna artemisioides* subsp. *oligophylla* and *Senna stricta* over hummock grassland dominated by *Triodia wiseana* and occasionally *Triodia angusta* on red-brown clay loam with ironstone and occasionally calcrete stones on undulating plains and lower slopes.
-  4 Low open woodland dominated by *Eucalyptus xerothermica* and *Corymbia hamersleyana* over tall open shrubland of mixed species dominated by *Petalostylis labicheoides*, *Acacia bivenosa*, *Eremophila longifolia*, *Acacia pyrifolia* var. *pyrifolia* and *Acacia citrinoviridis* over mid sparse shrubland of mixed species including *Tephrosia rosea* var. *Fortescue Creeks*, *Corchorus lasiocarpus* subsp. *parvus* and *Dodonaea lanceolata* var. *lanceolata* over low open hummock and tussock grassland of mixed species including *Themeda triandra*, *Cenchrus ciliaris*, *Eulalia aurea*, *Eriachne tenuiculmis* and *Triodia epactia* on red-brown clay loam, usually with mixed stony colluvium, in drainage lines and on adjacent flats.
-  5 Low isolated trees of *Eucalyptus leucophloia* subsp. *leucophloia* over tall sparse shrubland of mixed species including *Acacia maitlandii*, *Acacia kempeana*, *Acacia wanyu*, *Acacia marramamba* and *Acacia bivenosa* over mid sparse shrubland of mixed species including *Senna glutinosa* subsp. *pruinosa*, *Ptilotus rotundifolius*, *Ptilotus obovatus* and *Indigofera monophylla* over low hummock grassland dominated by *Triodia brizoides* and occasionally *Triodia epactia* on red-brown clay loam with ironstone stones and ironstone outcropping on hill slopes.
-  6 Tall open shrubland dominated by *Acacia xiphophylla* and occasionally *Acacia aptaneura* over mid sparse shrubland of mixed species including *Senna stricta*, *Eremophila cuneifolia*, *Senna glutinosa* subsp. *x luerssenii*, *Senna glutinosa* subsp. *glutinosa* and *Rhagodia eremaea* over low chenopod shrubland of mixed species including *Maireana triptera*, *Maireana melanocoma*, *Sclerolaena eriacantha*, *Sclerolaena minuta* and *Sclerolaena cuneata* over open to sparse hummock grassland dominated by *Triodia wiseana* on red or red-brown clay loam with stony colluvium and occasional basalt boulder outcropping on flats.
-  7 Tall open shrubland dominated by *Acacia xiphophylla* over mid to low sparse shrubland of mixed species including *Eremophila cuneifolia*, *Senna artemisioides* subsp. *oligophylla* and *Rhagodia eremaea* over low chenopod shrubland of mixed species including *Senna* sp. Karijini (M.E. Trudgen 10392), *Maireana triptera*, *Sclerolaena eriacantha*, *Sclerolaena lanicuspis* and *Sclerolaena cuneata* over open to sparse hummock grassland of mixed species including *Triodia wiseana* and *Triodia epactia* on red clay loam with stony colluvium and basalt rocks, interspersed with claypans with open to sparse tussock grassland of mixed species including *Eriachne benthamii*, *Aristida latifolia*, *Astrebala elymoides*, *Dichanthium fecundum* and *Eragrostis xerophila* over a seasonal open hermland and tussock grassland of mixed species including *Dichanthium sericeum* subsp. *humilius*, *Panicum laevinode*, *Sida fibulifera*, *Stemodia kingii* and *Goodenia muelleriana* on red cracking clay with basalt stones and rocks, on flats and in broad drainage lines.
-  8 Low open woodland to low isolated trees dominated by *Eucalyptus leucophloia* subsp. *leucophloia* over tall open to sparse shrubland dominated by *Acacia aptaneura* and *Acacia pruinoarpa*, and occasionally *Acacia aneura*, *Acacia ayersiana* and *Acacia atkinsiana* over low hummock grassland dominated by *Triodia wiseana* on red clay loam with laterised ironstone gravel and occasional laterised ironstone outcropping on low rises.
-  9 Isolated low trees of *Eucalyptus leucophloia* subsp. *leucophloia* over mid sparse shrubland dominated by *Acacia bivenosa* and *Melaleuca eleuterostachya* over low sparse chenopod shrubland of mixed species including *Sclerolaena eriacantha*, *Sclerolaena minuta*, *Sclerolaena lanicuspis* and *Maireana melanocoma* over hummock grassland dominated by *Triodia angusta* and *Triodia wiseana* on red-brown clay loam with metamorphic stones on undulating plains.
-  10 Isolated low trees of *Eucalyptus leucophloia* subsp. *leucophloia* over tall shrubland to open shrubland dominated by *Acacia aptaneura* and *Acacia pruinoarpa*, and occasionally *Acacia aneura* and *Acacia ayersiana*, over low sparse shrubland of mixed species including *Senna glutinosa* subsp. *glutinosa* and *Ptilotus rotundifolius* over low hummock grassland of *Triodia epactia* over low sparse hermland and tussock grassland of mixed species including *Aristida contorta*, *Ptilotus helipteroides*, *Goodenia tenuiloba* and *Eriachne pulchella* subsp. *dominii* on red clay loam with ironstone and occasionally basalt gravel on undulating plains or low rises.
-  11 Low open woodland dominated by *Eucalyptus leucophloia* subsp. *leucophloia*, *Eucalyptus gamophylla*, *Corymbia deserticola* subsp. *deserticola* and *Corymbia hamersleyana* over tall open to sparse shrubland of mixed species dominated by *Acacia atkinsiana* and occasionally *Acacia monticola*, *Acacia bivenosa* and *Acacia elachantha* over low sparse shrubland of mixed species including *Seringia elliptica*, *Senna artemisioides* subsp. *oligophylla*, *Scaevola parvifolia* subsp. *pilbarae* and *Acacia adoxa* var. *adoxo* over low hummock grassland dominated by *Triodia wiseana* on red-brown clay-loam with ironstone stones on lower slopes of ranges.
-  12 Low open woodland dominated by *Eucalyptus leucophloia* subsp. *leucophloia* over isolated mid shrubs of mixed species including *Senna glutinosa* subsp. *glutinosa* over low hummock grassland dominated by *Triodia wiseana* on brown clay loam with ironstone stones and ironstone outcropping on mid and lower slopes of ranges.
-  13 Mid sparse shrubland dominated by *Acacia synchronicia* and *Acacia bivenosa* over mid sparse shrubland of mixed species including *Senna glutinosa* subsp. *glutinosa*, *Senna glutinosa* subsp. *x luerssenii* and *Senna stricta* over low sparse chenopod shrubland of mixed species including *Maireana triptera*, *Maireana pyramidata*, *Sclerolaena cuneata*, *Sclerolaena densiflora* and *Sclerolaena eriacantha* over low hummock grassland dominated by *Triodia longiceps* on red clay-loam with stony colluvium on flats.
-  14 Low isolated trees of *Eucalyptus leucophloia* subsp. *leucophloia* over tall sparse shrubland of mixed species dominated by *Acacia pruinoarpa* and *Acacia bivenosa* over mid sparse shrubland of mixed species dominated by *Ptilotus rotundifolius*, *Senna glutinosa* subsp. *x luerssenii* and *Senna glutinosa* subsp. *glutinosa* over low hummock grassland dominated by *Triodia wiseana* on red-brown clay loam with basalt, laterised ironstone and quartz stones and basalt boulder outcropping on low rises.
-  15 Low open mallee woodland of *Eucalyptus socialis* subsp. *eucentrica* over mid sparse shrubland of mixed species including *Acacia bivenosa*, *Senna glutinosa* subsp. *x luerssenii*, *Senna artemisioides* subsp. *oligophylla* and *Senna glutinosa* subsp. *glutinosa* over low hummock grassland dominated by *Triodia wiseana* on pale brown clay loam with calcrete and laterised ironstone stones on low rises.
-  16 Low open woodland dominated by *Corymbia hamersleyana* over tall open shrubland of mixed species dominated by *Acacia bivenosa*, *Acacia inaequilatera* and *Acacia kempeana* over low hummock grassland dominated by *Triodia wiseana* on red-brown clay loam with calcrete and laterised ironstone stones on undulating plains.
-  17 Tall sparse shrubland to isolated tall shrubs of mixed species including *Acacia aptaneura*, *Acacia pruinoarpa*, *Acacia synchronicia*, *Acacia ancistrocarpa* and *Acacia inaequilatera* over mid sparse shrubland of mixed species including *Ptilotus rotundifolius*, *Acacia bivenosa*, *Senna glutinosa* subsp. *x luerssenii*, *Senna artemisioides* subsp. *oligophylla* and *Senna glutinosa* subsp. *glutinosa* over low hummock grassland of *Triodia epactia* over a seasonal sparse hermland and tussock grassland of mixed species dominated by *Ptilotus helipteroides*, *Aristida contorta* and *Goodenia tenuiloba* on red clay loam with basalt stones and rocks on lower slopes and outwash plains.
-  18 Low isolated trees of *Eucalyptus leucophloia* subsp. *leucophloia* and *Corymbia hamersleyana* over tall sparse shrubland of mixed species dominated by *Acacia aptaneura*, *Hakea lorea* subsp. *lorea*, *Acacia monticola*, *Acacia inaequilatera* and *Acacia pruinoarpa* over mid sparse shrubland of mixed species dominated by *Ptilotus rotundifolius*, *Senna glutinosa* subsp. *x luerssenii*, *Senna artemisioides* subsp. *oligophylla*, *Senna glutinosa* subsp. *pruinosa* and *Senna glutinosa* subsp. *glutinosa* over low hummock grassland dominated by *Triodia brizoides* over a seasonal open to sparse hermland and tussock grassland of mixed species dominated by *Aristida contorta*, *Ptilotus helipteroides*, *Fimbristylis dichotoma*, *Mnesithea formosa* and *Schizachyrium fragile* on red-brown or brown clay loam with basalt stones and basalt boulder outcropping on hill crests and upper slopes.
-  R Regrowth vegetation, including within and surrounding existing gravel extraction areas, and in rehabilitated gravel extraction
-  C Cleared land – includes roads and

## Significant Flora (Woodman Environmental)

-  Ajes *Aristida jerichoensis* var. *subspinulifera* (P3)
-  Alap *Astrebala lappacea* (P3)
-  Einq *Euphorbia inappendiculata* var. *queenslandica* (P1)
-  Gnu *Goodenia nuda* (P4)
-  Gped *Goodenia pedicellata* (P1)
-  OspHS *Oldenlandia* sp. Hamersley Station (A.A. Mitchell PRP 1479) (P3)
-  Swt *Swainsona thompsoniana* (P3)

## Significant Flora (DBCA)

-  Gped *Goodenia pedicellata* (P1)
-  GspEP *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) (P3)
-  Radl *Rostellularia adscendens* var. *latifolia* (P3)



**Appendix I: Location Details of Significant Flora and Introduced Flora  
Recorded within the Study Area**

Note: All locations are in datum GDA94, Zone 50

### **Significant Flora**

<b>Taxon</b>	<b>Status</b>	<b>Count</b>	<b>Easting</b>	<b>Northing</b>	<b>Comments</b>
<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>	P3		581730	7516187	
<i>Astrebla lappacea</i>	P3	30	581730	7516187	
<i>Astrebla lappacea</i>	P3	20	581119	7516725	
<i>Astrebla lappacea</i>	P3	2	557062	7489825	
<i>Astrebla lappacea</i>	P3	20	581738.5	7516173	
<i>Astrebla lappacea</i>	P3	12	581722.1	7516169	
<i>Astrebla lappacea</i>	P3	4	581706.6	7516159	
<i>Astrebla lappacea</i>	P3	5	581698.8	7516149	
<i>Astrebla lappacea</i>	P3	25	581776.7	7516185	
<i>Astrebla lappacea</i>	P3	2	581814.5	7516158	
<i>Astrebla lappacea</i>	P3	15	581932.8	7516104	
<i>Astrebla lappacea</i>	P3	25	581960.2	7516091	
<i>Astrebla lappacea</i>	P3	10	582020	7516049	
<i>Astrebla lappacea</i>	P3	50	582041.9	7516074	
<i>Astrebla lappacea</i>	P3	1	569140.7	7510775	
<i>Astrebla lappacea</i>	P3	35	569127.7	7510765	
<i>Astrebla lappacea</i>	P3	12	557128.5	7489816	
<i>Astrebla lappacea</i>	P3	30	557141.8	7489814	
<i>Astrebla lappacea</i>	P3	15	557158.8	7489810	
<i>Astrebla lappacea</i>	P3	20	557167.9	7489817	
<i>Astrebla lappacea</i>	P3	15	557151.4	7489819	
<i>Euphorbia inappendiculata</i> var. <i>queenslandica</i>	P1	1	581119	7516725	
<i>Goodenia nuda</i>	P4	1	568917	7510437	
<i>Goodenia nuda</i>	P4	12	582516.8	7516973	
<i>Goodenia nuda</i>	P4	20	569213.1	7510425	
<i>Goodenia nuda</i>	P4	1	565714.7	7508615	
<i>Goodenia pedicellata</i>	P1	150	555806.6	7488703	
<i>Goodenia pedicellata</i>	P1	4	555800.4	7488510	
<i>Goodenia pedicellata</i>	P1	80	555802.3	7488397	
<i>Goodenia pedicellata</i>	P1	12	555800.5	7488308	
<i>Goodenia pedicellata</i>	P1	5	557032.3	7489745	
<i>Goodenia pedicellata</i>	P1	200	557032.3	7489713	
<i>Goodenia pedicellata</i>	P1	8	557031.4	7489695	
<i>Goodenia pedicellata</i>	P1	80	557029.8	7489677	
<i>Goodenia pedicellata</i>	P1	120	557010.5	7489650	
<i>Goodenia pedicellata</i>	P1	150	556993	7489619	
<i>Goodenia pedicellata</i>	P1	20	556967.8	7489582	
<i>Goodenia pedicellata</i>	P1	80	556896.3	7489562	
<i>Goodenia pedicellata</i>	P1	85	556872.6	7489568	
<i>Goodenia pedicellata</i>	P1	350	556817	7489555	
<i>Goodenia pedicellata</i>	P1	60	556781.8	7489555	
<i>Goodenia pedicellata</i>	P1	80	556775.5	7489593	
<i>Goodenia pedicellata</i>	P1	100	556797.3	7489604	
<i>Goodenia pedicellata</i>	P1	250	556815.9	7489627	
<i>Goodenia pedicellata</i>	P1	35	556849.4	7489656	
<i>Goodenia pedicellata</i>	P1	81	555918	7488979	



Taxon	Status	Count	Easting	Northing	Comments
<i>Goodenia pedicellata</i>	P1	11	552237	7488839	
<i>Goodenia pedicellata</i>	P1	73	552106	7488386	
<i>Goodenia pedicellata</i>	P1	10	555339.3	7488731	
<i>Goodenia pedicellata</i>	P1	60	555283	7488711	
<i>Goodenia pedicellata</i>	P1	70	555202	7488663	
<i>Goodenia pedicellata</i>	P1	30	555150.6	7488656	
<i>Goodenia pedicellata</i>	P1	15	555102.7	7488649	
<i>Goodenia pedicellata</i>	P1	40	555065.6	7488647	
<i>Goodenia pedicellata</i>	P1	50	555055.8	7488569	
<i>Goodenia pedicellata</i>	P1	30	555803.1	7488920	
<i>Goodenia pedicellata</i>	P1	35	555809.1	7488840	
<i>Goodenia pedicellata</i>	P1	70	555803.5	7488786	
<i>Goodenia pedicellata</i>	P1	150	555815.4	7488747	
<i>Goodenia pedicellata</i>	P1	120	555865.2	7488786	
<i>Goodenia pedicellata</i>	P1	20	555940.7	7488829	
<i>Goodenia pedicellata</i>	P1	15	556037.7	7488877	
<i>Goodenia pedicellata</i>	P1	100	556002.1	7488947	
<i>Goodenia pedicellata</i>	P1	45	556000.3	7488999	
<i>Goodenia pedicellata</i>	P1	60	555873.9	7488891	
<i>Goodenia pedicellata</i>	P1	20	555834.8	7488833	
<i>Goodenia pedicellata</i>	P1	40	557323.2	7489797	
<i>Goodenia pedicellata</i>	P1	15	557285.5	7489719	
<i>Goodenia pedicellata</i>	P1	20	557196	7489718	
<i>Goodenia pedicellata</i>	P1	30	557145.9	7489727	
<i>Goodenia pedicellata</i>	P1	50	557092.6	7489734	
<i>Goodenia pedicellata</i>	P1	6	556957	7489689	
<i>Goodenia pedicellata</i>	P1	50	552687.3	7488038	
<i>Goodenia pedicellata</i>	P1	5	552692.9	7488066	
<i>Goodenia pedicellata</i>	P1	10	552724.8	7488066	
<i>Goodenia pedicellata</i>	P1	8	552137.2	7488314	
<i>Goodenia pedicellata</i>	P1	100	554968.7	7488346	
<i>Goodenia pedicellata</i>	P1	100	554948.1	7488326	
<i>Goodenia pedicellata</i>	P1	25	554908.1	7488289	
<i>Goodenia pedicellata</i>	P1	75	554936.4	7488342	
<i>Goodenia pedicellata</i>	P1	20	552691.5	7488565	
<i>Goodenia pedicellata</i>	P1	20	552723	7488587	
<i>Goodenia pedicellata</i>	P1	28	552402.8	7488635	
<i>Goodenia pedicellata</i>	P1	300	552353.2	7488659	
<i>Goodenia pedicellata</i>	P1	200	552297	7488668	
<i>Goodenia pedicellata</i>	P1	55	552066.8	7489295	
<i>Goodenia pedicellata</i>	P1	300	552349	7488606	
<i>Goodenia pedicellata</i>	P1	100	552317.4	7488562	
<i>Goodenia pedicellata</i>	P1	5	552908.1	7488226	
<i>Goodenia pedicellata</i>	P1	25	552869.6	7488234	
<i>Goodenia pedicellata</i>	P1	75	554998.5	7488674	
<i>Goodenia pedicellata</i>	P1	100	554683.2	7488595	
<i>Goodenia pedicellata</i>	P1	300	554698.4	7488573	
<i>Goodenia pedicellata</i>	P1	400	554677.9	7488546	
<i>Goodenia pedicellata</i>	P1	400	554655.7	7488557	
<i>Goodenia pedicellata</i>	P1	20	554656.2	7488578	
<i>Goodenia pedicellata</i>	P1	30	552647.5	7488582	

Taxon	Status	Count	Easting	Northing	Comments
<i>Goodenia pedicellata</i>	P1	35	552664.7	7488599	
<i>Goodenia pedicellata</i>	P1	35	552690.5	7488617	
<i>Goodenia pedicellata</i>	P1	25	552728	7488617	
<i>Goodenia pedicellata</i>	P1	25	552739.8	7488653	
<i>Goodenia pedicellata</i>	P1	5	552522.2	7488389	
<i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	20	572352.4	7511275	
<i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	1	556871.9	7489768	
<i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	20	557126.6	7489808	
<i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	25	557141.8	7489807	
<i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	5	557155.1	7489802	
<i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	15	557162.9	7489804	
<i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	35	557172.4	7489807	
<i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	40	557181.5	7489804	
<i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	8	557199.8	7489806	
<i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	1	557199.9	7489820	
<i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	15	557186.4	7489824	
<i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	3	557178.5	7489845	
<i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	4	557166.7	7489852	
<i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	50	572363.5	7511206	
<i>Swainsona thompsoniana</i>	P3	73	569134	7510771	
<i>Swainsona thompsoniana</i>	P3	20	577449	7514283	
<i>Swainsona thompsoniana</i>	P3	50	569098.2	7510822	
<i>Swainsona thompsoniana</i>	P3	50	569089.6	7510782	
<i>Swainsona thompsoniana</i>	P3	2	569250.3	7510478	
<i>Swainsona thompsoniana</i>	P3	3	569040	7510896	
<i>Swainsona thompsoniana</i>	P3	3	569031	7510910	
<i>Swainsona thompsoniana</i>	P3	11	569045.8	7510928	
<i>Swainsona thompsoniana</i>	P3	3	568989.2	7510982	
<i>Swainsona thompsoniana</i>	P3	20	569092.7	7510777	
<i>Swainsona thompsoniana</i>	P3	15	569081.8	7510772	
<i>Swainsona thompsoniana</i>	P3	25	577421.7	7514324	
<i>Swainsona thompsoniana</i>	P3	1	572352.4	7511275	
<i>Swainsona thompsoniana</i>	P3	25	577372.1	7514370	

**Introduced Flora**

Taxon	Count	Easting	Northing	Comments
<i>Bidens bipinnata</i>		578543	7515436	
<i>Bidens bipinnata</i>		568546	7510489	
<i>Bidens bipinnata</i>		568917	7510437	
<i>Bidens bipinnata</i>		552594	7488071	
<i>Cenchrus ciliaris</i>		552686	7488767	
<i>Cenchrus ciliaris</i>		552305	7488417	
<i>Cenchrus ciliaris</i>		552437	7488147	
<i>Cenchrus ciliaris</i>		552922	7488317	
<i>Cenchrus ciliaris</i>		582364	7516133	
<i>Cenchrus ciliaris</i>		581730	7516187	
<i>Cenchrus ciliaris</i>		555030	7488514	
<i>Cenchrus ciliaris</i>		569134	7510771	
<i>Cenchrus ciliaris</i>		577675	7514352	
<i>Cenchrus ciliaris</i>		577449	7514283	
<i>Cenchrus ciliaris</i>		578543	7515436	
<i>Cenchrus ciliaris</i>		581119	7516725	
<i>Cenchrus ciliaris</i>		581752	7516363	
<i>Cenchrus ciliaris</i>	5	555405.9	7488777	
<i>Cenchrus ciliaris</i>		566172	7508306	
<i>Cenchrus ciliaris</i>		557062	7489825	
<i>Cenchrus ciliaris</i>		582819.1	7517251	
<i>Cenchrus ciliaris</i>		577784.7	7514497	
<i>Cenchrus ciliaris</i>		578110	7515647	
<i>Cenchrus ciliaris</i>		578168.3	7515639	
<i>Cenchrus setiger</i>		557062	7489825	
<i>Malvastrum americanum</i>		581730	7516187	
<i>Malvastrum americanum</i>		578543	7515436	
<i>Malvastrum americanum</i>		581119	7516725	
<i>Malvastrum americanum</i>		577449	7514283	
<i>Malvastrum americanum</i>		577675	7514352	
<i>Malvastrum americanum</i>		569134	7510771	
<i>Malvastrum americanum</i>		578168.3	7515639	
<i>Malvastrum americanum</i>		557062	7489825	
<i>Malvastrum americanum</i>		577784.7	7514497	
<i>Setaria verticillata</i>		552437	7488147	
<i>Sonchus oleraceus</i>		581730	7516187	
<i>Sonchus oleraceus</i>		581119	7516725	
<i>Vachellia farnesiana</i>		578110	7515647	
<i>Vachellia farnesiana</i>		578168.3	7515639	
<i>Vachellia farnesiana</i>	1	576989.5	7513715	
<i>Vachellia farnesiana</i>		577503	7514303	
<i>Vachellia farnesiana</i>		581119	7516725	
<i>Vachellia farnesiana</i>		552922	7488317	

## Appendix J: Threatened and Priority Flora Report Forms



# Threatened and Priority Flora Report Form

Version 1.3 August 2017

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at <http://dpaw.wa.gov.au/> under *Standard Report Forms*

<b>TAXON:</b> <u>Aristida jerichoensis var. subspinulifera</u>		<b>TPFL Pop. No.:</b> _____
<b>OBSERVATION DATE:</b> <u>25/07/2018</u>	<b>CONSERVATION STATUS:</b> <u>P3</u>	New population <input type="checkbox"/>
<b>OBSERVER/S:</b> <u>David Coultas</u>		<b>PHONE:</b> <u>(08) 9315 4688</u>
<b>ROLE:</b> <u>Botanist</u>	<b>ORGANISATION:</b> <u>Woodman Environmental Consulting</u>	

**DESCRIPTION OF LOCATION** (Provide at least nearest town/named locality, and the distance and direction to that place):  
Ca. 26 km N of Tom Price, ca. 25.4 km NE of Nanutarra-Munjina Road and Nameless Valley Drive intersection, ca. 0.94 km S of Nanutarra-Munjina Road on Hamersley pastoral station

<b>DBC DISTRICT:</b> <u>Pilbara Region</u>		<b>LGA:</b> <u>Ashburton</u>	<b>Reserve No.:</b> _____	Land manager present: <input type="checkbox"/>
<b>DATUM:</b>	<b>COORDINATES:</b> (If UTM coords provided, Zone is also required)		<b>METHOD USED:</b>	
GDA94 / MGA94 <input checked="" type="checkbox"/>	DecDegrees <input type="checkbox"/>	DegMinSec <input type="checkbox"/>	UTMs <input checked="" type="checkbox"/>	GPS <input checked="" type="checkbox"/> Differential GPS <input type="checkbox"/> Map <input type="checkbox"/>
AGD84 / AMG84 <input type="checkbox"/>	<b>Lat / Northing:</b> <u>7516187</u>		No. satellites: _____	Map used: _____
WGS84 <input type="checkbox"/>	<b>Long / Easting:</b> <u>581730</u>		Boundary polygon captured: <input type="checkbox"/>	Map scale: _____
Unknown <input type="checkbox"/>	<b>ZONE:</b> <u>50</u>			
<b>LAND TENURE:</b>				
Nature reserve <input type="checkbox"/>	Timber reserve <input type="checkbox"/>	Private property <input type="checkbox"/>	Rail reserve <input type="checkbox"/>	Shire road reserve <input type="checkbox"/>
National park <input type="checkbox"/>	State forest <input type="checkbox"/>	Pastoral lease <input checked="" type="checkbox"/>	MRWA road reserve <input type="checkbox"/>	Other Crown reserve <input type="checkbox"/>
Conservation park <input type="checkbox"/>	Water reserve <input type="checkbox"/>	UCL <input type="checkbox"/>	SLK/Pole _____ to _____	Specify other: _____

**AREA ASSESSMENT:** Edge survey  Partial survey  Full survey  Area observed (m<sup>2</sup>): \_\_\_\_\_

**EFFORT:** Time spent surveying (minutes): \_\_\_\_\_ No. of minutes spent / 100 m<sup>2</sup>: \_\_\_\_\_

**POP'N COUNT ACCURACY:** Actual  Extrapolation  Estimate  Count method: \_\_\_\_\_  
(Refer to field manual for list)

**WHAT COUNTED:** Plants  Clumps  Clonal stems

<b>TOTAL POP'N STRUCTURE:</b>	<b>Mature:</b>	<b>Juveniles:</b>	<b>Seedlings:</b>	<b>Totals:</b>	Area of pop (m <sup>2</sup> ): _____ Note: Pls record count as numbers (not percentages) for database.
Alive	1			1	
Dead					

**QUADRATS PRESENT:** No. \_\_\_\_\_ Size \_\_\_\_\_ Data attached  Total area of quadrats (m<sup>2</sup>): \_\_\_\_\_

**Summary Quad. Totals:** Alive \_\_\_\_\_

**REPRODUCTIVE STATE:** Clonal  Vegetative  Flowerbud  Flower   
Immature fruit  Fruit  Dehisced fruit  Percentage in flower: \_\_\_\_\_%

**CONDITION OF PLANTS:** Healthy  Moderate  Poor  Senescent

**COMMENT:** \_\_\_\_\_

THREATS - type, agent and supporting information:	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. Specify agent where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)			
• Clearing for borrow pits	N	H	S
•	_____	_____	_____
•	_____	_____	_____

Please return completed form to **Species And Communities Branch DBCA**,  
 Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: [flora.data@dbca.wa.gov.au](mailto:flora.data@dbca.wa.gov.au)

**RECORDS:** Please forward to **Flora Administrative Officer**, Species and Communities Branch.  
 Record entered by: \_\_\_\_\_ Sheet No.: \_\_\_\_\_ Record Entered in Database



# Threatened and Priority Flora Report Form

**HABITAT INFORMATION:**

<b>LANDFORM:</b>	<b>ROCK TYPE:</b>	<b>LOOSE ROCK:</b>	<b>SOIL TYPE:</b>	<b>SOIL COLOUR:</b>	<b>DRAINAGE:</b>
Crest <input type="checkbox"/>	Granite <input type="checkbox"/>	(on soil surface; eg gravel, quartz fields)	Sand <input type="checkbox"/>	Red <input checked="" type="checkbox"/>	Well drained <input type="checkbox"/>
Hill <input type="checkbox"/>	Dolerite <input checked="" type="checkbox"/>		Sandy loam <input type="checkbox"/>	Brown <input type="checkbox"/>	Seasonally inundated <input checked="" type="checkbox"/>
Ridge <input type="checkbox"/>	Laterite <input type="checkbox"/>	0-10% <input type="checkbox"/>	Loam <input type="checkbox"/>	Yellow <input type="checkbox"/>	Permanently inundated <input type="checkbox"/>
Outcrop <input type="checkbox"/>	Ironstone <input type="checkbox"/>	10-30% <input type="checkbox"/>	Clay loam <input type="checkbox"/>	White <input type="checkbox"/>	Tidal <input type="checkbox"/>
Slope <input type="checkbox"/>	Limestone <input type="checkbox"/>	30-50% <input type="checkbox"/>	Light clay <input checked="" type="checkbox"/>	Grey <input type="checkbox"/>	
Flat <input checked="" type="checkbox"/>	Quartz <input type="checkbox"/>	50-100% <input checked="" type="checkbox"/>	Peat <input type="checkbox"/>	Black <input type="checkbox"/>	
Open depression <input type="checkbox"/>	Specify other: _____		Specify other: _____	Specify other: _____	
Drainage line <input type="checkbox"/>					
Closed depression <input type="checkbox"/>					
Wetland <input type="checkbox"/>					
	Specific <b>Landform</b> Element: (Refer to field manual for additional values)	Flat with dolerite outcrop			
<b>CONDITION OF SOIL:</b>	Dry <input checked="" type="checkbox"/>	Moist <input type="checkbox"/>	Waterlogged <input type="checkbox"/>	Inundated <input type="checkbox"/>	

**VEGETATION CLASSIFICATION\*:**

Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia);  
2. Open shrubland (Hibbertia sp., Acacia spp.);  
3. Isolated clumps of sedges (Mesomelaena tetragona)

1. Tall shrubland of Acacia xiphophylla I
2. Low sparse shrubland of Maireana triptera and Senna sp. Karijini (M.E. Trudgen 10392)
3. Sparse tussock and hummock grassland of Eragrostis xerophila, Triodia longiceps and Triodia wiseana
- 4.

**ASSOCIATED SPECIES:**

Other (non-dominant) spp

\* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

**CONDITION OF HABITAT:** Pristine  Excellent  Very good  Good  Degraded  Completely degraded

**COMMENT:** \_\_\_\_\_

**FIRE HISTORY:** Last Fire: Season/Month: \_\_\_\_\_ Year: >5 yrs **Fire Intensity:** High  Medium  Low  No signs of fire

**FENCING:** Not required  Present  Replace / repair  Required  Length req'd: \_\_\_\_\_

**ROADSIDE MARKERS:** Not required  Present  Replace / reposition  Required  Quantity req'd: \_\_\_\_\_

**OTHER COMMENTS:** (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.) \_\_\_\_\_

Species found during a borrow pit survey for Main Roads Western Australia (Woodman Environmental Consulting job code MR18-34)

Species also recorded at a number of locations (see GIS data attached)

Collection number: NM26-10

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**DRF PERMIT/ LICENCE No:** \_\_\_\_\_ Note if only observing plants (i.e. no specimens or plant material is taken) then no permit/licence is required. For further information on permit and licencing requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under licence/permit should be recorded above in the OTHER COMMENTS section.

**SPECIMEN:** Collectors No: \_\_\_\_\_ WA Herb.  Regional Herb.  District Herb.  Other: \_\_\_\_\_

**ATTACHED:** Map  Mudmap  Photo  GIS data  Field notes  Other: \_\_\_\_\_

**COPY SENT TO:** Regional Office  District Office  Other: \_\_\_\_\_

Submitter of Record: Alison Saligari Role: Botanist Signed: Alison Saligari Date: 22/10/2018

Please return completed form to **Species And Communities Branch DBCA**,  
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: flora.data@dbca.wa.gov.au

**RECORDS:** Please forward to **Flora Administrative Officer**, Species and Communities Branch.  
Record entered by: \_\_\_\_\_ Sheet No.: \_\_\_\_\_ Record Entered in Database



# Threatened and Priority Flora Report Form

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at <http://dpaw.wa.gov.au/> under Standard Report Forms

<b>TAXON:</b> <u>Astrebla lappacea</u>		<b>TPFL Pop. No.:</b> _____
<b>OBSERVATION DATE:</b> <u>30/07/2018</u>	<b>CONSERVATION STATUS:</b> <u>P3</u>	New population <input type="checkbox"/>
<b>OBSERVER/S:</b> <u>David Coultas</u>		<b>PHONE:</b> <u>(08) 9315 4688</u>
<b>ROLE:</b> <u>Botanist</u>	<b>ORGANISATION:</b> <u>Woodman Environmental Consulting</u>	

**DESCRIPTION OF LOCATION** (Provide at least nearest town/named locality, and the distance and direction to that place):  
Ca. 24 km E of Tom Price, ca. 10.6 km SW of Nanutarra-Munjina Road and Nameless Valley Drive intersection, ca. 0.13 km SE of Nanutarra-Munjina Road

<b>DBC DISTRICT:</b> <u>Pilbara Region</u>		<b>LGA:</b> <u>Ashburton</u>	<b>Reserve No.:</b> _____	Land manager present: <input type="checkbox"/>
<b>DATUM:</b>	<b>COORDINATES:</b> (If UTM coords provided, Zone is also required)		<b>METHOD USED:</b>	
GDA94 / MGA94 <input checked="" type="checkbox"/>	DecDegrees <input type="checkbox"/>	DegMinSec <input type="checkbox"/>	UTMs <input checked="" type="checkbox"/>	GPS <input checked="" type="checkbox"/> Differential GPS <input type="checkbox"/> Map <input type="checkbox"/>
AGD84 / AMG84 <input type="checkbox"/>	<b>Lat / Northing:</b> <u>7489817</u>		No. satellites: _____	Map used: _____
WGS84 <input type="checkbox"/>	<b>Long / Easting:</b> <u>557167</u>		Boundary polygon captured: <input type="checkbox"/>	Map scale: _____
Unknown <input type="checkbox"/>	<b>ZONE:</b> <u>50</u>			
<b>LAND TENURE:</b>				
Nature reserve <input type="checkbox"/>	Timber reserve <input type="checkbox"/>	Private property <input type="checkbox"/>	Rail reserve <input type="checkbox"/>	Shire road reserve <input type="checkbox"/>
National park <input type="checkbox"/>	State forest <input type="checkbox"/>	Pastoral lease <input type="checkbox"/>	MRWA road reserve <input type="checkbox"/>	Other Crown reserve <input checked="" type="checkbox"/>
Conservation park <input type="checkbox"/>	Water reserve <input type="checkbox"/>	UCL <input type="checkbox"/>	SLK/Pole _____ to _____	Specify other: _____

**AREA ASSESSMENT:** Edge survey  Partial survey  Full survey  Area observed (m<sup>2</sup>): \_\_\_\_\_

**EFFORT:** Time spent surveying (minutes): \_\_\_\_\_ No. of minutes spent / 100 m<sup>2</sup>: \_\_\_\_\_

**POP'N COUNT ACCURACY:** Actual  Extrapolation  Estimate  Count method: \_\_\_\_\_  
(Refer to field manual for list)

**WHAT COUNTED:** Plants  Clumps  Clonal stems

<b>TOTAL POP'N STRUCTURE:</b>	<b>Mature:</b>	<b>Juveniles:</b>	<b>Seedlings:</b>	<b>Totals:</b>	Area of pop (m <sup>2</sup> ): _____ Note: Pls record count as numbers (not percentages) for database.
Alive	20			20	
Dead					

**QUADRATS PRESENT:** No. \_\_\_\_\_ Size \_\_\_\_\_ Data attached  Total area of quadrats (m<sup>2</sup>): \_\_\_\_\_

**Summary Quad. Totals:** Alive \_\_\_\_\_

**REPRODUCTIVE STATE:** Clonal  Vegetative  Flowerbud  Flower   
Immature fruit  Fruit  Dehisced fruit  Percentage in flower: \_\_\_\_\_%

**CONDITION OF PLANTS:** Healthy  Moderate  Poor  Senescent

**COMMENT:** \_\_\_\_\_

THREATS - type, agent and supporting information:	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. Specify agent where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)			
• Clearing for borrow pits	N	H	S
•	_____	_____	_____
•	_____	_____	_____

Please return completed form to **Species And Communities Branch DBCA**,  
 Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: [flora.data@dbca.wa.gov.au](mailto:flora.data@dbca.wa.gov.au)

**RECORDS:** Please forward to **Flora Administrative Officer**, Species and Communities Branch.  
 Record entered by: \_\_\_\_\_ Sheet No.: \_\_\_\_\_ Record Entered in Database



# Threatened and Priority Flora Report Form

**HABITAT INFORMATION:**

<b>LANDFORM:</b>	<b>ROCK TYPE:</b>	<b>LOOSE ROCK:</b>	<b>SOIL TYPE:</b>	<b>SOIL COLOUR:</b>	<b>DRAINAGE:</b>
Crest <input type="checkbox"/>	Granite <input type="checkbox"/>	(on soil surface; eg gravel, quartz fields)	Sand <input type="checkbox"/>	Red <input type="checkbox"/>	Well drained <input type="checkbox"/>
Hill <input type="checkbox"/>	Dolerite <input type="checkbox"/>		Sandy loam <input type="checkbox"/>	Brown <input type="checkbox"/>	Seasonally inundated <input type="checkbox"/>
Ridge <input type="checkbox"/>	Laterite <input type="checkbox"/>	0-10% <input type="checkbox"/>	Loam <input type="checkbox"/>	Yellow <input type="checkbox"/>	Permanently inundated <input type="checkbox"/>
Outcrop <input type="checkbox"/>	Ironstone <input type="checkbox"/>	10-30% <input type="checkbox"/>	Clay loam <input type="checkbox"/>	White <input type="checkbox"/>	Tidal <input type="checkbox"/>
Slope <input type="checkbox"/>	Limestone <input type="checkbox"/>	30-50% <input type="checkbox"/>	Light clay <input type="checkbox"/>	Grey <input type="checkbox"/>	
Flat <input type="checkbox"/>	Quartz <input type="checkbox"/>	50-100% <input type="checkbox"/>	Peat <input type="checkbox"/>	Black <input type="checkbox"/>	
Open depression <input type="checkbox"/>	Specify other: _____		Specify other: _____	Specify other: _____	
Drainage line <input type="checkbox"/>			Cracking clay _____		
Closed depression <input type="checkbox"/>					
Wetland <input type="checkbox"/>					
<b>CONDITION OF SOIL:</b>	Dry <input checked="" type="checkbox"/>	Moist <input type="checkbox"/>	Waterlogged <input type="checkbox"/>	Inundated <input type="checkbox"/>	

**VEGETATION  
CLASSIFICATION\*:**

Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia);  
2. Open shrubland (Hibbertia sp., Acacia spp.);  
3. Isolated clumps of sedges (Mesomelaena tetragona)

1. Acacia xiphophylla  
 2. Bothriochloa ewartiana, Dichanthium fecundum  
 3.  
 4.

**ASSOCIATED  
SPECIES:**

Other (non-dominant) spp

\* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

**CONDITION OF HABITAT:** Pristine  Excellent  Very good  Good  Degraded  Completely degraded

**COMMENT:** \_\_\_\_\_

**FIRE HISTORY:** Last Fire: Season/Month: \_\_\_\_\_ Year: \_\_\_\_\_ Fire Intensity: High  Medium  Low  No signs of fire

**FENCING:** Not required  Present  Replace / repair  Required  Length req'd: \_\_\_\_\_

**ROADSIDE MARKERS:** Not required  Present  Replace / reposition  Required  Quantity req'd: \_\_\_\_\_

**OTHER COMMENTS:** (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

Species found during a borrow pit survey for Main Roads Western Australia (Woodman Environmental Consulting job code MR18-34)

Collection Number: DCMS OPP66

**DRF PERMIT/ LICENCE No:**

Note if only observing plants (i.e. no specimens or plant material is taken) then no permit/licence is required. For further information on permit and licencing requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under licence/permit should be recorded above in the OTHER COMMENTS section.

**SPECIMEN:** Collectors No: \_\_\_\_\_ WA Herb.  Regional Herb.  District Herb.  Other: \_\_\_\_\_

**ATTACHED:** Map  Mudmap  Photo  GIS data  Field notes  Other: \_\_\_\_\_

**COPY SENT TO:** Regional Office  District Office  Other: \_\_\_\_\_

Submitter of Record: Alison Saligari Role: Botanist Signed: Alison Saligari Date: 29/10/2018

Please return completed form to **Species And Communities Branch DBCA**,  
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: flora.data@dbca.wa.gov.au

**RECORDS:** Please forward to **Flora Administrative Officer**, Species and Communities Branch.

Record entered by: \_\_\_\_\_ Sheet No.: \_\_\_\_\_ Record Entered in Database





# Threatened and Priority Flora Report Form

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at <http://dpaw.wa.gov.au/> under *Standard Report Forms*

<b>TAXON:</b> <u>Astrebla lappacea</u>		<b>TPFL Pop. No.:</b> _____	
<b>OBSERVATION DATE:</b> <u>30/07/2018</u>		<b>CONSERVATION STATUS:</b> <u>P3</u> New population <input type="checkbox"/>	
<b>OBSERVER/S:</b> <u>David Coultas</u>		<b>PHONE:</b> <u>(08) 9315 4688</u>	
<b>ROLE:</b> <u>Botanist</u>		<b>ORGANISATION:</b> <u>Woodman Environmental Consulting</u>	

**DESCRIPTION OF LOCATION** (Provide at least nearest town/named locality, and the distance and direction to that place):  
Ca. 24 km NW of Tom Price, ca. 13.7 km NE of Nanutarra-Munjina Road and Nameless Valley Drive intersection, ca. 0.34 km NW of Nanutarra-Munjina Road on Hamersley Pastoral Station

<b>DBC DISTRICT:</b> <u>Pilbara Region</u>		<b>LGA:</b> <u>Ashburton</u>		<b>Reserve No.:</b> _____		Land manager present: <input type="checkbox"/>	
<b>DATUM:</b>		<b>COORDINATES:</b> (If UTM coords provided, Zone is also required)		<b>METHOD USED:</b>			
GDA94 / MGA94 <input checked="" type="checkbox"/>		DecDegrees <input type="checkbox"/> DegMinSec <input type="checkbox"/> UTM <input checked="" type="checkbox"/>		GPS <input checked="" type="checkbox"/>		Differential GPS <input type="checkbox"/> Map <input type="checkbox"/>	
AGD84 / AMG84 <input type="checkbox"/>		<b>Lat / Northing:</b> <u>7510765</u>		No. satellites: _____		Map used: _____	
WGS84 <input type="checkbox"/>		<b>Long / Easting:</b> <u>569127</u>		Boundary polygon captured: <input type="checkbox"/>		Map scale: _____	
Unknown <input type="checkbox"/>		<b>ZONE:</b> <u>50</u>					
<b>LAND TENURE:</b>							
Nature reserve <input type="checkbox"/>		Timber reserve <input type="checkbox"/>		Private property <input type="checkbox"/>		Rail reserve <input type="checkbox"/>	
National park <input type="checkbox"/>		State forest <input type="checkbox"/>		Pastoral lease <input checked="" type="checkbox"/>		MRWA road reserve <input type="checkbox"/>	
Conservation park <input type="checkbox"/>		Water reserve <input type="checkbox"/>		UCL <input type="checkbox"/> SLK/Pole _____ to _____		Shire road reserve <input type="checkbox"/>	
						Other Crown reserve <input type="checkbox"/>	
						Specify other: _____	

**AREA ASSESSMENT:** Edge survey     Partial survey     Full survey     Area observed (m<sup>2</sup>): \_\_\_\_\_

**EFFORT:** Time spent surveying (minutes): \_\_\_\_\_    No. of minutes spent / 100 m<sup>2</sup>: \_\_\_\_\_

**POP'N COUNT ACCURACY:** Actual     Extrapolation     Estimate     Count method: \_\_\_\_\_  
(Refer to field manual for list)

**WHAT COUNTED:** Plants     Clumps     Clonal stems

<b>TOTAL POP'N STRUCTURE:</b>	<b>Mature:</b>	<b>Juveniles:</b>	<b>Seedlings:</b>	<b>Totals:</b>	Area of pop (m <sup>2</sup> ): _____ <small>Note: Pls record count as numbers (not percentages) for database.</small>
Alive	35			35	
Dead					

**QUADRATS PRESENT:** No. \_\_\_\_\_    Size \_\_\_\_\_    Data attached     Total area of quadrats (m<sup>2</sup>): \_\_\_\_\_

**Summary Quad. Totals:** Alive \_\_\_\_\_

**REPRODUCTIVE STATE:** Clonal     Vegetative     Flowerbud     Flower   
 Immature fruit     Fruit     Dehisced fruit     Percentage in flower: \_\_\_\_\_%

**CONDITION OF PLANTS:** Healthy     Moderate     Poor     Senescent

**COMMENT:** \_\_\_\_\_

THREATS - type, agent and supporting information:	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. <b>Specify agent</b> where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)			
• Clearing for borrow pits	N	H	S
•	_____	_____	_____
•	_____	_____	_____



# Threatened and Priority Flora Report Form

**HABITAT INFORMATION:**

<b>LANDFORM:</b>	<b>ROCK TYPE:</b>	<b>LOOSE ROCK:</b>	<b>SOIL TYPE:</b>	<b>SOIL COLOUR:</b>	<b>DRAINAGE:</b>
Crest <input type="checkbox"/>	Granite <input type="checkbox"/>	(on soil surface; eg gravel, quartz fields)	Sand <input type="checkbox"/>	Red <input checked="" type="checkbox"/>	Well drained <input type="checkbox"/>
Hill <input type="checkbox"/>	Dolerite <input type="checkbox"/>		Sandy loam <input type="checkbox"/>	Brown <input type="checkbox"/>	Seasonally inundated <input type="checkbox"/>
Ridge <input type="checkbox"/>	Laterite <input type="checkbox"/>	0-10% <input type="checkbox"/>	Loam <input type="checkbox"/>	Yellow <input type="checkbox"/>	Permanently inundated <input type="checkbox"/>
Outcrop <input type="checkbox"/>	Ironstone <input type="checkbox"/>	10-30% <input type="checkbox"/>	Clay loam <input checked="" type="checkbox"/>	White <input type="checkbox"/>	Tidal <input type="checkbox"/>
Slope <input type="checkbox"/>	Limestone <input type="checkbox"/>	30-50% <input checked="" type="checkbox"/>	Light clay <input checked="" type="checkbox"/>	Grey <input type="checkbox"/>	
Flat <input checked="" type="checkbox"/>	Quartz <input type="checkbox"/>	50-100% <input type="checkbox"/>	Peat <input type="checkbox"/>	Black <input type="checkbox"/>	
Open depression <input type="checkbox"/>	Specify other: _____		Specify other: _____	Specify other: _____	
Drainage line <input type="checkbox"/>					
Closed depression <input type="checkbox"/>					
Wetland <input type="checkbox"/>					
	Specific <b>Landform</b> Element: _____ (Refer to field manual for additional values)				
<b>CONDITION OF SOIL:</b>	Dry <input checked="" type="checkbox"/>	Moist <input type="checkbox"/>	Waterlogged <input type="checkbox"/>	Inundated <input type="checkbox"/>	

**VEGETATION CLASSIFICATION\*:**

Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia);  
2. Open shrubland (Hibbertia sp., Acacia spp.);  
3. Isolated clumps of sedges (Mesomelaena tetragona)

1. Tall open shrubland of *Acacia xiphophylla*
2. Mid sparse shrubland of *Enchylaena tomentosa* var. *tomentosa* and *Senna artemisioides* subsp. *oligophylla*
3. Low tussock grassland of *Astrebla elymoides*, *Chrysopogon fallax*, *Eriachne benthamii*
- 4.

**ASSOCIATED SPECIES:**

Other (non-dominant) spp \_\_\_\_\_

\* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

**CONDITION OF HABITAT:** Pristine  Excellent  Very good  Good  Degraded  Completely degraded

**COMMENT:** \_\_\_\_\_

**FIRE HISTORY:** Last Fire: Season/Month: \_\_\_\_\_ Year: >5 yrs **Fire Intensity:** High  Medium  Low  No signs of fire

**FENCING:** Not required  Present  Replace / repair  Required  Length req'd: \_\_\_\_\_

**ROADSIDE MARKERS:** Not required  Present  Replace / reposition  Required  Quantity req'd: \_\_\_\_\_

**OTHER COMMENTS:** (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.) \_\_\_\_\_

Species found during a borrow pit survey for Main Roads Western Australia (Woodman Environmental Consulting job code MR18-34)

Collection Number: DCMS OPP65

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**DRF PERMIT/ LICENCE No:** Note if only observing plants (i.e. no specimens or plant material is taken) then no permit/licence is required. For further information on permit and licencing requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under licence/permit should be recorded above in the OTHER COMMENTS section.

**SPECIMEN:** Collectors No: \_\_\_\_\_ WA Herb.  Regional Herb.  District Herb.  Other: \_\_\_\_\_

**ATTACHED:** Map  Mudmap  Photo  GIS data  Field notes  Other: \_\_\_\_\_

**COPY SENT TO:** Regional Office  District Office  Other: \_\_\_\_\_

Submitter of Record: Alison Saligari Role: Botanist Signed: Alison Saligari Date: 1/11/2018

Please return completed form to **Species And Communities Branch DBCA**,  
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: flora.data@dbca.wa.gov.au

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Record entered by: \_\_\_\_\_ Sheet No.: \_\_\_\_\_ Record Entered in Database



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<b>TAXON:</b> <u>Astrebla lappacea</u>		<b>TPFL Pop. No.:</b> _____
<b>OBSERVATION DATE:</b> <u>30/07/2018</u>	<b>CONSERVATION STATUS:</b> <u>P3</u>	New population <input type="checkbox"/>
<b>OBSERVER/S:</b> <u>David Coultas</u>		<b>PHONE:</b> <u>(08) 9315 4688</u>
<b>ROLE:</b> <u>Botanist</u>	<b>ORGANISATION:</b> <u>Woodman Environmental Consulting</u>	

**DESCRIPTION OF LOCATION** (Provide at least nearest town/named locality, and the distance and direction to that place):  
Ca. 26 km N of Tom Price, ca. 25.55 km NE of Nanutarra-Munjina Road and Nameless Valley Drive intersection, ca. 0.3 km S of Nanutarra-Munjina Road

<b>DBC DISTRICT:</b> <u>Pilbara Region</u>		<b>LGA:</b> <u>Ashburton</u>	<b>Reserve No.:</b> _____	Land manager present: <input type="checkbox"/>
<b>DATUM:</b>	<b>COORDINATES:</b> (If UTM coords provided, Zone is also required)		<b>METHOD USED:</b>	
GDA94 / MGA94 <input checked="" type="checkbox"/>	DecDegrees <input type="checkbox"/>	DegMinSec <input type="checkbox"/>	UTMs <input checked="" type="checkbox"/>	GPS <input checked="" type="checkbox"/> Differential GPS <input type="checkbox"/> Map <input type="checkbox"/>
AGD84 / AMG84 <input type="checkbox"/>	<b>Lat / Northing:</b> <u>7516725</u>		No. satellites: _____	Map used: _____
WGS84 <input type="checkbox"/>	<b>Long / Easting:</b> <u>581119</u>		Boundary polygon captured: <input type="checkbox"/>	Map scale: _____
Unknown <input type="checkbox"/>	<b>ZONE:</b> <u>50</u>			
<b>LAND TENURE:</b>				
Nature reserve <input type="checkbox"/>	Timber reserve <input type="checkbox"/>	Private property <input type="checkbox"/>	Rail reserve <input type="checkbox"/>	Shire road reserve <input type="checkbox"/>
National park <input type="checkbox"/>	State forest <input type="checkbox"/>	Pastoral lease <input type="checkbox"/>	MRWA road reserve <input type="checkbox"/>	Other Crown reserve <input checked="" type="checkbox"/>
Conservation park <input type="checkbox"/>	Water reserve <input type="checkbox"/>	UCL <input type="checkbox"/>	SLK/Pole _____ to _____	Specify other: _____

**AREA ASSESSMENT:** Edge survey  Partial survey  Full survey  Area observed (m<sup>2</sup>): \_\_\_\_\_

**EFFORT:** Time spent surveying (minutes): \_\_\_\_\_ No. of minutes spent / 100 m<sup>2</sup>: \_\_\_\_\_

**POP'N COUNT ACCURACY:** Actual  Extrapolation  Estimate  Count method: \_\_\_\_\_  
(Refer to field manual for list)

**WHAT COUNTED:** Plants  Clumps  Clonal stems

<b>TOTAL POP'N STRUCTURE:</b>	<b>Mature:</b>	<b>Juveniles:</b>	<b>Seedlings:</b>	<b>Totals:</b>	Area of pop (m <sup>2</sup> ): _____ Note: Pls record count as numbers (not percentages) for database.
Alive	20			20	
Dead					

**QUADRATS PRESENT:** No. \_\_\_\_\_ Size \_\_\_\_\_ Data attached  Total area of quadrats (m<sup>2</sup>): \_\_\_\_\_

**Summary Quad. Totals:** Alive \_\_\_\_\_

**REPRODUCTIVE STATE:** Clonal  Vegetative  Flowerbud  Flower   
 Immature fruit  Fruit  Dehisced fruit  Percentage in flower: \_\_\_\_\_%

**CONDITION OF PLANTS:** Healthy  Moderate  Poor  Senescent

**COMMENT:** \_\_\_\_\_

THREATS - type, agent and supporting information:	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. <b>Specify agent</b> where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)			
• Clearing for borrow pits	N	H	S
•	_____	_____	_____
•	_____	_____	_____



# Threatened and Priority Flora Report Form

## HABITAT INFORMATION:

<b>LANDFORM:</b>	<b>ROCK TYPE:</b>	<b>LOOSE ROCK:</b>	<b>SOIL TYPE:</b>	<b>SOIL COLOUR:</b>	<b>DRAINAGE:</b>
Crest <input type="checkbox"/>	Granite <input type="checkbox"/>	(on soil surface; eg gravel, quartz fields)	Sand <input type="checkbox"/>	Red <input type="checkbox"/>	Well drained <input type="checkbox"/>
Hill <input type="checkbox"/>	Dolerite <input type="checkbox"/>		Sandy loam <input type="checkbox"/>	Brown <input checked="" type="checkbox"/>	Seasonally inundated <input checked="" type="checkbox"/>
Ridge <input type="checkbox"/>	Laterite <input type="checkbox"/>	0-10% <input type="checkbox"/>	Loam <input type="checkbox"/>	Yellow <input type="checkbox"/>	Permanently inundated <input type="checkbox"/>
Outcrop <input type="checkbox"/>	Ironstone <input type="checkbox"/>	10-30% <input type="checkbox"/>	Clay loam <input type="checkbox"/>	White <input type="checkbox"/>	Tidal <input type="checkbox"/>
Slope <input type="checkbox"/>	Limestone <input type="checkbox"/>	30-50% <input type="checkbox"/>	Light clay <input checked="" type="checkbox"/>	Grey <input type="checkbox"/>	
Flat <input type="checkbox"/>	Quartz <input type="checkbox"/>	50-100% <input type="checkbox"/>	Peat <input type="checkbox"/>	Black <input type="checkbox"/>	
Open depression <input type="checkbox"/>	Specify other: _____		Specify other: _____	Specify other: _____	
Drainage line <input type="checkbox"/>				Light brown	
Closed depression <input checked="" type="checkbox"/>					
Wetland <input type="checkbox"/>					
	Specific <b>Landform</b> Element: _____ (Refer to field manual for additional values)	Clay pan			
<b>CONDITION OF SOIL:</b>	Dry <input checked="" type="checkbox"/>	Moist <input type="checkbox"/>	Waterlogged <input type="checkbox"/>	Inundated <input type="checkbox"/>	

## VEGETATION CLASSIFICATION\*:

Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia);  
2. Open shrubland (Hibbertia sp., Acacia spp.);  
3. Isolated clumps of sedges (Mesomelaena tetragona)

1. Low open woodland of Eucalyptus xerothermica and Corymbia hamersleyana
2. Tall sparse shrubland of Acacia aptaneura, Acacia pruinocarpa and Acacia bivenosa
3. Tussock grassland of Eriachne benthamii, Eulalia aurea and Themeda triandra
- 4.

## ASSOCIATED SPECIES:

Other (non-dominant) spp \_\_\_\_\_

\* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 Australian Soil and Land Survey Field Handbook guidelines – refer to field manual for further information and structural formation table.

**CONDITION OF HABITAT:** Pristine  Excellent  Very good  Good  Degraded  Completely degraded

**COMMENT:** Some weeds and cattle activity

**FIRE HISTORY:** Last Fire: Season/Month: \_\_\_\_\_ Year: >5 yrs **Fire Intensity:** High  Medium  Low  No signs of fire

**FENCING:** Not required  Present  Replace / repair  Required  Length req'd: \_\_\_\_\_

**ROADSIDE MARKERS:** Not required  Present  Replace / reposition  Required  Quantity req'd: \_\_\_\_\_

**OTHER COMMENTS:** (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.) \_\_\_\_\_

Species found during a borrow pit survey for Main Roads Western Australia (Woodman Environmental Consulting job code MR18-34)

Collection Number: NMR01-16

## DRF PERMIT/ LICENCE No:

Note if only observing plants (i.e. no specimens or plant material is taken) then no permit/licence is required. For further information on permit and licencing requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under licence/permit should be recorded above in the OTHER COMMENTS section.

**SPECIMEN:** Collectors No: \_\_\_\_\_ WA Herb.  Regional Herb.  District Herb.  Other: \_\_\_\_\_

**ATTACHED:** Map  Mudmap  Photo  GIS data  Field notes  Other: \_\_\_\_\_

**COPY SENT TO:** Regional Office  District Office  Other: \_\_\_\_\_

Submitter of Record: Alison Saligari Role: Botanist Signed: Alison Saligari Date: 29/10/2018

Please return completed form to **Species And Communities Branch DBCA**,  
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: flora.data@dbca.wa.gov.au

**RECORDS:** Please forward to **Flora Administrative Officer**, Species and Communities Branch.

Record entered by: \_\_\_\_\_ Sheet No.: \_\_\_\_\_ Record Entered in Database



# Threatened and Priority Flora Report Form

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at <http://dpaw.wa.gov.au/> under *Standard Report Forms*

<b>TAXON:</b> <u>Euphorbia inappendiculata var. queenslandica</u>		<b>TPFL Pop. No.:</b> _____
<b>OBSERVATION DATE:</b> <u>26/07/2018</u>	<b>CONSERVATION STATUS:</b> <u>P1</u>	New population <input type="checkbox"/>
<b>OBSERVER/S:</b> <u>David Coultas</u>		<b>PHONE:</b> <u>(08) 9315 4688</u>
<b>ROLE:</b> <u>Botanist</u>	<b>ORGANISATION:</b> <u>Woodman Environmental Consulting</u>	

**DESCRIPTION OF LOCATION** (Provide at least nearest town/named locality, and the distance and direction to that place):  
Ca. 26 km N of Tom Price, ca. 25.55 km NE of Nanutarra-Munjina Road and Nameless Valley Drive intersection, ca. 0.3 km S of Nanutarra-Munjina Road on Hamersley Pastoral Station

<b>DBC DISTRICT:</b> <u>Pilbara Region</u>		<b>LGA:</b> <u>Ashburton</u>	<b>Reserve No.:</b> _____	Land manager present: <input type="checkbox"/>
<b>DATUM:</b>	<b>COORDINATES:</b> (If UTM coords provided, Zone is also required)		<b>METHOD USED:</b>	
GDA94 / MGA94 <input checked="" type="checkbox"/>	DecDegrees <input type="checkbox"/>	DegMinSec <input type="checkbox"/>	UTMs <input checked="" type="checkbox"/>	GPS <input checked="" type="checkbox"/> Differential GPS <input type="checkbox"/> Map <input type="checkbox"/>
AGD84 / AMG84 <input type="checkbox"/>	<b>Lat / Northing:</b> <u>7516725</u>		No. satellites: _____	Map used: _____
WGS84 <input type="checkbox"/>	<b>Long / Easting:</b> <u>581119</u>		Boundary polygon captured: <input type="checkbox"/>	Map scale: _____
Unknown <input type="checkbox"/>	<b>ZONE:</b> <u>50</u>			
<b>LAND TENURE:</b>				
Nature reserve <input type="checkbox"/>	Timber reserve <input type="checkbox"/>	Private property <input type="checkbox"/>	Rail reserve <input type="checkbox"/>	Shire road reserve <input type="checkbox"/>
National park <input type="checkbox"/>	State forest <input type="checkbox"/>	Pastoral lease <input checked="" type="checkbox"/>	MRWA road reserve <input type="checkbox"/>	Other Crown reserve <input type="checkbox"/>
Conservation park <input type="checkbox"/>	Water reserve <input type="checkbox"/>	UCL <input type="checkbox"/>	SLK/Pole _____ to _____	Specify other: _____

**AREA ASSESSMENT:** Edge survey  Partial survey  Full survey  Area observed (m<sup>2</sup>): \_\_\_\_\_

**EFFORT:** Time spent surveying (minutes): \_\_\_\_\_ No. of minutes spent / 100 m<sup>2</sup>: \_\_\_\_\_

**POP'N COUNT ACCURACY:** Actual  Extrapolation  Estimate  Count method: \_\_\_\_\_  
(Refer to field manual for list)

**WHAT COUNTED:** Plants  Clumps  Clonal stems

<b>TOTAL POP'N STRUCTURE:</b>	<b>Mature:</b>	<b>Juveniles:</b>	<b>Seedlings:</b>	<b>Totals:</b>	Area of pop (m <sup>2</sup> ): _____ Note: Pls record count as numbers (not percentages) for database.
Alive	1			1	
Dead					

**QUADRATS PRESENT:** No. \_\_\_\_\_ Size \_\_\_\_\_ Data attached  Total area of quadrats (m<sup>2</sup>): \_\_\_\_\_

**Summary Quad. Totals:** Alive \_\_\_\_\_

**REPRODUCTIVE STATE:** Clonal  Vegetative  Flowerbud  Flower   
Immature fruit  Fruit  Dehisced fruit  Percentage in flower: \_\_\_\_\_%

**CONDITION OF PLANTS:** Healthy  Moderate  Poor  Senescent

**COMMENT:** \_\_\_\_\_

THREATS - type, agent and supporting information:	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. Specify agent where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)			
• Clearing for borrow pits	N	H	S
•	_____	_____	_____
•	_____	_____	_____



# Threatened and Priority Flora Report Form

## HABITAT INFORMATION:

<b>LANDFORM:</b>	<b>ROCK TYPE:</b>	<b>LOOSE ROCK:</b>	<b>SOIL TYPE:</b>	<b>SOIL COLOUR:</b>	<b>DRAINAGE:</b>
Crest <input type="checkbox"/>	Granite <input type="checkbox"/>	(on soil surface; eg gravel, quartz fields)	Sand <input type="checkbox"/>	Red <input type="checkbox"/>	Well drained <input type="checkbox"/>
Hill <input type="checkbox"/>	Dolerite <input type="checkbox"/>		Sandy loam <input type="checkbox"/>	Brown <input checked="" type="checkbox"/>	Seasonally inundated <input checked="" type="checkbox"/>
Ridge <input type="checkbox"/>	Laterite <input type="checkbox"/>	0-10% <input type="checkbox"/>	Loam <input type="checkbox"/>	Yellow <input type="checkbox"/>	Permanently inundated <input type="checkbox"/>
Outcrop <input type="checkbox"/>	Ironstone <input type="checkbox"/>	10-30% <input type="checkbox"/>	Clay loam <input type="checkbox"/>	White <input type="checkbox"/>	Tidal <input type="checkbox"/>
Slope <input type="checkbox"/>	Limestone <input type="checkbox"/>	30-50% <input type="checkbox"/>	Light clay <input checked="" type="checkbox"/>	Grey <input type="checkbox"/>	
Flat <input type="checkbox"/>	Quartz <input type="checkbox"/>	50-100% <input type="checkbox"/>	Peat <input type="checkbox"/>	Black <input type="checkbox"/>	
Open depression <input type="checkbox"/>	Specify other: _____		Specify other: _____	Specify other: _____	
Drainage line <input type="checkbox"/>				Light brown	
Closed depression <input checked="" type="checkbox"/>					
Wetland <input type="checkbox"/>					
	Specific <b>Landform</b> Element: _____ (Refer to field manual for additional values)	Clay pan			
<b>CONDITION OF SOIL:</b>	Dry <input checked="" type="checkbox"/>	Moist <input type="checkbox"/>	Waterlogged <input type="checkbox"/>	Inundated <input type="checkbox"/>	

## VEGETATION CLASSIFICATION\*:

Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia);  
 2. Open shrubland (Hibbertia sp., Acacia spp.);  
 3. Isolated clumps of sedges (Mesomelaena tetragona)

1. Low open woodland of Eucalyptus xerothermica and Corymbia hamersleyana
2. Tall sparse shrubland of Acacia aptaneura, Acacia pruinocarpa and Acacia bivenosa
3. Tussock grassland of Eriachne benthamii, Eulalia aurea and Themeda triandra
- 4.

## ASSOCIATED SPECIES:

Other (non-dominant) spp \_\_\_\_\_

\* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

**CONDITION OF HABITAT:** Pristine  Excellent  Very good  Good  Degraded  Completely degraded

**COMMENT:** Some weeds and cattle activity

**FIRE HISTORY:** Last Fire: Season/Month: \_\_\_\_\_ Year: >5 yrs **Fire Intensity:** High  Medium  Low  No signs of fire

**FENCING:** Not required  Present  Replace / repair  Required  Length req'd: \_\_\_\_\_

**ROADSIDE MARKERS:** Not required  Present  Replace / reposition  Required  Quantity req'd: \_\_\_\_\_

**OTHER COMMENTS:** (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.) \_\_\_\_\_

Species found during a borrow pit survey for Main Roads Western Australia (Woodman Environmental Consulting job code MR18-34)

Collection Number: NMR01-14

## DRF PERMIT/ LICENCE No:

Note if only observing plants (i.e. no specimens or plant material is taken) then no permit/licence is required. For further information on permit and licencing requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under licence/permit should be recorded above in the OTHER COMMENTS section.

**SPECIMEN:** Collectors No: \_\_\_\_\_ WA Herb.  Regional Herb.  District Herb.  Other: \_\_\_\_\_

**ATTACHED:** Map  Mudmap  Photo  GIS data  Field notes  Other: \_\_\_\_\_

**COPY SENT TO:** Regional Office  District Office  Other: \_\_\_\_\_

Submitter of Record: Alison Saligari Role: Botanist Signed: Alison Saligari Date: 26/10/2018

Please return completed form to **Species And Communities Branch DBCA**,  
 Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: flora.data@dbca.wa.gov.au

**RECORDS:** Please forward to **Flora Administrative Officer**, Species and Communities Branch.

Record entered by: \_\_\_\_\_ Sheet No.: \_\_\_\_\_ Record Entered in Database



# Threatened and Priority Flora Report Form

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at <http://dpaw.wa.gov.au/> under *Standard Report Forms*

<b>TAXON:</b> <u>Goodenia nuda</u>		<b>TPFL Pop. No.:</b> _____	
<b>OBSERVATION DATE:</b> <u>25/07/2018</u>		<b>CONSERVATION STATUS:</b> <u>P4</u> New population <input type="checkbox"/>	
<b>OBSERVER/S:</b> <u>David Coultas</u>		<b>PHONE:</b> <u>(08) 9315 4688</u>	
<b>ROLE:</b> <u>Botanist</u>		<b>ORGANISATION:</b> <u>Woodman Environmental Consulting</u>	

**DESCRIPTION OF LOCATION** (Provide at least nearest town/named locality, and the distance and direction to that place):  
Ca. 24.4 km NW of Tom Price, ca. 10.7 km NNE of Nanutarra-Munjina Road and Nameless Valley Drive intersection, ca. 0.64 km NW of Nanutarra-Munjina Road on Hamersley Pastoral Station

<b>DBC DISTRICT:</b> <u>Pilbara Region</u>		<b>LGA:</b> <u>Ashburton</u>		<b>Reserve No.:</b> _____		Land manager present: <input type="checkbox"/>	
<b>DATUM:</b>		<b>COORDINATES:</b> (If UTM coords provided, Zone is also required)		<b>METHOD USED:</b>			
GDA94 / MGA94 <input checked="" type="checkbox"/>		DecDegrees <input type="checkbox"/> DegMinSec <input type="checkbox"/> UTM <input checked="" type="checkbox"/>		GPS <input checked="" type="checkbox"/>		Differential GPS <input type="checkbox"/> Map <input type="checkbox"/>	
AGD84 / AMG84 <input type="checkbox"/>		<b>Lat / Northing:</b> <u>7508614</u>		No. satellites: _____		Map used: _____	
WGS84 <input type="checkbox"/>		<b>Long / Easting:</b> <u>565714</u>		Boundary polygon captured: <input type="checkbox"/>		Map scale: _____	
Unknown <input type="checkbox"/>		<b>ZONE:</b> <u>50</u>					
<b>LAND TENURE:</b>							
Nature reserve <input type="checkbox"/>		Timber reserve <input type="checkbox"/>		Private property <input type="checkbox"/>		Rail reserve <input type="checkbox"/>	
National park <input type="checkbox"/>		State forest <input type="checkbox"/>		Pastoral lease <input checked="" type="checkbox"/>		MRWA road reserve <input type="checkbox"/>	
Conservation park <input type="checkbox"/>		Water reserve <input type="checkbox"/>		UCL <input type="checkbox"/> SLK/Pole _____ to _____		Shire road reserve <input type="checkbox"/>	
						Other Crown reserve <input type="checkbox"/>	
						Specify other: _____	

**AREA ASSESSMENT:** Edge survey     Partial survey     Full survey     Area observed (m<sup>2</sup>): \_\_\_\_\_

**EFFORT:** Time spent surveying (minutes): \_\_\_\_\_    No. of minutes spent / 100 m<sup>2</sup>: \_\_\_\_\_

**POP'N COUNT ACCURACY:** Actual     Extrapolation     Estimate     Count method: \_\_\_\_\_  
(Refer to field manual for list)

**WHAT COUNTED:** Plants     Clumps     Clonal stems

<b>TOTAL POP'N STRUCTURE:</b>	<b>Mature:</b>	<b>Juveniles:</b>	<b>Seedlings:</b>	<b>Totals:</b>	Area of pop (m <sup>2</sup> ): _____ <small>Note: Pls record count as numbers (not percentages) for database.</small>
Alive	1			1	
Dead					

**QUADRATS PRESENT:** No. \_\_\_\_\_    Size \_\_\_\_\_    Data attached     Total area of quadrats (m<sup>2</sup>): \_\_\_\_\_

**Summary Quad. Totals:** Alive \_\_\_\_\_

**REPRODUCTIVE STATE:** Clonal     Vegetative     Flowerbud     Flower   
 Immature fruit     Fruit     Dehisced fruit     Percentage in flower: \_\_\_\_\_%

**CONDITION OF PLANTS:** Healthy     Moderate     Poor     Senescent

**COMMENT:** \_\_\_\_\_

THREATS - type, agent and supporting information:	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. <b>Specify agent</b> where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)			
• Clearing for borrow pits	N	H	S
•	_____	_____	_____
•	_____	_____	_____



# Threatened and Priority Flora Report Form

## HABITAT INFORMATION:

<b>LANDFORM:</b>	<b>ROCK TYPE:</b>	<b>LOOSE ROCK:</b>	<b>SOIL TYPE:</b>	<b>SOIL COLOUR:</b>	<b>DRAINAGE:</b>
Crest <input type="checkbox"/>	Granite <input type="checkbox"/>	(on soil surface; eg gravel, quartz fields)	Sand <input type="checkbox"/>	Red <input checked="" type="checkbox"/>	Well drained <input checked="" type="checkbox"/>
Hill <input type="checkbox"/>	Dolerite <input type="checkbox"/>		Sandy loam <input type="checkbox"/>	Brown <input type="checkbox"/>	Seasonally inundated <input type="checkbox"/>
Ridge <input type="checkbox"/>	Laterite <input type="checkbox"/>	0-10% <input type="checkbox"/>	Loam <input type="checkbox"/>	Yellow <input type="checkbox"/>	Permanently inundated <input type="checkbox"/>
Outcrop <input type="checkbox"/>	Ironstone <input type="checkbox"/>	10-30% <input type="checkbox"/>	Clay loam <input checked="" type="checkbox"/>	White <input type="checkbox"/>	Tidal <input type="checkbox"/>
Slope <input type="checkbox"/>	Limestone <input type="checkbox"/>	30-50% <input type="checkbox"/>	Light clay <input type="checkbox"/>	Grey <input type="checkbox"/>	
Flat <input type="checkbox"/>	Quartz <input type="checkbox"/>	50-100% <input checked="" type="checkbox"/>	Peat <input type="checkbox"/>	Black <input type="checkbox"/>	
Open depression <input type="checkbox"/>	Specify other: _____		Specify other: _____	Specify other: _____	
Drainage line <input type="checkbox"/>					
Closed depression <input type="checkbox"/>					
Wetland <input type="checkbox"/>					

**CONDITION OF SOIL:** Dry  Moist  Waterlogged  Inundated

**VEGETATION CLASSIFICATION\*:**

Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia);  
 2. Open shrubland (Hibbertia sp., Acacia spp.);  
 3. Isolated clumps of sedges (Mesomelaena tetragona)

- Low open woodland to low isolated trees dominated by Eucalyptus leucophloia subsp. leucophloia
- Tall open to sparse shrubland dominated by Acacia aptaneura and Acacia pruinocarpa
- Low hummock grassland dominated by Triodia wiseana
- 

**ASSOCIATED SPECIES:**

Other (non-dominant) spp: \_\_\_\_\_

\* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 Australian Soil and Land Survey Field Handbook guidelines – refer to field manual for further information and structural formation table.

**CONDITION OF HABITAT:** Pristine  Excellent  Very good  Good  Degraded  Completely degraded

**COMMENT:** \_\_\_\_\_

**FIRE HISTORY:** Last Fire: Season/Month: \_\_\_\_\_ Year: \_\_\_\_\_ Fire Intensity: High  Medium  Low  No signs of fire

**FENCING:** Not required  Present  Replace / repair  Required  Length req'd: \_\_\_\_\_

**ROADSIDE MARKERS:** Not required  Present  Replace / reposition  Required  Quantity req'd: \_\_\_\_\_

**OTHER COMMENTS:** (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

Species found during a borrow pit survey for Main Roads Western Australia (Woodman Environmental Consulting job code MR18-34)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**DRF PERMIT/ LICENCE No:** Note if only observing plants (i.e. no specimens or plant material is taken) then no permit/licence is required. For further information on permit and licencing requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under licence/permit should be recorded above in the OTHER COMMENTS section.

**SPECIMEN:** Collectors No: \_\_\_\_\_ WA Herb.  Regional Herb.  District Herb.  Other: \_\_\_\_\_

**ATTACHED:** Map  Mudmap  Photo  GIS data  Field notes  Other: \_\_\_\_\_

**COPY SENT TO:** Regional Office  District Office  Other: \_\_\_\_\_

Submitter of Record: Alison Saligari Role: Botanist Signed: Alison Saligari Date: 1/11/2018

Please return completed form to **Species And Communities Branch DBCA**,  
 Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: flora.data@dbca.wa.gov.au

**RECORDS:** Please forward to **Flora Administrative Officer**, Species and Communities Branch.  
 Record entered by: \_\_\_\_\_ Sheet No.: \_\_\_\_\_ Record Entered in Database





# Threatened and Priority Flora Report Form

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at <http://dpaw.wa.gov.au/> under *Standard Report Forms*

<b>TAXON:</b> <u>Goodenia nuda</u>		<b>TPFL Pop. No.:</b> _____	
<b>OBSERVATION DATE:</b> <u>25/07/2018</u>		<b>CONSERVATION STATUS:</b> <u>P4</u> New population <input type="checkbox"/>	
<b>OBSERVER/S:</b> <u>David Coultas</u>		<b>PHONE:</b> <u>(08) 9315 4688</u>	
<b>ROLE:</b> <u>Botanist</u>		<b>ORGANISATION:</b> <u>Woodman Environmental Consulting</u>	

**DESCRIPTION OF LOCATION** (Provide at least nearest town/named locality, and the distance and direction to that place):  
Ca. 24 km NW of Tom Price, ca. 13.3 km NE of Nanutarra-Munjina Road and Nameless Valley Drive intersection, ca. 0.19 km NW of Nanutarra-Munjina Road on Hamersley Pastoral Station

<b>DBC DISTRICT:</b> <u>Pilbara Region</u>		<b>LGA:</b> <u>Ashburton</u>		<b>Reserve No.:</b> _____		Land manager present: <input type="checkbox"/>	
<b>DATUM:</b>		<b>COORDINATES:</b> (If UTM coords provided, Zone is also required)		<b>METHOD USED:</b>			
GDA94 / MGA94 <input checked="" type="checkbox"/>		DecDegrees <input type="checkbox"/> DegMinSec <input type="checkbox"/> UTM <input checked="" type="checkbox"/>		GPS <input checked="" type="checkbox"/> Differential GPS <input type="checkbox"/> Map <input type="checkbox"/>		No. satellites: _____ Map used: _____	
AGD84 / AMG84 <input type="checkbox"/>		<b>Lat / Northing:</b> <u>7510437</u>		Boundary polygon captured: <input type="checkbox"/>		Map scale: _____	
WGS84 <input type="checkbox"/>		<b>Long / Easting:</b> <u>568917</u>					
Unknown <input type="checkbox"/>		<b>ZONE:</b> <u>50</u>					
<b>LAND TENURE:</b>							
Nature reserve <input type="checkbox"/>		Timber reserve <input type="checkbox"/>		Private property <input type="checkbox"/>		Rail reserve <input type="checkbox"/>	
National park <input type="checkbox"/>		State forest <input type="checkbox"/>		Pastoral lease <input checked="" type="checkbox"/>		MRWA road reserve <input type="checkbox"/>	
Conservation park <input type="checkbox"/>		Water reserve <input type="checkbox"/>		UCL <input type="checkbox"/> SLK/Pole _____ to _____		Shire road reserve <input type="checkbox"/>	
						Other Crown reserve <input type="checkbox"/>	
						Specify other: _____	

**AREA ASSESSMENT:** Edge survey  Partial survey  Full survey  Area observed (m<sup>2</sup>): \_\_\_\_\_

**EFFORT:** Time spent surveying (minutes): \_\_\_\_\_ No. of minutes spent / 100 m<sup>2</sup>: \_\_\_\_\_

**POP'N COUNT ACCURACY:** Actual  Extrapolation  Estimate  Count method: \_\_\_\_\_  
(Refer to field manual for list)

**WHAT COUNTED:** Plants  Clumps  Clonal stems

<b>TOTAL POP'N STRUCTURE:</b>	<b>Mature:</b>	<b>Juveniles:</b>	<b>Seedlings:</b>	<b>Totals:</b>	Area of pop (m <sup>2</sup> ): _____ Note: Pls record count as numbers (not percentages) for database.
Alive	1			1	
Dead					

**QUADRATS PRESENT:** No. \_\_\_\_\_ Size \_\_\_\_\_ Data attached  Total area of quadrats (m<sup>2</sup>): \_\_\_\_\_

**Summary Quad. Totals:** Alive \_\_\_\_\_

**REPRODUCTIVE STATE:** Clonal  Vegetative  Flowerbud  Flower   
 Immature fruit  Fruit  Dehisced fruit  Percentage in flower: \_\_\_\_\_%

**CONDITION OF PLANTS:** Healthy  Moderate  Poor  Senescent

**COMMENT:** \_\_\_\_\_

THREATS - type, agent and supporting information:	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. Specify agent where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)			
• Clearing for borrow pits	N	H	S
•	_____	_____	_____
•	_____	_____	_____

Please return completed form to **Species And Communities Branch DBCA**,  
 Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: [flora.data@dbca.wa.gov.au](mailto:flora.data@dbca.wa.gov.au)

**RECORDS:** Please forward to **Flora Administrative Officer**, Species and Communities Branch.  
 Record entered by: \_\_\_\_\_ Sheet No.: \_\_\_\_\_ Record Entered in Database



# Threatened and Priority Flora Report Form

**HABITAT INFORMATION:**

<b>LANDFORM:</b>	<b>ROCK TYPE:</b>	<b>LOOSE ROCK:</b>	<b>SOIL TYPE:</b>	<b>SOIL COLOUR:</b>	<b>DRAINAGE:</b>
Crest <input type="checkbox"/>	Granite <input type="checkbox"/>	(on soil surface; eg gravel, quartz fields)	Sand <input type="checkbox"/>	Red <input checked="" type="checkbox"/>	Well drained <input checked="" type="checkbox"/>
Hill <input type="checkbox"/>	Dolerite <input type="checkbox"/>		Sandy loam <input type="checkbox"/>	Brown <input type="checkbox"/>	Seasonally inundated <input type="checkbox"/>
Ridge <input type="checkbox"/>	Laterite <input type="checkbox"/>	0-10% <input type="checkbox"/>	Loam <input type="checkbox"/>	Yellow <input type="checkbox"/>	Permanently inundated <input type="checkbox"/>
Outcrop <input type="checkbox"/>	Ironstone <input type="checkbox"/>	10-30% <input type="checkbox"/>	Clay loam <input checked="" type="checkbox"/>	White <input type="checkbox"/>	Tidal <input type="checkbox"/>
Slope <input checked="" type="checkbox"/>	Limestone <input type="checkbox"/>	30-50% <input type="checkbox"/>	Light clay <input type="checkbox"/>	Grey <input type="checkbox"/>	
Flat <input type="checkbox"/>	Quartz <input type="checkbox"/>	50-100% <input checked="" type="checkbox"/>	Peat <input type="checkbox"/>	Black <input type="checkbox"/>	
Open depression <input type="checkbox"/>	Specify other: _____		Specify other: _____	Specify other: _____	
Drainage line <input type="checkbox"/>	Laterised ironstone stones				
Closed depression <input type="checkbox"/>					
Wetland <input type="checkbox"/>	Specific <b>Landform</b> Element: (Refer to field manual for additional values)	Undulating plain			
	Dry <input checked="" type="checkbox"/>	Moist <input type="checkbox"/>	Waterlogged <input type="checkbox"/>	Inundated <input type="checkbox"/>	

**VEGETATION CLASSIFICATION\*:**

Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia);  
2. Open shrubland (Hibbertia sp., Acacia spp.);  
3. Isolated clumps of sedges (Mesomelaena tetragona)

1. Low isolated trees of Eucalyptus leucophloia subsp. leucophloia
2. Tall shrubland of Acacia aptaneura and Acacia pruinocarpa
3. Low hummock grassland of Triodia epactia
- 4.

**ASSOCIATED SPECIES:**

Other (non-dominant) spp \_\_\_\_\_

\* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

**CONDITION OF HABITAT:** Pristine  Excellent  Very good  Good  Degraded  Completely degraded

**COMMENT:** \_\_\_\_\_

**FIRE HISTORY:** Last Fire: Season/Month: \_\_\_\_\_ Year: >5 yrs **Fire Intensity:** High  Medium  Low  No signs of fire

**FENCING:** Not required  Present  Replace / repair  Required  Length req'd: \_\_\_\_\_

**ROADSIDE MARKERS:** Not required  Present  Replace / reposition  Required  Quantity req'd: \_\_\_\_\_

**OTHER COMMENTS:** (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.) \_\_\_\_\_

Species found during a borrow pit survey for Main Roads Western Australia (Woodman Environmental Consulting job code MR18-34)

Species also recorded at a number of locations (see GIS data attached)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**DRF PERMIT/ LICENCE No:** Note if only observing plants (i.e. no specimens or plant material is taken) then no permit/licence is required. For further information on permit and licencing requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under licence/permit should be recorded above in the OTHER COMMENTS section.

**SPECIMEN:** Collectors No: \_\_\_\_\_ WA Herb.  Regional Herb.  District Herb.  Other: \_\_\_\_\_

**ATTACHED:** Map  Mudmap  Photo  GIS data  Field notes  Other: \_\_\_\_\_

**COPY SENT TO:** Regional Office  District Office  Other: \_\_\_\_\_

Submitter of Record: Alison Saligari Role: Botanist Signed: Alison Saligari Date: 22/10/2018

Please return completed form to **Species And Communities Branch DBCA,**  
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: flora.data@dbca.wa.gov.au

**RECORDS:** Please forward to **Flora Administrative Officer,** Species and Communities Branch.  
Record entered by: \_\_\_\_\_ Sheet No.: \_\_\_\_\_ Record Entered in Database



# Threatened and Priority Flora Report Form

Version 1.3 August 2017

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at <http://dpaw.wa.gov.au/> under *Standard Report Forms*

<b>TAXON:</b> <u>Goodenia nuda</u>		<b>TPFL Pop. No.:</b> _____	
<b>OBSERVATION DATE:</b> <u>25/07/2018</u>		<b>CONSERVATION STATUS:</b> <u>P4</u> New population <input type="checkbox"/>	
<b>OBSERVER/S:</b> <u>David Coultas</u>		<b>PHONE:</b> <u>(08) 9315 4688</u>	
<b>ROLE:</b> <u>Botanist</u>		<b>ORGANISATION:</b> <u>Woodman Environmental Consulting</u>	

**DESCRIPTION OF LOCATION** (Provide at least nearest town/named locality, and the distance and direction to that place):  
Ca. 26.7 km N of Tom Price, ca. 26.6 km NE of Nanutarra-Munjina Road and Nameless Valley Drive intersection, ca. 0.5 km SE of Nanutarra-Munjina Road on Hamersley Pastoral Station

<b>DBC DISTRICT:</b> <u>Pilbara Region</u>		<b>LGA:</b> <u>Ashburton</u>		<b>Reserve No.:</b> _____		Land manager present: <input type="checkbox"/>	
<b>DATUM:</b>		<b>COORDINATES:</b> (If UTM coords provided, Zone is also required)		<b>METHOD USED:</b>			
GDA94 / MGA94 <input checked="" type="checkbox"/>		DecDegrees <input type="checkbox"/> DegMinSec <input type="checkbox"/> UTM <input checked="" type="checkbox"/>		GPS <input checked="" type="checkbox"/> Differential GPS <input type="checkbox"/> Map <input type="checkbox"/>		No. satellites: _____ Map used: _____	
AGD84 / AMG84 <input type="checkbox"/>		<b>Lat / Northing:</b> <u>7516972</u>		Boundary polygon captured: <input type="checkbox"/>		Map scale: _____	
WGS84 <input type="checkbox"/>		<b>Long / Easting:</b> <u>582516</u>					
Unknown <input type="checkbox"/>		<b>ZONE:</b> <u>50</u>					
<b>LAND TENURE:</b>							
Nature reserve <input type="checkbox"/>		Timber reserve <input type="checkbox"/>		Private property <input type="checkbox"/>		Rail reserve <input type="checkbox"/>	
National park <input type="checkbox"/>		State forest <input type="checkbox"/>		Pastoral lease <input checked="" type="checkbox"/>		MRWA road reserve <input type="checkbox"/>	
Conservation park <input type="checkbox"/>		Water reserve <input type="checkbox"/>		UCL <input type="checkbox"/> SLK/Pole _____ to _____		Shire road reserve <input type="checkbox"/>	
						Other Crown reserve <input type="checkbox"/>	
						Specify other: _____	

**AREA ASSESSMENT:** Edge survey  Partial survey  Full survey  Area observed (m<sup>2</sup>): \_\_\_\_\_

**EFFORT:** Time spent surveying (minutes): \_\_\_\_\_ No. of minutes spent / 100 m<sup>2</sup>: \_\_\_\_\_

**POP'N COUNT ACCURACY:** Actual  Extrapolation  Estimate  Count method: \_\_\_\_\_  
(Refer to field manual for list)

**WHAT COUNTED:** Plants  Clumps  Clonal stems

<b>TOTAL POP'N STRUCTURE:</b>	<b>Mature:</b>	<b>Juveniles:</b>	<b>Seedlings:</b>	<b>Totals:</b>	Area of pop (m <sup>2</sup> ): _____ Note: Pls record count as numbers (not percentages) for database.
	Alive	12			
Dead					

**QUADRATS PRESENT:** No. \_\_\_\_\_ Size \_\_\_\_\_ Data attached  Total area of quadrats (m<sup>2</sup>): \_\_\_\_\_

**Summary Quad. Totals:** Alive \_\_\_\_\_

**REPRODUCTIVE STATE:** Clonal  Vegetative  Flowerbud  Flower   
 Immature fruit  Fruit  Dehisced fruit  Percentage in flower: \_\_\_\_\_%

**CONDITION OF PLANTS:** Healthy  Moderate  Poor  Senescent

**COMMENT:** \_\_\_\_\_

THREATS - type, agent and supporting information:	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. Specify agent where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)			
• Clearing for borrow pits	N	H	S
•	_____	_____	_____
•	_____	_____	_____

Please return completed form to **Species And Communities Branch DBCA**,  
 Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: [flora.data@dbca.wa.gov.au](mailto:flora.data@dbca.wa.gov.au)

**RECORDS:** Please forward to **Flora Administrative Officer**, Species and Communities Branch.  
 Record entered by: \_\_\_\_\_ Sheet No.: \_\_\_\_\_ Record Entered in Database



# Threatened and Priority Flora Report Form

## HABITAT INFORMATION:

<b>LANDFORM:</b>	<b>ROCK TYPE:</b>	<b>LOOSE ROCK:</b>	<b>SOIL TYPE:</b>	<b>SOIL COLOUR:</b>	<b>DRAINAGE:</b>
Crest <input type="checkbox"/>	Granite <input type="checkbox"/>	(on soil surface; eg gravel, quartz fields)	Sand <input type="checkbox"/>	Red <input checked="" type="checkbox"/>	Well drained <input type="checkbox"/>
Hill <input type="checkbox"/>	Dolerite <input type="checkbox"/>		Sandy loam <input type="checkbox"/>	Brown <input type="checkbox"/>	Seasonally inundated <input type="checkbox"/>
Ridge <input type="checkbox"/>	Laterite <input type="checkbox"/>	0-10% <input type="checkbox"/>	Loam <input type="checkbox"/>	Yellow <input type="checkbox"/>	Permanently inundated <input type="checkbox"/>
Outcrop <input type="checkbox"/>	Ironstone <input type="checkbox"/>	10-30% <input type="checkbox"/>	Clay loam <input checked="" type="checkbox"/>	White <input type="checkbox"/>	Tidal <input type="checkbox"/>
Slope <input type="checkbox"/>	Limestone <input type="checkbox"/>	30-50% <input type="checkbox"/>	Light clay <input type="checkbox"/>	Grey <input type="checkbox"/>	
Flat <input type="checkbox"/>	Quartz <input type="checkbox"/>	50-100% <input checked="" type="checkbox"/>	Peat <input type="checkbox"/>	Black <input type="checkbox"/>	
Open depression <input type="checkbox"/>	Specify other: _____		Specify other: _____	Specify other: _____	
Drainage line <input type="checkbox"/>					
Closed depression <input type="checkbox"/>					
Wetland <input type="checkbox"/>					

**CONDITION OF SOIL:** Dry  Moist  Waterlogged  Inundated

**VEGETATION CLASSIFICATION\*:**

Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia);  
 2. Open shrubland (Hibbertia sp., Acacia spp.);  
 3. Isolated clumps of sedges (Mesomelaena tetragona)

- Low open woodland to low isolated trees dominated by Eucalyptus leucophloia subsp. leucophloia
- Tall open to sparse shrubland dominated by Acacia aptaneura and Acacia pruinocarpa,
- Low hummock grassland dominated by Triodia wiseana
- 

**ASSOCIATED SPECIES:**

Other (non-dominant) spp \_\_\_\_\_

\* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 Australian Soil and Land Survey Field Handbook guidelines – refer to field manual for further information and structural formation table.

**CONDITION OF HABITAT:** Pristine  Excellent  Very good  Good  Degraded  Completely degraded

**COMMENT:** \_\_\_\_\_

**FIRE HISTORY:** Last Fire: Season/Month: \_\_\_\_\_ Year: \_\_\_\_\_ Fire Intensity: High  Medium  Low  No signs of fire

**FENCING:** Not required  Present  Replace / repair  Required  Length req'd: \_\_\_\_\_

**ROADSIDE MARKERS:** Not required  Present  Replace / reposition  Required  Quantity req'd: \_\_\_\_\_

**OTHER COMMENTS:** (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

Species found during a borrow pit survey for Main Roads Western Australia (Woodman Environmental Consulting job code MR18-34)

**DRF PERMIT/ LICENCE No:** Note if only observing plants (i.e. no specimens or plant material is taken) then no permit/licence is required. For further information on permit and licencing requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under licence/permit should be recorded above in the OTHER COMMENTS section.

**SPECIMEN:** Collectors No: \_\_\_\_\_ WA Herb.  Regional Herb.  District Herb.  Other: \_\_\_\_\_

**ATTACHED:** Map  Mudmap  Photo  GIS data  Field notes  Other: \_\_\_\_\_

**COPY SENT TO:** Regional Office  District Office  Other: \_\_\_\_\_

Submitter of Record: Alison Saligari Role: Botanist Signed: Alison Saligari Date: 1/11/2018

Please return completed form to **Species And Communities Branch DBCA**,  
 Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: flora.data@dbca.wa.gov.au

**RECORDS:** Please forward to **Flora Administrative Officer**, Species and Communities Branch.  
 Record entered by: \_\_\_\_\_ Sheet No.: \_\_\_\_\_ Record Entered in Database



# Threatened and Priority Flora Report Form

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at <http://dpaw.wa.gov.au/> under *Standard Report Forms*

<b>TAXON:</b> <u>Goodenia pedicellata</u>		<b>TPFL Pop. No.:</b> _____	
<b>OBSERVATION DATE:</b> <u>23/07/2018</u>		<b>CONSERVATION STATUS:</b> <u>P1</u> New population <input type="checkbox"/>	
<b>OBSERVER/S:</b> <u>David Coultas</u>		<b>PHONE:</b> <u>(08) 9315 4688</u>	
<b>ROLE:</b> <u>Botanist</u>		<b>ORGANISATION:</b> <u>Woodman Environmental Consulting</u>	

**DESCRIPTION OF LOCATION** (Provide at least nearest town/named locality, and the distance and direction to that place):  
Ca. 29 km W of Tom Price, ca. 15 km SW of Nanutarra-Munjina Road and Nameless Valley Drive intersection, ca. 0.14 km NW of Nanutarra-Munjina Road

<b>DBC DISTRICT:</b> <u>Pilbara Region</u>		<b>LGA:</b> <u>Ashburton</u>		<b>Reserve No.:</b> _____		Land manager present: <input type="checkbox"/>	
<b>DATUM:</b>		<b>COORDINATES:</b> (If UTM coords provided, Zone is also required)		<b>METHOD USED:</b>			
GDA94 / MGA94 <input checked="" type="checkbox"/>		DecDegrees <input type="checkbox"/> DegMinSec <input type="checkbox"/> UTM <input checked="" type="checkbox"/>		GPS <input checked="" type="checkbox"/>		Differential GPS <input type="checkbox"/> Map <input type="checkbox"/>	
AGD84 / AMG84 <input type="checkbox"/>		<b>Lat / Northing:</b> <u>7488037</u>		No. satellites: _____		Map used: _____	
WGS84 <input type="checkbox"/>		<b>Long / Easting:</b> <u>552687</u>		Boundary polygon captured: <input type="checkbox"/>		Map scale: _____	
Unknown <input type="checkbox"/>		<b>ZONE:</b> <u>50</u>					
<b>LAND TENURE:</b>							
Nature reserve <input type="checkbox"/>		Timber reserve <input type="checkbox"/>		Private property <input type="checkbox"/>		Rail reserve <input type="checkbox"/>	
National park <input type="checkbox"/>		State forest <input type="checkbox"/>		Pastoral lease <input type="checkbox"/>		MRWA road reserve <input type="checkbox"/>	
Conservation park <input type="checkbox"/>		Water reserve <input type="checkbox"/>		UCL <input type="checkbox"/> SLK/Pole _____ to _____		Shire road reserve <input type="checkbox"/>	
						Other Crown reserve <input checked="" type="checkbox"/>	
						Specify other: _____	

**AREA ASSESSMENT:** Edge survey     Partial survey     Full survey     Area observed (m<sup>2</sup>): \_\_\_\_\_

**EFFORT:** Time spent surveying (minutes): \_\_\_\_\_    No. of minutes spent / 100 m<sup>2</sup>: \_\_\_\_\_

**POP'N COUNT ACCURACY:** Actual     Extrapolation     Estimate     Count method: \_\_\_\_\_  
(Refer to field manual for list)

**WHAT COUNTED:** Plants     Clumps     Clonal stems

<b>TOTAL POP'N STRUCTURE:</b>	<b>Mature:</b>	<b>Juveniles:</b>	<b>Seedlings:</b>	<b>Totals:</b>	Area of pop (m <sup>2</sup> ): _____ <small>Note: Pls record count as numbers (not percentages) for database.</small>
	Alive	50			
Dead					

**QUADRATS PRESENT:** No. \_\_\_\_\_    Size \_\_\_\_\_    Data attached     Total area of quadrats (m<sup>2</sup>): \_\_\_\_\_

**Summary Quad. Totals:** Alive \_\_\_\_\_

**REPRODUCTIVE STATE:** Clonal     Vegetative     Flowerbud     Flower   
 Immature fruit     Fruit     Dehisced fruit     Percentage in flower: \_\_\_\_\_%

**CONDITION OF PLANTS:** Healthy     Moderate     Poor     Senescent

**COMMENT:** \_\_\_\_\_

THREATS - type, agent and supporting information:	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. <b>Specify agent</b> where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)			
• Clearing for borrow pits	N	H	S
•	_____	_____	_____
•	_____	_____	_____



# Threatened and Priority Flora Report Form

**HABITAT INFORMATION:**

<b>LANDFORM:</b>	<b>ROCK TYPE:</b>	<b>LOOSE ROCK:</b>	<b>SOIL TYPE:</b>	<b>SOIL COLOUR:</b>	<b>DRAINAGE:</b>
Crest <input type="checkbox"/>	Granite <input type="checkbox"/>	(on soil surface; eg gravel, quartz fields)	Sand <input type="checkbox"/>	Red <input type="checkbox"/>	Well drained <input type="checkbox"/>
Hill <input type="checkbox"/>	Dolerite <input type="checkbox"/>		Sandy loam <input type="checkbox"/>	Brown <input checked="" type="checkbox"/>	Seasonally inundated <input type="checkbox"/>
Ridge <input type="checkbox"/>	Laterite <input type="checkbox"/>	0-10% <input type="checkbox"/>	Loam <input type="checkbox"/>	Yellow <input type="checkbox"/>	Permanently inundated <input type="checkbox"/>
Outcrop <input type="checkbox"/>	Ironstone <input type="checkbox"/>	10-30% <input type="checkbox"/>	Clay loam <input checked="" type="checkbox"/>	White <input type="checkbox"/>	Tidal <input type="checkbox"/>
Slope <input type="checkbox"/>	Limestone <input type="checkbox"/>	30-50% <input type="checkbox"/>	Light clay <input type="checkbox"/>	Grey <input type="checkbox"/>	
Flat <input type="checkbox"/>	Quartz <input type="checkbox"/>	50-100% <input type="checkbox"/>	Peat <input type="checkbox"/>	Black <input type="checkbox"/>	
Open depression <input type="checkbox"/>	Specify other: _____		Specify other: _____	Specify other: _____	
Drainage line <input type="checkbox"/>	Calcrete _____				
Closed depression <input type="checkbox"/>					
Wetland <input type="checkbox"/>					
	Specific <b>Landform</b> Element: _____	Low rise			
	(Refer to field manual for additional values)				
<b>CONDITION OF SOIL:</b>	Dry <input checked="" type="checkbox"/>	Moist <input type="checkbox"/>	Waterlogged <input type="checkbox"/>	Inundated <input type="checkbox"/>	

**VEGETATION CLASSIFICATION\*:**

Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia);  
2. Open shrubland (Hibbertia sp., Acacia spp.);  
3. Isolated clumps of sedges (Mesomelaena tetragona)

1. Low isolated trees/mallees to low open woodland/mallee woodland of mixed species dominated by Eucalyptus xerothermica, Eucalyptus socialis subsp. eucentrica and Eucalyptus leucophloia subsp. leucophloia

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2. Mid sparse shrubland of mixed species dominated by Acacia bivenosa and Melaleuca eleuterostachya

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3. Low shrubland sparse shrubland of mixed species dominated by Heliotropium ovalifolium and Androcalva luteiflora

---

4. Low hummock grassland dominated by Triodia wiseana and occasionally Triodia angusta

---

**ASSOCIATED SPECIES:**

Other (non-dominant) spp \_\_\_\_\_

\* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 Australian Soil and Land Survey Field Handbook guidelines – refer to field manual for further information and structural formation table.

**CONDITION OF HABITAT:** Pristine  Excellent  Very good  Good  Degraded  Completely degraded

**COMMENT:** \_\_\_\_\_

**FIRE HISTORY:** Last Fire: Season/Month: \_\_\_\_\_ Year: >5 yrs Fire Intensity: High  Medium  Low  No signs of fire

**FENCING:** Not required  Present  Replace / repair  Required  Length req'd: \_\_\_\_\_

**ROADSIDE MARKERS:** Not required  Present  Replace / reposition  Required  Quantity req'd: \_\_\_\_\_

**OTHER COMMENTS:** (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.) \_\_\_\_\_

Species found during a borrow pit survey for Main Roads Western Australia (Woodman Environmental Consulting job code MR18-34)

Collection Number: DCMS OPP01

Species also recorded at a number of locations for this population (see GIS data attached)

---

**DRF PERMIT/ LICENCE No:** Note if only observing plants (i.e. no specimens or plant material is taken) then no permit/licence is required. For further information on permit and licencing requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under licence/permit should be recorded above in the OTHER COMMENTS section.

**SPECIMEN:** Collectors No: \_\_\_\_\_ WA Herb.  Regional Herb.  District Herb.  Other: \_\_\_\_\_

**ATTACHED:** Map  Mudmap  Photo  GIS data  Field notes  Other: \_\_\_\_\_

**COPY SENT TO:** Regional Office  District Office  Other: \_\_\_\_\_

Submitter of Record: Alison Saligari Role: Botanist Signed: Alison Saligari Date: 22/10/2018

Please return completed form to **Species And Communities Branch DBCA**,  
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: flora.data@dbca.wa.gov.au

**RECORDS:** Please forward to **Flora Administrative Officer**, Species and Communities Branch.  
Record entered by: \_\_\_\_\_ Sheet No.: \_\_\_\_\_ Record Entered in Database



# Threatened and Priority Flora Report Form

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at <http://dpaw.wa.gov.au/> under Standard Report Forms

<b>TAXON:</b> <u>Goodenia pedicellata</u>		<b>TPFL Pop. No.:</b> _____	
<b>OBSERVATION DATE:</b> <u>23/07/2018</u>		<b>CONSERVATION STATUS:</b> <u>P1</u> New population <input type="checkbox"/>	
<b>OBSERVER/S:</b> <u>David Coultas</u>		<b>PHONE:</b> <u>(08) 9315 4688</u>	
<b>ROLE:</b> <u>Botanist</u>		<b>ORGANISATION:</b> <u>Woodman Environmental Consulting</u>	

**DESCRIPTION OF LOCATION** (Provide at least nearest town/named locality, and the distance and direction to that place):  
Ca. 26.6 km WSW of Tom Price, ca. 12.9 km SW of Nanutarra-Munjina Road and Nameless Valley Drive intersection, ca. 0.02 km SE of Nanutarra-Munjina Road

<b>DBC DISTRICT:</b> <u>Pilbara Region</u>		<b>LGA:</b> <u>Ashburton</u>		<b>Reserve No.:</b> _____		Land manager present: <input type="checkbox"/>	
<b>DATUM:</b>		<b>COORDINATES:</b> (If UTM coords provided, Zone is also required)		<b>METHOD USED:</b>			
GDA94 / MGA94 <input checked="" type="checkbox"/>		DecDegrees <input type="checkbox"/> DegMinSec <input type="checkbox"/> UTM <input checked="" type="checkbox"/>		GPS <input checked="" type="checkbox"/>		Differential GPS <input type="checkbox"/> Map <input type="checkbox"/>	
AGD84 / AMG84 <input type="checkbox"/>		<b>Lat / Northing:</b> <u>7488673</u>		No. satellites: _____		Map used: _____	
WGS84 <input type="checkbox"/>		<b>Long / Easting:</b> <u>554998</u>		Boundary polygon captured: <input type="checkbox"/>		Map scale: _____	
Unknown <input type="checkbox"/>		<b>ZONE:</b> <u>50</u>					
<b>LAND TENURE:</b>							
Nature reserve <input type="checkbox"/>		Timber reserve <input type="checkbox"/>		Private property <input type="checkbox"/>		Rail reserve <input type="checkbox"/>	
National park <input type="checkbox"/>		State forest <input type="checkbox"/>		Pastoral lease <input type="checkbox"/>		MRWA road reserve <input type="checkbox"/>	
Conservation park <input type="checkbox"/>		Water reserve <input type="checkbox"/>		UCL <input type="checkbox"/> SLK/Pole _____ to _____		Shire road reserve <input type="checkbox"/>	
						Other Crown reserve <input checked="" type="checkbox"/>	
						Specify other: _____	

**AREA ASSESSMENT:** Edge survey  Partial survey  Full survey  Area observed (m<sup>2</sup>): \_\_\_\_\_

**EFFORT:** Time spent surveying (minutes): \_\_\_\_\_ No. of minutes spent / 100 m<sup>2</sup>: \_\_\_\_\_

**POP'N COUNT ACCURACY:** Actual  Extrapolation  Estimate  Count method: \_\_\_\_\_  
(Refer to field manual for list)

**WHAT COUNTED:** Plants  Clumps  Clonal stems

<b>TOTAL POP'N STRUCTURE:</b>	<b>Mature:</b>	<b>Juveniles:</b>	<b>Seedlings:</b>	<b>Totals:</b>	Area of pop (m <sup>2</sup> ): _____ Note: Pls record count as numbers (not percentages) for database.
Alive	75			75	
Dead					

**QUADRATS PRESENT:** No. \_\_\_\_\_ Size \_\_\_\_\_ Data attached  Total area of quadrats (m<sup>2</sup>): \_\_\_\_\_

**Summary Quad. Totals:** Alive \_\_\_\_\_

**REPRODUCTIVE STATE:** Clonal  Vegetative  Flowerbud  Flower   
 Immature fruit  Fruit  Dehisced fruit  Percentage in flower: \_\_\_\_\_%

**CONDITION OF PLANTS:** Healthy  Moderate  Poor  Senescent

**COMMENT:** \_\_\_\_\_

THREATS - type, agent and supporting information:	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. Specify agent where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)			
• Clearing for borrow pits	N	H	S
•	_____	_____	_____
•	_____	_____	_____

Please return completed form to **Species And Communities Branch DBCA**,  
 Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: [flora.data@dbca.wa.gov.au](mailto:flora.data@dbca.wa.gov.au)

**RECORDS:** Please forward to **Flora Administrative Officer**, Species and Communities Branch.  
 Record entered by: \_\_\_\_\_ Sheet No.: \_\_\_\_\_ Record Entered in Database



# Threatened and Priority Flora Report Form

**HABITAT INFORMATION:**

<b>LANDFORM:</b>	<b>ROCK TYPE:</b>	<b>LOOSE ROCK:</b>	<b>SOIL TYPE:</b>	<b>SOIL COLOUR:</b>	<b>DRAINAGE:</b>
Crest <input type="checkbox"/>	Granite <input type="checkbox"/>	(on soil surface; eg gravel, quartz fields)	Sand <input type="checkbox"/>	Red <input type="checkbox"/>	Well drained <input type="checkbox"/>
Hill <input type="checkbox"/>	Dolerite <input type="checkbox"/>		Sandy loam <input type="checkbox"/>	Brown <input checked="" type="checkbox"/>	Seasonally inundated <input type="checkbox"/>
Ridge <input type="checkbox"/>	Laterite <input type="checkbox"/>	0-10% <input type="checkbox"/>	Loam <input type="checkbox"/>	Yellow <input type="checkbox"/>	Permanently inundated <input type="checkbox"/>
Outcrop <input type="checkbox"/>	Ironstone <input type="checkbox"/>	10-30% <input type="checkbox"/>	Clay loam <input checked="" type="checkbox"/>	White <input type="checkbox"/>	Tidal <input type="checkbox"/>
Slope <input type="checkbox"/>	Limestone <input type="checkbox"/>	30-50% <input type="checkbox"/>	Light clay <input type="checkbox"/>	Grey <input type="checkbox"/>	
Flat <input type="checkbox"/>	Quartz <input type="checkbox"/>	50-100% <input type="checkbox"/>	Peat <input type="checkbox"/>	Black <input type="checkbox"/>	
Open depression <input type="checkbox"/>	Specify other: _____		Specify other: _____	Specify other: _____	
Drainage line <input type="checkbox"/>	Calcrete _____				
Closed depression <input type="checkbox"/>					
Wetland <input type="checkbox"/>					
	Specific <b>Landform</b> Element: _____	Low rise _____			
	(Refer to field manual for additional values)				
<b>CONDITION OF SOIL:</b>	Dry <input checked="" type="checkbox"/>	Moist <input type="checkbox"/>	Waterlogged <input type="checkbox"/>	Inundated <input type="checkbox"/>	

**VEGETATION CLASSIFICATION\*:**

Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia);  
2. Open shrubland (Hibbertia sp., Acacia spp.);  
3. Isolated clumps of sedges (Mesomelaena tetragona)

1. Low isolated trees/mallees to low open woodland/mallee woodland of mixed species dominated by Eucalyptus xerothermica, Eucalyptus socialis subsp. eucentrica and Eucalyptus leucophloia subsp. leucophloia

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2. Mid sparse shrubland of mixed species dominated by Acacia bivenosa and Melaleuca eleuterostachya

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3. Low shrubland sparse shrubland of mixed species dominated by Heliotropium ovalifolium and Androcalva luteiflora

---

4. Low hummock grassland dominated by Triodia wiseana and occasionally Triodia angusta

---

**ASSOCIATED SPECIES:** \_\_\_\_\_

Other (non-dominant) spp \_\_\_\_\_

\* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 Australian Soil and Land Survey Field Handbook guidelines – refer to field manual for further information and structural formation table.

**CONDITION OF HABITAT:** Pristine  Excellent  Very good  Good  Degraded  Completely degraded

**COMMENT:** \_\_\_\_\_

**FIRE HISTORY:** Last Fire: Season/Month: \_\_\_\_\_ Year: \_\_\_\_\_ Fire Intensity: High  Medium  Low  No signs of fire

**FENCING:** Not required  Present  Replace / repair  Required  Length req'd: \_\_\_\_\_

**ROADSIDE MARKERS:** Not required  Present  Replace / reposition  Required  Quantity req'd: \_\_\_\_\_

**OTHER COMMENTS:** (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.) \_\_\_\_\_

Species found during a borrow pit survey for Main Roads Western Australia (Woodman Environmental Consulting job code MR18-34)

Collection Number: DCMS OPP07

Species also recorded at a number of locations for this population (see GIS data attached)

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**DRF PERMIT/ LICENCE No:** \_\_\_\_\_ Note if only observing plants (i.e. no specimens or plant material is taken) then no permit/licence is required. For further information on permit and licencing requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under licence/permit should be recorded above in the OTHER COMMENTS section.

**SPECIMEN:** Collectors No: \_\_\_\_\_ WA Herb.  Regional Herb.  District Herb.  Other: \_\_\_\_\_

**ATTACHED:** Map  Mudmap  Photo  GIS data  Field notes  Other: \_\_\_\_\_

**COPY SENT TO:** Regional Office  District Office  Other: \_\_\_\_\_

Submitter of Record: Alison Saligari Role: Botanist Signed: Alison Saligari Date: 22/10/2018

Please return completed form to **Species And Communities Branch DBCA**,  
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: flora.data@dbca.wa.gov.au  
**RECORDS:** Please forward to **Flora Administrative Officer**, Species and Communities Branch.  
Record entered by: \_\_\_\_\_ Sheet No.: \_\_\_\_\_ Record Entered in Database





# Threatened and Priority Flora Report Form

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at <http://dpaw.wa.gov.au/> under Standard Report Forms

<b>TAXON:</b> Oldenlandia sp. Hamersley Station (A.A. Mitchell PRP 1479)		<b>TPFL Pop. No.:</b> _____
<b>OBSERVATION DATE:</b> 30/07/2018	<b>CONSERVATION STATUS:</b> P3	New population <input type="checkbox"/>
<b>OBSERVER/S:</b> David Coultas	<b>PHONE:</b> (08) 9315 4688	
<b>ROLE:</b> Botanist	<b>ORGANISATION:</b> Woodman Environmental Consulting	

**DESCRIPTION OF LOCATION** (Provide at least nearest town/named locality, and the distance and direction to that place):  
Ca. 24.5 km W of Tom Price, ca. 10.6 km SW of Nanutarra-Munjina Road and Nameless Valley Drive intersection, ca. 0.11 km SE of Nanutarra-Munjina Road

<b>DBC DISTRICT:</b> Pilbara Region		<b>LGA:</b> Ashburton	<b>Reserve No.:</b> _____
Land manager present: <input type="checkbox"/>			
<b>DATUM:</b>	<b>COORDINATES:</b> (If UTM coords provided, Zone is also required)	<b>METHOD USED:</b>	
GDA94 / MGA94 <input checked="" type="checkbox"/>	DecDegrees <input type="checkbox"/> DegMinSec <input type="checkbox"/> UTM <input checked="" type="checkbox"/>	GPS <input checked="" type="checkbox"/>	Differential GPS <input type="checkbox"/> Map <input type="checkbox"/>
AGD84 / AMG84 <input type="checkbox"/>	<b>Lat / Northing:</b> 7489808	No. satellites: _____	Map used: _____
WGS84 <input type="checkbox"/>	<b>Long / Easting:</b> 557126	Boundary polygon captured: <input type="checkbox"/>	Map scale: _____
Unknown <input type="checkbox"/>	<b>ZONE:</b> 50		
<b>LAND TENURE:</b>			
Nature reserve <input type="checkbox"/>	Timber reserve <input type="checkbox"/>	Private property <input type="checkbox"/>	Rail reserve <input type="checkbox"/> Shire road reserve <input type="checkbox"/>
National park <input type="checkbox"/>	State forest <input type="checkbox"/>	Pastoral lease <input type="checkbox"/>	MRWA road reserve <input type="checkbox"/> Other Crown reserve <input checked="" type="checkbox"/>
Conservation park <input type="checkbox"/>	Water reserve <input type="checkbox"/>	UCL <input type="checkbox"/> SLK/Pole _____ to _____	Specify other: _____

**AREA ASSESSMENT:** Edge survey  Partial survey  Full survey  Area observed (m<sup>2</sup>): \_\_\_\_\_

**EFFORT:** Time spent surveying (minutes): \_\_\_\_\_ No. of minutes spent / 100 m<sup>2</sup>: \_\_\_\_\_

**POP'N COUNT ACCURACY:** Actual  Extrapolation  Estimate  Count method: \_\_\_\_\_  
(Refer to field manual for list)

**WHAT COUNTED:** Plants  Clumps  Clonal stems

<b>TOTAL POP'N STRUCTURE:</b>	<b>Mature:</b>	<b>Juveniles:</b>	<b>Seedlings:</b>	<b>Totals:</b>	Area of pop (m <sup>2</sup> ): _____ Note: Pls record count as numbers (not percentages) for database.
Alive	20			20	
Dead					

**QUADRATS PRESENT:** No. \_\_\_\_\_ Size \_\_\_\_\_ Data attached  Total area of quadrats (m<sup>2</sup>): \_\_\_\_\_

**Summary Quad. Totals:** Alive \_\_\_\_\_

**REPRODUCTIVE STATE:** Clonal  Vegetative  Flowerbud  Flower   
Immature fruit  Fruit  Dehisced fruit  Percentage in flower: \_\_\_\_\_%

**CONDITION OF PLANTS:** Healthy  Moderate  Poor  Senescent

**COMMENT:** \_\_\_\_\_

THREATS - type, agent and supporting information:	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. Specify agent where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)			
• Clearing for borrow pits	N	H	S
•	_____	_____	_____
•	_____	_____	_____

Please return completed form to **Species And Communities Branch DBCA**,  
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: [flora.data@dbca.wa.gov.au](mailto:flora.data@dbca.wa.gov.au)

**RECORDS:** Please forward to **Flora Administrative Officer**, Species and Communities Branch.  
Record entered by: \_\_\_\_\_ Sheet No.: \_\_\_\_\_ Record Entered in Database



# Threatened and Priority Flora Report Form

**HABITAT INFORMATION:**

<b>LANDFORM:</b>	<b>ROCK TYPE:</b>	<b>LOOSE ROCK:</b>	<b>SOIL TYPE:</b>	<b>SOIL COLOUR:</b>	<b>DRAINAGE:</b>
Crest <input type="checkbox"/>	Granite <input type="checkbox"/>	(on soil surface; eg gravel, quartz fields)	Sand <input type="checkbox"/>	Red <input checked="" type="checkbox"/>	Well drained <input type="checkbox"/>
Hill <input type="checkbox"/>	Dolerite <input type="checkbox"/>		Sandy loam <input type="checkbox"/>	Brown <input type="checkbox"/>	Seasonally inundated <input checked="" type="checkbox"/>
Ridge <input type="checkbox"/>	Laterite <input type="checkbox"/>	0-10% <input type="checkbox"/>	Loam <input type="checkbox"/>	Yellow <input type="checkbox"/>	Permanently inundated <input type="checkbox"/>
Outcrop <input type="checkbox"/>	Ironstone <input type="checkbox"/>	10-30% <input type="checkbox"/>	Clay loam <input type="checkbox"/>	White <input type="checkbox"/>	Tidal <input type="checkbox"/>
Slope <input type="checkbox"/>	Limestone <input type="checkbox"/>	30-50% <input type="checkbox"/>	Light clay <input checked="" type="checkbox"/>	Grey <input type="checkbox"/>	
Flat <input checked="" type="checkbox"/>	Quartz <input type="checkbox"/>	50-100% <input checked="" type="checkbox"/>	Peat <input type="checkbox"/>	Black <input type="checkbox"/>	
Open depression <input type="checkbox"/>	Specify other: _____		Specify other: _____	Specify other: _____	
Drainage line <input type="checkbox"/>	Flat with cracking clay				
Closed depression <input type="checkbox"/>					
Wetland <input type="checkbox"/>	Specific <b>Landform</b> Element: _____ (Refer to field manual for additional values)				
<b>CONDITION OF SOIL:</b>	Dry <input checked="" type="checkbox"/>	Moist <input type="checkbox"/>	Waterlogged <input type="checkbox"/>	Inundated <input type="checkbox"/>	

**VEGETATION CLASSIFICATION\*:**

Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia);  
2. Open shrubland (Hibbertia sp., Acacia spp.);  
3. Isolated clumps of sedges (Mesomelaena tetragona)

1. Tall open shrubland dominated by *Acacia xiphophylla*
2. Mid to low sparse shrubland of mixed species *Eremophila cuneifolia*, *Senna artemisioides* subsp. *oligophylla* and *Rhagodia eremaea*
3. Low chenopod shrubland of mixed species including *Senna* sp. Karijini (M.E. Trudgen 10392), *Maireana triptera*, *Sclerolaena ericantha*, *Sclerolaena lanicuspis* and *Sclerolaena cuneata*
4. Open to sparse hummock grassland of mixed species including *Triodia wiseana* and *Triodia epactia*

**ASSOCIATED SPECIES:**

Other (non-dominant) spp \_\_\_\_\_

\* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

**CONDITION OF HABITAT:** Pristine  Excellent  Very good  Good  Degraded  Completely degraded

**COMMENT:** Disturbance - cattle activity and vehicle tracks

**FIRE HISTORY:** Last Fire: Season/Month: <5yrs Year: \_\_\_\_\_ **Fire Intensity:** High  Medium  Low  No signs of fire

**FENCING:** Not required  Present  Replace / repair  Required  Length req'd: \_\_\_\_\_

**ROADSIDE MARKERS:** Not required  Present  Replace / reposition  Required  Quantity req'd: \_\_\_\_\_

**OTHER COMMENTS:** (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.) \_\_\_\_\_

Species found during a borrow pit survey for Main Roads Western Australia (Woodman Environmental Consulting job code MR18-34)

Species also recorded at a number of locations (see GIS data attached)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**DRF PERMIT/ LICENCE No:** Note if only observing plants (i.e. no specimens or plant material is taken) then no permit/licence is required. For further information on permit and licencing requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under licence/permit should be recorded above in the OTHER COMMENTS section.

**SPECIMEN:** Collectors No: \_\_\_\_\_ WA Herb.  Regional Herb.  District Herb.  Other: \_\_\_\_\_

**ATTACHED:** Map  Mudmap  Photo  GIS data  Field notes  Other: \_\_\_\_\_

**COPY SENT TO:** Regional Office  District Office  Other: \_\_\_\_\_

Submitter of Record: Alison Saligari Role: Botanist Signed: Alison Saligari Date: 29/10/2018

Please return completed form to **Species And Communities Branch DBCA**,  
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: flora.data@dbca.wa.gov.au

**RECORDS:** Please forward to **Flora Administrative Officer**, Species and Communities Branch.

Record entered by: \_\_\_\_\_ Sheet No.: \_\_\_\_\_ Record Entered in Database



# Threatened and Priority Flora Report Form

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at <http://dpaw.wa.gov.au/> under *Standard Report Forms*

<b>TAXON:</b> <u>Swainsona thompsoniana</u>		<b>TPFL Pop. No.:</b> _____	
<b>OBSERVATION DATE:</b> <u>28/07/2018</u>		<b>CONSERVATION STATUS:</b> <u>P3</u> New population <input type="checkbox"/>	
<b>OBSERVER/S:</b> <u>David Coultas</u>		<b>PHONE:</b> <u>(08) 9315 4688</u>	
<b>ROLE:</b> <u>Botanist</u>		<b>ORGANISATION:</b> <u>Woodman Environmental Consulting</u>	

**DESCRIPTION OF LOCATION** (Provide at least nearest town/named locality, and the distance and direction to that place):  
Ca. 24 km NW of Tom Price, ca. 13.7 km NE of Nanutarra-Munjina Road and Nameless Valley Drive intersection, ca. 0.33 km NW of Nanutarra-Munjina Road on Hamersley Pastoral Station

<b>DBC DISTRICT:</b> <u>Pilbara Region</u>		<b>LGA:</b> <u>Ashburton</u>		<b>Reserve No.:</b> _____		Land manager present: <input type="checkbox"/>	
<b>DATUM:</b>		<b>COORDINATES:</b> (If UTM coords provided, Zone is also required)		<b>METHOD USED:</b>			
GDA94 / MGA94 <input checked="" type="checkbox"/>		DecDegrees <input type="checkbox"/> DegMinSec <input type="checkbox"/> UTM <input checked="" type="checkbox"/>		GPS <input checked="" type="checkbox"/> Differential GPS <input type="checkbox"/> Map <input type="checkbox"/>		No. satellites: _____    Map used: _____	
AGD84 / AMG84 <input type="checkbox"/>		<b>Lat / Northing:</b> <u>7510771</u>		Boundary polygon captured: <input type="checkbox"/>		Map scale: _____	
WGS84 <input type="checkbox"/>		<b>Long / Easting:</b> <u>569134</u>					
Unknown <input type="checkbox"/>		<b>ZONE:</b> <u>50</u>					
<b>LAND TENURE:</b>							
Nature reserve <input type="checkbox"/>		Timber reserve <input type="checkbox"/>		Private property <input type="checkbox"/>		Rail reserve <input type="checkbox"/>	
National park <input type="checkbox"/>		State forest <input type="checkbox"/>		Pastoral lease <input checked="" type="checkbox"/>		MRWA road reserve <input type="checkbox"/>	
Conservation park <input type="checkbox"/>		Water reserve <input type="checkbox"/>		UCL <input type="checkbox"/> SLK/Pole _____ to _____		Shire road reserve <input type="checkbox"/>	
						Other Crown reserve <input type="checkbox"/>	
						Specify other: _____	

**AREA ASSESSMENT:** Edge survey     Partial survey     Full survey     Area observed (m<sup>2</sup>): \_\_\_\_\_

**EFFORT:** Time spent surveying (minutes): \_\_\_\_\_    No. of minutes spent / 100 m<sup>2</sup>: \_\_\_\_\_

**POP'N COUNT ACCURACY:** Actual     Extrapolation     Estimate     Count method: \_\_\_\_\_  
(Refer to field manual for list)

**WHAT COUNTED:** Plants     Clumps     Clonal stems

<b>TOTAL POP'N STRUCTURE:</b>	<b>Mature:</b>	<b>Juveniles:</b>	<b>Seedlings:</b>	<b>Totals:</b>	Area of pop (m <sup>2</sup> ): _____ <small>Note: Pls record count as numbers (not percentages) for database.</small>
Alive	73			73	
Dead					

**QUADRATS PRESENT:** No. \_\_\_\_\_    Size \_\_\_\_\_    Data attached     Total area of quadrats (m<sup>2</sup>): \_\_\_\_\_

**Summary Quad. Totals:** Alive \_\_\_\_\_

**REPRODUCTIVE STATE:** Clonal     Vegetative     Flowerbud     Flower   
 Immature fruit     Fruit     Dehisced fruit     Percentage in flower: \_\_\_\_\_%

**CONDITION OF PLANTS:** Healthy     Moderate     Poor     Senescent

**COMMENT:** \_\_\_\_\_

THREATS - type, agent and supporting information:	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. <b>Specify agent</b> where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)			
• Clearing for borrow pits	N	H	S
•	_____	_____	_____
•	_____	_____	_____



# Threatened and Priority Flora Report Form

**HABITAT INFORMATION:**

<b>LANDFORM:</b>	<b>ROCK TYPE:</b>	<b>LOOSE ROCK:</b>	<b>SOIL TYPE:</b>	<b>SOIL COLOUR:</b>	<b>DRAINAGE:</b>
Crest <input type="checkbox"/>	Granite <input type="checkbox"/>	(on soil surface; eg gravel, quartz fields)	Sand <input type="checkbox"/>	Red <input checked="" type="checkbox"/>	Well drained <input type="checkbox"/>
Hill <input type="checkbox"/>	Dolerite <input type="checkbox"/>		Sandy loam <input type="checkbox"/>	Brown <input type="checkbox"/>	Seasonally inundated <input type="checkbox"/>
Ridge <input type="checkbox"/>	Laterite <input type="checkbox"/>	0-10% <input type="checkbox"/>	Loam <input type="checkbox"/>	Yellow <input type="checkbox"/>	Permanently inundated <input type="checkbox"/>
Outcrop <input type="checkbox"/>	Ironstone <input type="checkbox"/>	10-30% <input type="checkbox"/>	Clay loam <input checked="" type="checkbox"/>	White <input type="checkbox"/>	Tidal <input type="checkbox"/>
Slope <input type="checkbox"/>	Limestone <input type="checkbox"/>	30-50% <input checked="" type="checkbox"/>	Light clay <input checked="" type="checkbox"/>	Grey <input type="checkbox"/>	
Flat <input checked="" type="checkbox"/>	Quartz <input type="checkbox"/>	50-100% <input type="checkbox"/>	Peat <input type="checkbox"/>	Black <input type="checkbox"/>	
Open depression <input type="checkbox"/>	Specify other: _____		Specify other: _____	Specify other: _____	
Drainage line <input type="checkbox"/>					
Closed depression <input type="checkbox"/>					
Wetland <input type="checkbox"/>					
	Specific <b>Landform</b> Element: _____ (Refer to field manual for additional values)				
<b>CONDITION OF SOIL:</b>	Dry <input checked="" type="checkbox"/>	Moist <input type="checkbox"/>	Waterlogged <input type="checkbox"/>	Inundated <input type="checkbox"/>	

**VEGETATION CLASSIFICATION\*:**

Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia);  
2. Open shrubland (Hibbertia sp., Acacia spp.);  
3. Isolated clumps of sedges (Mesomelaena tetragona)

1. Tall open shrubland of *Acacia xiphophylla*
2. Mid sparse shrubland of *Enchylaena tomentosa* var. *tomentosa* and *Senna artemisioides* subsp. *oligophylla*
3. Low tussock grassland of *Astrebla elymoides*, *Chrysopogon fallax*, *Eriachne benthamii*
- 4.

**ASSOCIATED SPECIES:**

Other (non-dominant) spp \_\_\_\_\_

\* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

**CONDITION OF HABITAT:** Pristine  Excellent  Very good  Good  Degraded  Completely degraded

**COMMENT:** \_\_\_\_\_

**FIRE HISTORY:** Last Fire: Season/Month: \_\_\_\_\_ Year: >5 yrs Fire Intensity: High  Medium  Low  No signs of fire

**FENCING:** Not required  Present  Replace / repair  Required  Length req'd: \_\_\_\_\_

**ROADSIDE MARKERS:** Not required  Present  Replace / reposition  Required  Quantity req'd: \_\_\_\_\_

**OTHER COMMENTS:** (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.) \_\_\_\_\_

Species found during a borrow pit survey for Main Roads Western Australia (Woodman Environmental Consulting job code MR18-34)

Species also recorded at a number of locations (see GIS data attached)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**DRF PERMIT/ LICENCE No:** Note if only observing plants (i.e. no specimens or plant material is taken) then no permit/licence is required. For further information on permit and licencing requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under licence/permit should be recorded above in the OTHER COMMENTS section.

**SPECIMEN:** Collectors No: \_\_\_\_\_ WA Herb.  Regional Herb.  District Herb.  Other: \_\_\_\_\_

**ATTACHED:** Map  Mudmap  Photo  GIS data  Field notes  Other: \_\_\_\_\_

**COPY SENT TO:** Regional Office  District Office  Other: \_\_\_\_\_

Submitter of Record: Alison Saligari Role: Botanist Signed: Alison Saligari Date: 29/10/2018

Please return completed form to **Species And Communities Branch DBCA**,  
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: flora.data@dbca.wa.gov.au

**RECORDS:** Please forward to **Flora Administrative Officer**, Species and Communities Branch.  
Record entered by: \_\_\_\_\_ Sheet No.: \_\_\_\_\_ Record Entered in Database



# Threatened and Priority Flora Report Form

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at <http://dpaw.wa.gov.au/> under *Standard Report Forms*

<b>TAXON:</b> <u>Swainsona thompsoniana</u>		<b>TPFL Pop. No.:</b> _____	
<b>OBSERVATION DATE:</b> <u>28/07/2018</u>		<b>CONSERVATION STATUS:</b> <u>P3</u> New population <input type="checkbox"/>	
<b>OBSERVER/S:</b> <u>David Coultas</u>		<b>PHONE:</b> <u>(08) 9315 4688</u>	
<b>ROLE:</b> <u>Botanist</u>		<b>ORGANISATION:</b> <u>Woodman Environmental Consulting</u>	

**DESCRIPTION OF LOCATION** (Provide at least nearest town/named locality, and the distance and direction to that place):  
Ca. 24.5 km NNW of Tom Price, ca. 21.2 km NE of Nanutarra-Munjina Road and Nameless Valley Drive intersection, ca. 0.09 km SE of Nanutarra-Munjina Road on Hamersley Pastoral Station

<b>DBC DISTRICT:</b> <u>Pilbara Region</u>		<b>LGA:</b> <u>Ashburton</u>		<b>Reserve No.:</b> _____		Land manager present: <input type="checkbox"/>	
<b>DATUM:</b>		<b>COORDINATES:</b> (If UTM coords provided, Zone is also required)		<b>METHOD USED:</b>			
GDA94 / MGA94 <input checked="" type="checkbox"/>		DecDegrees <input type="checkbox"/> DegMinSec <input type="checkbox"/> UTM <input checked="" type="checkbox"/>		GPS <input checked="" type="checkbox"/>		Differential GPS <input type="checkbox"/> Map <input type="checkbox"/>	
AGD84 / AMG84 <input type="checkbox"/>		<b>Lat / Northing:</b> <u>7514283</u>		No. satellites: _____		Map used: _____	
WGS84 <input type="checkbox"/>		<b>Long / Easting:</b> <u>577449</u>		Boundary polygon captured: <input type="checkbox"/>		Map scale: _____	
Unknown <input type="checkbox"/>		<b>ZONE:</b> <u>50</u>					
<b>LAND TENURE:</b>							
Nature reserve <input type="checkbox"/>		Timber reserve <input type="checkbox"/>		Private property <input type="checkbox"/>		Rail reserve <input type="checkbox"/>	
National park <input type="checkbox"/>		State forest <input type="checkbox"/>		Pastoral lease <input checked="" type="checkbox"/>		MRWA road reserve <input type="checkbox"/>	
Conservation park <input type="checkbox"/>		Water reserve <input type="checkbox"/>		UCL <input type="checkbox"/> SLK/Pole _____ to _____		Shire road reserve <input type="checkbox"/>	
						Other Crown reserve <input type="checkbox"/>	
						Specify other: _____	

**AREA ASSESSMENT:** Edge survey     Partial survey     Full survey     Area observed (m<sup>2</sup>): \_\_\_\_\_

**EFFORT:** Time spent surveying (minutes): \_\_\_\_\_    No. of minutes spent / 100 m<sup>2</sup>: \_\_\_\_\_

**POP'N COUNT ACCURACY:** Actual     Extrapolation     Estimate     Count method: \_\_\_\_\_  
(Refer to field manual for list)

**WHAT COUNTED:** Plants     Clumps     Clonal stems

<b>TOTAL POP'N STRUCTURE:</b>	<b>Mature:</b>	<b>Juveniles:</b>	<b>Seedlings:</b>	<b>Totals:</b>	Area of pop (m <sup>2</sup> ): _____ Note: Pls record count as numbers (not percentages) for database.
Alive	20			20	
Dead					

**QUADRATS PRESENT:** No. \_\_\_\_\_    Size \_\_\_\_\_    Data attached     Total area of quadrats (m<sup>2</sup>): \_\_\_\_\_

**Summary Quad. Totals:** Alive \_\_\_\_\_

**REPRODUCTIVE STATE:** Clonal     Vegetative     Flowerbud     Flower   
 Immature fruit     Fruit     Dehisced fruit     Percentage in flower: \_\_\_\_\_%

**CONDITION OF PLANTS:** Healthy     Moderate     Poor     Senescent

**COMMENT:** \_\_\_\_\_

THREATS - type, agent and supporting information:	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. Specify agent where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)			
• Clearing for borrow pits	N	H	S
•	_____	_____	_____
•	_____	_____	_____



# Threatened and Priority Flora Report Form

**HABITAT INFORMATION:**

<b>LANDFORM:</b>	<b>ROCK TYPE:</b>	<b>LOOSE ROCK:</b>	<b>SOIL TYPE:</b>	<b>SOIL COLOUR:</b>	<b>DRAINAGE:</b>
Crest <input type="checkbox"/>	Granite <input type="checkbox"/>	(on soil surface; eg gravel, quartz fields)	Sand <input type="checkbox"/>	Red <input checked="" type="checkbox"/>	Well drained <input type="checkbox"/>
Hill <input type="checkbox"/>	Dolerite <input type="checkbox"/>		Sandy loam <input type="checkbox"/>	Brown <input type="checkbox"/>	Seasonally inundated <input type="checkbox"/>
Ridge <input type="checkbox"/>	Laterite <input type="checkbox"/>	0-10% <input type="checkbox"/>	Loam <input type="checkbox"/>	Yellow <input type="checkbox"/>	Permanently inundated <input type="checkbox"/>
Outcrop <input type="checkbox"/>	Ironstone <input type="checkbox"/>	10-30% <input type="checkbox"/>	Clay loam <input checked="" type="checkbox"/>	White <input type="checkbox"/>	Tidal <input type="checkbox"/>
Slope <input type="checkbox"/>	Limestone <input type="checkbox"/>	30-50% <input type="checkbox"/>	Light clay <input checked="" type="checkbox"/>	Grey <input type="checkbox"/>	
Flat <input checked="" type="checkbox"/>	Quartz <input type="checkbox"/>	50-100% <input checked="" type="checkbox"/>	Peat <input type="checkbox"/>	Black <input type="checkbox"/>	
Open depression <input type="checkbox"/>	Specify other: _____		Specify other: _____	Specify other: _____	
Drainage line <input type="checkbox"/>					
Closed depression <input type="checkbox"/>					
Wetland <input type="checkbox"/>					
	Specific <b>Landform</b> Element: _____ (Refer to field manual for additional values)				
<b>CONDITION OF SOIL:</b>	Dry <input checked="" type="checkbox"/>	Moist <input type="checkbox"/>	Waterlogged <input type="checkbox"/>	Inundated <input type="checkbox"/>	

**VEGETATION CLASSIFICATION\*:**

Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia);  
2. Open shrubland (Hibbertia sp., Acacia spp.);  
3. Isolated clumps of sedges (Mesomelaena tetragona)

1. Tall open shrubland of Acacia aptaneura and Acacia xiphophylla

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2. Low sparse shrubland of Eremophila cuneifolia and Maireana pyramidata

---

3. Low sparse tussock grassland of Eriachne pulchella subsp. dominii and Sporobolus australasicus

---

4. Low sparse chenopod shrubland of Sclerolaena lanicuspis and Sclerolaena eriacantha

---

**ASSOCIATED SPECIES:**

Other (non-dominant) spp \_\_\_\_\_

\* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

**CONDITION OF HABITAT:** Pristine  Excellent  Very good  Good  Degraded  Completely degraded

**COMMENT:** \_\_\_\_\_

**FIRE HISTORY:** Last Fire: Season/Month: \_\_\_\_\_ Year: >5 yrs **Fire Intensity:** High  Medium  Low  No signs of fire

**FENCING:** Not required  Present  Replace / repair  Required  Length req'd: \_\_\_\_\_

**ROADSIDE MARKERS:** Not required  Present  Replace / reposition  Required  Quantity req'd: \_\_\_\_\_

**OTHER COMMENTS:** (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.) \_\_\_\_\_

Species found during a borrow pit survey for Main Roads Western Australia (Woodman Environmental Consulting job code MR18-34)

Species also recorded at a number of locations (see GIS data attached)

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**DRF PERMIT/ LICENCE No:** Note if only observing plants (i.e. no specimens or plant material is taken) then no permit/licence is required. For further information on permit and licencing requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under licence/permit should be recorded above in the OTHER COMMENTS section.

**SPECIMEN:** Collectors No: \_\_\_\_\_ WA Herb.  Regional Herb.  District Herb.  Other: \_\_\_\_\_

**ATTACHED:** Map  Mudmap  Photo  GIS data  Field notes  Other: \_\_\_\_\_

**COPY SENT TO:** Regional Office  District Office  Other: \_\_\_\_\_

Submitter of Record: Alison Saligari Role: Botanist Signed: Alison Saligari Date: 29/10/2018

Please return completed form to **Species And Communities Branch DBCA,**  
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: flora.data@dbca.wa.gov.au

**RECORDS:** Please forward to **Flora Administrative Officer,** Species and Communities Branch.  
Record entered by: \_\_\_\_\_ Sheet No.: \_\_\_\_\_ Record Entered in Database

**Appendix L: Matrix of Vascular Plant Taxa Recorded within each Vegetation Unit Described in the Study Area**

Taxon	Vegetation Unit																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<i>Abutilon cunninghamii</i>		x		x							x							
<i>Abutilon fraseri</i> subsp. <i>fraseri</i>	x			x									x					
<i>Abutilon lepidum</i>										x			x	x			x	x
<i>Abutilon malvifolium</i>							x											
<i>Abutilon otocarpum</i>								x		x	x		x	x			x	
<i>Abutilon</i> sp. Pilbara (W.R. Barker 2025)									x				x	x			x	
<i>Acacia adoxa</i> var. <i>adoxo</i>											x	x						
<i>Acacia ancistrocarpa</i>			x	x				x			x						x	
<i>Acacia aneura</i>						x		x		x								
<i>Acacia aptaneura</i>						x	x	x	x	x	x						x	x
<i>Acacia atkinsiana</i>								x			x	x						
<i>Acacia ayersiana</i>								x		x								
<i>Acacia bivenosa</i>	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
<i>Acacia bivenosa</i> x <i>sclerosperma</i> subsp. <i>sclerosperma</i>														x				
<i>Acacia citrinoviridis</i>	x			x														
<i>Acacia cowleana</i>											x							
<i>Acacia dictyophleba</i>												x						
<i>Acacia exigua</i>								x										
<i>Acacia inaequilatera</i>															x	x	x	x
<i>Acacia kempeana</i>		x	x	x	x					x					x	x		
<i>Acacia maitlandii</i>	x	x	x	x	x					x		x						
<i>Acacia marramamba</i>					x													
<i>Acacia monticola</i>				x							x	x						x
<i>Acacia pruinocarpa</i>	x						x	x		x	x			x	x	x	x	x
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>				x														x
<i>Acacia rhodophloia</i>										x								
<i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i>								x		x				x				
<i>Acacia sibirica</i>														x				
<i>Acacia synchronicia</i>		x	x	x	x	x	x	x	x				x	x		x	x	
<i>Acacia tenuissima</i>									x		x	x					x	x
<i>Acacia tetragonophylla</i>	x	x	x			x	x	x		x						x		x
<i>Acacia trudgeniana</i>		x																
<i>Acacia tumida</i> var. <i>pilbarensis</i>											x							



Taxon	Vegetation Unit																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<i>Acacia wanyu</i>			x	x	x													
<i>Acacia xiphophylla</i>						x	x						x					
<i>Achyranthes aspera</i>																		x
<i>Acrachne racemosa</i>				x														
<i>Alternanthera denticulata</i>							x											
<i>Alternanthera nana</i>				x														
<i>Amaranthus cuspidifolius</i>										x								x
<i>Amaranthus undulatus</i>				x														
<i>Amphipogon sericeus</i>								x				x						
<i>Amyema hilliana</i>	x																	
<i>Amyema</i> sp. Fortescue (M.E. Trudgen 5358)							x		x									
<i>Androcalva luteiflora</i>	x	x		x														
<i>Anthobolus leptomerioides</i>	x					x			x	x				x	x	x		
<i>Aristida burbridgeae</i>																		x
<i>Aristida contorta</i>	x	x	x	x	x	x	x	x		x			x	x			x	x
<i>Aristida holathera</i> var. <i>holathera</i>		x									x	x					x	x
<i>Aristida inaequiglumis</i>							x			x	x					x		
<i>Aristida jerichoensis</i> var. <i>subspinulifera</i> (P3)							x											
<i>Aristida latifolia</i>							x						x					
<i>Astrebla elymoides</i>							x											
<i>Astrebla lappacea</i> (P3)							x											
<i>Astrebla pectinata</i>							x											
<i>Atriplex bunburyana</i>							x						x					
<i>Austrobryonia pilbarensis</i>							x											
<i>Bergia pedicellaris</i>							x											
* <i>Bidens bipinnata</i>	x									x							x	
<i>Boerhavia coccinea</i>							x											
<i>Bonamia erecta</i>											x							
<i>Bonamia pilbarensis</i>																		x
<i>Bothriochloa ewartiana</i>						x	x											
<i>Bulbostylis barbata</i>										x		x						x
<i>Calandrinia Ptychosperma</i>										x								
<i>Calotis hispidula</i>														x				

Taxon	Vegetation Unit																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<i>Capparis lasiantha</i>		x		x		x	x	x			x	x	x	x	x			
<i>Capparis spinosa</i> subsp. <i>nummularia</i>	x			x														
<i>Capparis umbonata</i>		x									x							
<i>Cassytha capillaris</i>		x	x					x				x						
* <i>Cenchrus ciliaris</i>	x			x		x	x		x				x	x				x
* <i>Cenchrus setiger</i>							x											
<i>Centipeda minima</i>							x											
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>						x		x	x	x			x					
<i>Chloris pectinata</i>							x						x					
<i>Chrysocephalum gilesii</i>										x								
<i>Chrysopogon fallax</i>				x			x			x			x	x		x	x	
<i>Cleome viscosa</i>				x														x
<i>Clerodendrum floribundum</i> var. <i>angustifolium</i>																		x
<i>Codonocarpus cotinifolius</i>			x	x	x			x										
<i>Convolvulus clementii</i>				x						x								
<i>Corchorus crozophorifolius</i>	x			x														
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>		x	x	x	x			x										
<i>Corchorus tectus</i>																		x
<i>Corchorus tridens</i>							x											
<i>Corymbia deserticola</i> subsp. <i>deserticola</i>											x							
<i>Corymbia hamersleyana</i>		x	x	x			x				x					x	x	x
<i>Crotalaria dissitiflora</i> subsp. <i>benthamiana</i>							x											
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>																		x
<i>Cucumis variabilis</i>	x			x							x						x	x
<i>Cullen graveolens</i>							x											
<i>Cymbopogon ambiguus</i>	x	x	x	x	x			x	x		x	x	x			x	x	x
<i>Cymbopogon obtectus</i>	x	x	x								x							
<i>Cynanchum viminalis</i> subsp. <i>australe</i>	x																	
<i>Cynodon convergens</i>							x											
<i>Cynodon prostratus</i>			x			x	x						x					
<i>Cyperus difformis</i>							x											
<i>Dampiera candidans</i>											x							
<i>Dichanthium fecundum</i>							x											

Taxon	Vegetation Unit																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<i>Dichanthium sericeum</i> subsp. <i>humilius</i>				x			x		x	x			x					
<i>Dichromochlamys dentatifolia</i>														x				
<i>Digitaria ammophila</i>										x								
<i>Digitaria brownii</i>										x								x
<i>Digitaria ctenantha</i>	x																	
<i>Dipteracanthus australasicus</i> subsp. <i>australasicus</i>				x		x	x											
<i>Dissocarpus paradoxus</i>							x											
<i>Dodonaea coriacea</i>												x						
<i>Dodonaea lanceolata</i> var. <i>lanceolata</i>		x		x							x							
<i>Dodonaea petiolaris</i>					x	x				x								
<i>Duperreya commixta</i>	x	x		x		x	x	x	x	x	x			x	x	x	x	x
<i>Dysphania rhadinostachya</i>										x	x		x					x
<i>Elytrophorus spicatus</i>							x											
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	x					x	x	x		x			x	x			x	
<i>Enneapogon caeruleus</i>	x	x	x	x	x	x	x	x		x				x	x		x	x
<i>Enneapogon lindleyanus</i>	x			x										x				
<i>Enneapogon polyphyllus</i>	x					x	x	x	x	x	x		x	x			x	x
<i>Enteropogon ramosus</i>						x	x											
<i>Eragrostis cumingii</i>										x								
<i>Eragrostis desertorum</i>	x	x		x											x			
<i>Eragrostis falcata</i>							x											
<i>Eragrostis leptocarpa</i>							x											
<i>Eragrostis pergracilis</i>										x								
<i>Eragrostis setifolia</i>							x											
<i>Eragrostis tenellula</i>							x											
<i>Eragrostis xerophila</i>							x											
<i>Eremophila cuneifolia</i>			x			x	x	x	x				x	x	x		x	x
<i>Eremophila exilifolia</i>	x																	
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>		x		x			x	x		x								x
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	x		x							x							x	x
<i>Eremophila latrobei</i> subsp. <i>filiformis</i>								x		x								
<i>Eremophila longifolia</i>		x	x	x		x	x							x		x	x	x
<i>Eremophila phyllopada</i> subsp. <i>obliqua</i>	x																	

Taxon	Vegetation Unit																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<i>Eriachne aristidea</i>																	X	X
<i>Eriachne benthamii</i>							X											
<i>Eriachne helmsii</i>						X	X	X										
<i>Eriachne mucronata</i>		X			X						X	X		X				X
<i>Eriachne pulchella</i> subsp. <i>dominii</i>					X	X	X	X		X	X	X	X		X		X	
<i>Eriachne tenuiculmis</i>			X	X														
<i>Eucalyptus gamophylla</i>								X			X							
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		X			X			X	X	X	X	X		X				X
<i>Eucalyptus socialis</i> subsp. <i>eucentrica</i>		X		X											X			
<i>Eucalyptus xerothermica</i>	X	X		X			X											
<i>Eulalia aurea</i>			X	X			X				X							
<i>Euphorbia australis</i> var. <i>subtomentosa</i>																	X	
<i>Euphorbia australis</i> var. <i>hispidula</i>										X								
<i>Euphorbia biconvexa</i>	X			X													X	
<i>Euphorbia boophthona</i>	X								X		X			X	X	X	X	X
<i>Euphorbia drummondii</i>										X								
<i>Euphorbia inappendiculata</i> var. <i>queenslandica</i> (P1)							X											
<i>Euphorbia trigonosperma</i>													X					
<i>Euphorbia vaccaria</i> var. <i>vaccaria</i>											X			X				
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	X			X			X	X		X	X		X	X			X	X
<i>Fimbristylis dichotoma</i>																		X
<i>Glycine canescens</i>				X														
<i>Gompholobium oreophilum</i>											X							
<i>Gomphrena cunninghamii</i>					X													X
<i>Gomphrena kanisii</i>						X	X							X			X	
<i>Goodenia forrestii</i>	X	X	X	X														
<i>Goodenia microptera</i>	X	X						X	X	X	X	X						X
<i>Goodenia muelleriana</i>					X	X	X	X		X	X		X	X		X	X	X
<i>Goodenia nuda</i> (P4)										X								
<i>Goodenia pasqua</i>							X											
<i>Goodenia pedicellata</i> (P1)		X																
<i>Goodenia stellata</i>											X							
<i>Goodenia stobbsiana</i>			X	X				X			X	X						X

Taxon	Vegetation Unit																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<i>Goodenia tenuiloba</i>								x		x							x	x
<i>Goodenia triodiophila</i>												x						
<i>Gossypium australe</i>				x													x	x
<i>Gossypium robinsonii</i>			x	x														x
<i>Grevillea berryana</i>	x									x								
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>																		x
<i>Grevillea wickhamii</i>											x							
<i>Hakea chordophylla</i>				x														
<i>Hakea lorea</i> subsp. <i>lorea</i>						x						x						x
<i>Haloragis gossei</i> var. <i>gossei</i>		x								x					x	x		
<i>Haloragis maierae</i>							x											
<i>Heliotropium crispatum</i>							x											
<i>Heliotropium cunninghamii</i>	x																x	
<i>Heliotropium heteranthum</i>								x		x							x	
<i>Heliotropium inexplicitum</i>																	x	x
<i>Heliotropium ovalifolium</i>	x	x	x	x														
<i>Hibiscus burtonii</i>						x		x		x	x							
<i>Hibiscus coatesii</i>			x		x			x			x	x						
<i>Hibiscus goldsworthii</i>																		x
<i>Hibiscus leptocladus</i>		x		x														
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>			x	x	x			x	x	x	x		x				x	
<i>Hibiscus sturtii</i> var. <i>platychlamys</i>											x							
<i>Hybanthus aurantiacus</i>	x				x													
<i>Indigofera georgei</i>										x								
<i>Indigofera monophylla</i>	x	x		x	x		x	x		x	x					x	x	x
<i>Iseilema dolichotrichum</i>										x			x				x	x
<i>Iseilema vaginiflorum</i>							x											
<i>Jasminum didymum</i> subsp. <i>lineare</i>	x	x		x							x	x			x	x		x
<i>Lepidium muelleri-ferdinandii</i>							x											
<i>Lepidium pedicellosum</i>		x					x											
<i>Lepidium phlebopetalum</i>							x			x				x			x	
<i>Lotus cruentus</i>							x											
<i>Lysiana casuarinae</i>	x										x							

Taxon	Vegetation Unit																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<i>Maireana eriosphaera</i>													X					
<i>Maireana georgei</i>						X											X	
<i>Maireana melanocoma</i>						X	X		X	X			X	X				
<i>Maireana planifolia</i>						X				X								
<i>Maireana pyramidata</i>						X	X						X					
<i>Maireana thesioides</i>						X												
<i>Maireana tomentosa</i> subsp. <i>tomentosa</i>							X						X					
<i>Maireana triptera</i>						X	X						X	X			X	
* <i>Malvastrum americanum</i>						X	X										X	
<i>Marsilea hirsuta</i>							X											
<i>Maytenus</i> sp. Mt Windell (S. van Leeuwen 846)											X							
<i>Melaleuca eleuterostachya</i>		X	X						X									
<i>Melhania oblongifolia</i>	X																X	X
<i>Mimulus gracilis</i>							X											
<i>Mirbelia viminalis</i>												X						
<i>Mnesithea formosa</i>																		X
<i>Neptunia dimorphantha</i>							X											
<i>Notoleptopus decaisnei</i>	X			X														
<i>Oldenlandia crouchiana</i>	X	X						X				X		X				X
<i>Operculina aequisepala</i>							X											
<i>Panicum decompositum</i>							X											
<i>Panicum laevinode</i>							X											
<i>Paraneurachne muelleri</i>	X	X	X	X	X			X			X	X		X	X	X	X	X
<i>Paspalidium basicladum</i>													X					
<i>Paspalidium clementii</i>	X		X		X					X	X						X	
<i>Paspalidium constrictum</i>						X	X											
<i>Peripleura arida</i>	X						X	X		X	X		X	X			X	
<i>Peripleura obovata</i>									X									
<i>Peripleura virgata</i>													X					
<i>Perotis rara</i>										X								
<i>Petalostylis labicheoides</i>		X		X														
<i>Phyllanthus erwinii</i>										X							X	X
<i>Phyllanthus maderaspatensis</i>	X			X			X											

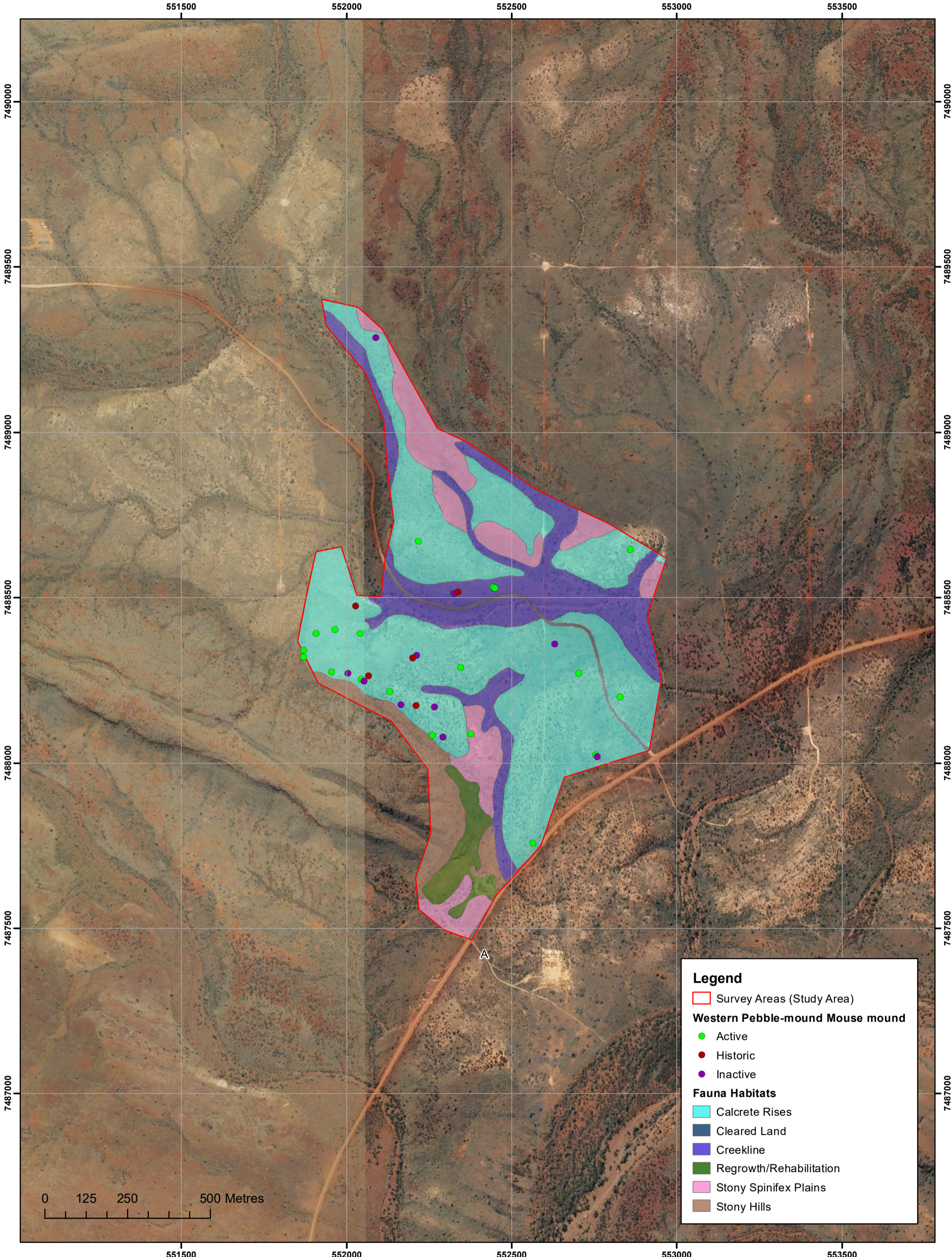
Taxon	Vegetation Unit																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<i>Pimelea holroydii</i>							x											
<i>Pluchea dentex</i>		x		x														
<i>Polycarpaea corymbosa</i>										x								x
<i>Polycarpaea holtzei</i>								x			x	x						x
<i>Polycarpaea longiflora</i>					x													
<i>Polygala glaucifolia</i>										x		x						x
<i>Polymeria ambigua</i>				x														
<i>Portulaca conspicua</i>							x											
<i>Portulaca oleracea</i>	x						x			x							x	
<i>Psydrax suaveolens</i>								x		x							x	
<i>Pterocaulon sphacelatum</i>				x			x		x	x			x	x				x
<i>Ptilotus aevroides</i>						x	x	x						x			x	x
<i>Ptilotus astrolasius</i>			x	x	x						x	x						
<i>Ptilotus auriculifolius</i>																		x
<i>Ptilotus calostachyus</i>			x		x			x			x	x						
<i>Ptilotus carinatus</i>							x			x								
<i>Ptilotus clementii</i>	x				x			x			x						x	x
<i>Ptilotus fusiformis</i>			x					x										x
<i>Ptilotus gaudichaudii</i>										x								
<i>Ptilotus gomphrenoides</i>							x											
<i>Ptilotus helipteroides</i>						x	x	x		x				x		x	x	x
<i>Ptilotus macrocephalus</i>										x								
<i>Ptilotus nobilis</i>	x		x	x	x	x	x			x	x	x	x	x			x	
<i>Ptilotus obovatus</i>	x		x	x	x	x	x			x			x	x	x			x
<i>Ptilotus roei</i>								x		x								
<i>Ptilotus rotundifolius</i>	x				x			x		x				x	x		x	x
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>						x		x		x							x	
<i>Rhagodia eremaea</i>						x	x	x		x				x			x	
<i>Rhodanthe charsleyae</i>	x																	
<i>Rhyncharrhena linearis</i>								x		x	x	x					x	
<i>Rhynchosia minima</i>				x			x										x	x
<i>Roebuckiella similis</i>										x								
<i>Rostellularia adscendens</i> var. <i>clementii</i>							x											

Taxon	Vegetation Unit																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<i>Salsola australis</i>		x				x	x							x			x	
<i>Santalum lanceolatum</i>				x			x				x							
<i>Santalum spicatum</i>	x																	
<i>Scaevola amblyanthera</i> var. <i>centralis</i>				x														
<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>											x							
<i>Scaevola spinescens</i>		x	x	x			x									x		
<i>Schenkia clementii</i>							x											
<i>Schizachyrium fragile</i>								x			x						x	x
<i>Schoenoplectiella laevis</i>							x											
<i>Sclerolaena bicornis</i> var. <i>bicornis</i>							x											
<i>Sclerolaena cornishiana</i>							x			x							x	x
<i>Sclerolaena cuneata</i>						x	x						x					
<i>Sclerolaena densiflora</i>							x	x					x	x				
<i>Sclerolaena eriacantha</i>						x	x		x				x	x			x	
<i>Sclerolaena lanicuspis</i>						x	x		x	x			x					
<i>Sclerolaena minuta</i>						x	x		x				x					
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	x		x								x						x	x
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	x	x	x	x	x		x				x		x	x	x	x	x	x
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	x		x		x	x		x	x	x	x	x	x	x	x	x	x	x
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	x		x		x	x	x	x		x			x	x	x	x	x	x
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	x				x			x				x						x
<i>Senna hamersleyensis</i>							x						x					
<i>Senna notabilis</i>							x	x			x		x	x				
<i>Senna</i> sp. Karijini (M.E. Trudgen 10392)		x				x	x											
<i>Senna stricta</i>			x			x	x	x		x			x		x			
<i>Seringia elliptica</i>											x						x	x
* <i>Setaria verticillata</i>				x														
<i>Sida ?arenicola</i>								x	x	x	x	x						
<i>Sida arsinia</i>				x														
<i>Sida echinocarpa</i>		x	x	x	x			x	x								x	x
<i>Sida fibulifera</i>			x	x		x	x			x			x	x				
<i>Sida</i> sp. dark green fruits (S. van Leeuwen 2260)						x				x								
<i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925)												x						



Taxon	Vegetation Unit																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)											X							
<i>Sida</i> sp. spiciform panicles (E. Leyland s.n. 14/8/90)	X																	
<i>Sida</i> sp. verrucose glands (F.H. Mollemans 2423)											X						X	X
<i>Sida spinosa</i>							X											
<i>Sida trichopoda</i>							X											
<i>Solanum cleistogamum</i>	X						X	X			X					X	X	X
<i>Solanum diversiflorum</i>			X															
<i>Solanum elatius</i>								X										
<i>Solanum lasiophyllum</i>	X						X	X	X	X	X			X		X	X	X
<i>Solanum phlomoides</i>	X				X												X	X
<i>Solanum piceum</i>																	X	
* <i>Sonchus oleraceus</i>							X											
<i>Spermacoce brachystema</i>										X								
<i>Sporobolus actinocladus</i>							X											
<i>Sporobolus australasicus</i>	X		X	X		X	X	X		X			X	X			X	X
<i>Sporobolus caroli</i>							X											
<i>Stackhousia muricata</i>		X																
<i>Stackhousia</i> sp. swollen gynophore (W.R. Barker 2041)											X							
<i>Stemodia grossa</i>				X						X								
<i>Stemodia kingii</i>							X											
<i>Stenopetalum anfractum</i>																	X	
<i>Streptoglossa adscendens</i>							X											
<i>Streptoglossa bubakii</i>		X					X						X				X	
<i>Streptoglossa decurrens</i>									X									
<i>Stylobasium spathulatum</i>				X														
<i>Swainsona leeana</i>							X											
<i>Swainsona maccullochiana</i>																	X	
<i>Swainsona thompsoniana</i> (P3)							X											
<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>										X								
<i>Tephrosia rosea</i> var. Fortescue creeks (M.I.H. Brooker 2186)				X														
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)					X													
<i>Themeda triandra</i>			X	X			X				X	X		X		X		X
<i>Trachymene oleracea</i>								X	X									X

Taxon	Vegetation Unit																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<i>Tragus australianus</i>														X			X	
<i>Trianthema glossostigmum</i>						X												
<i>Tribulus hirsutus</i>										X								
<i>Tribulus suberosus</i>					X					X								X
<i>Trichodesma zeylanicum</i>				X				X	X		X					X		X
<i>Trigastrotheca molluginea</i>			X	X														
<i>Triodia angusta</i>	X	X	X	X	X		X		X									
<i>Triodia brizoides</i>				X	X													X
<i>Triodia epactia</i>	X		X	X	X	X	X	X		X							X	X
<i>Triodia longiceps</i>						X	X						X					
<i>Triodia melvillei</i>						X		X										
<i>Triodia wiseana</i>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
<i>Tripogonella loliiformis</i>						X												X
<i>Triumfetta maconochieana</i>																		X
<i>Urochloa occidentalis</i> var. <i>occidentalis</i>																	X	
* <i>Vachellia farnesiana</i>				X			X											
<i>Velleia connata</i>											X							
<i>Vigna</i> sp. Hamersley Clay (A.A. Mitchell PRP 113)							X											
<i>Wahlenbergia gracilentia</i>							X											
<i>Waltheria virgata</i>																		X
<i>Zygophyllum eichleri</i>	X		X				X							X		X	X	



**Legend**

- Survey Areas (Study Area)
- Western Pebble-mound Mouse mound**
  - Active
  - Historic
  - Inactive
- Fauna Habitats**
  - Calcrete Rises
  - Cleared Land
  - Creekline
  - Regrowth/Rehabilitation
  - Stony Spinifex Plains
  - Stony Hills



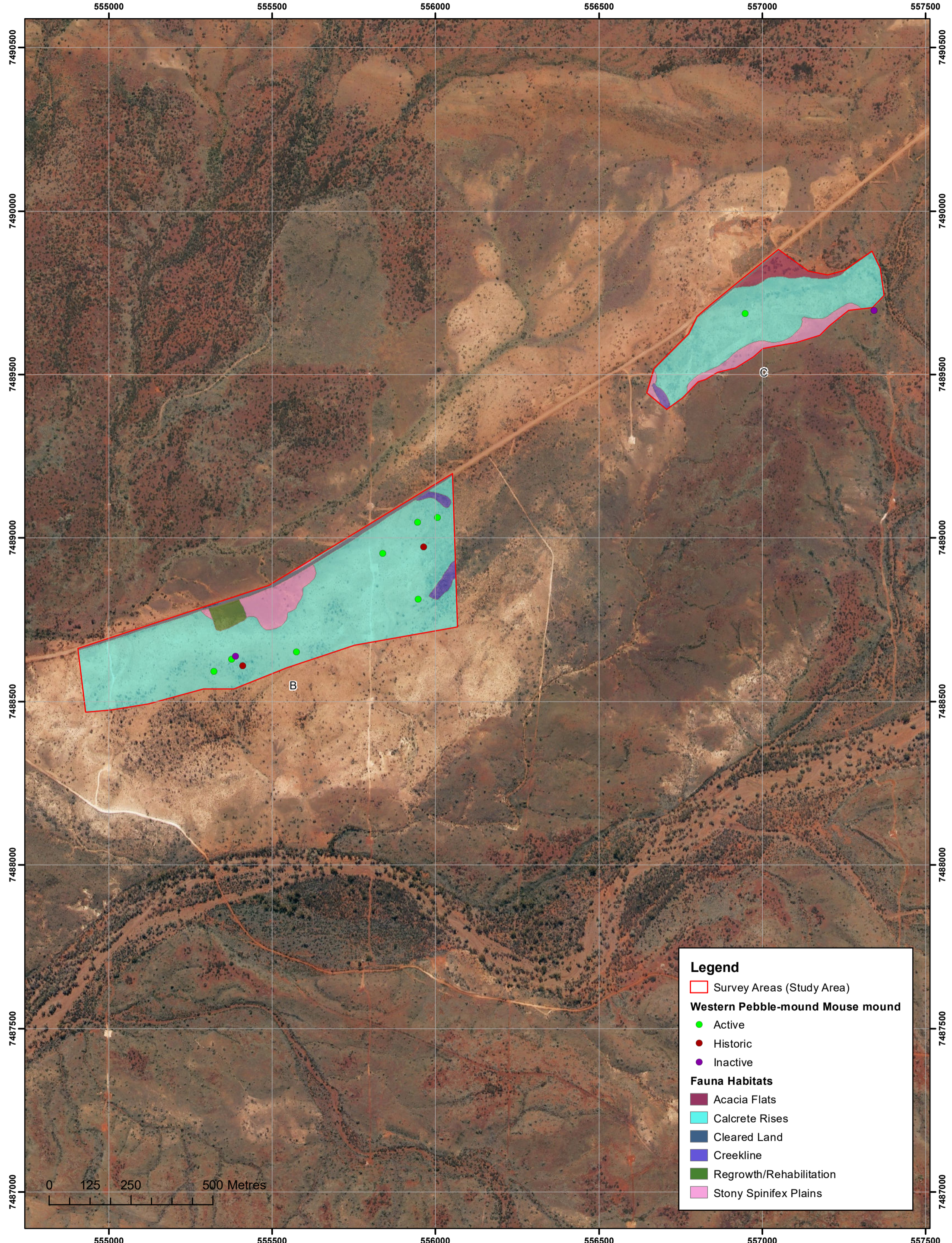
This map should only be used in conjunction with WEC report MR18-34-01.

**Fauna Habitats and  
Western Pebble-mound Mouse  
(*Pseudomys chapmani*) Mound Locations**

Revision: 0 - 21 Nov 2018      Scale: 1:10,000 (A3)

Author: David Coultas  
 WEC Ref: MR18-34-01  
 Filename: MR18-34-01-App-M.mxd  
 Projection: GDA 1994 MGA Zone 50

**Appendix  
M1**



**Legend**

- Survey Areas (Study Area)
- Western Pebble-mound Mouse mound**
- Active
- Historic
- Inactive
- Fauna Habitats**
- Acacia Flats
- Calcrete Rises
- Cleared Land
- Creepline
- Regrowth/Rehabilitation
- Stony Spinifex Plains



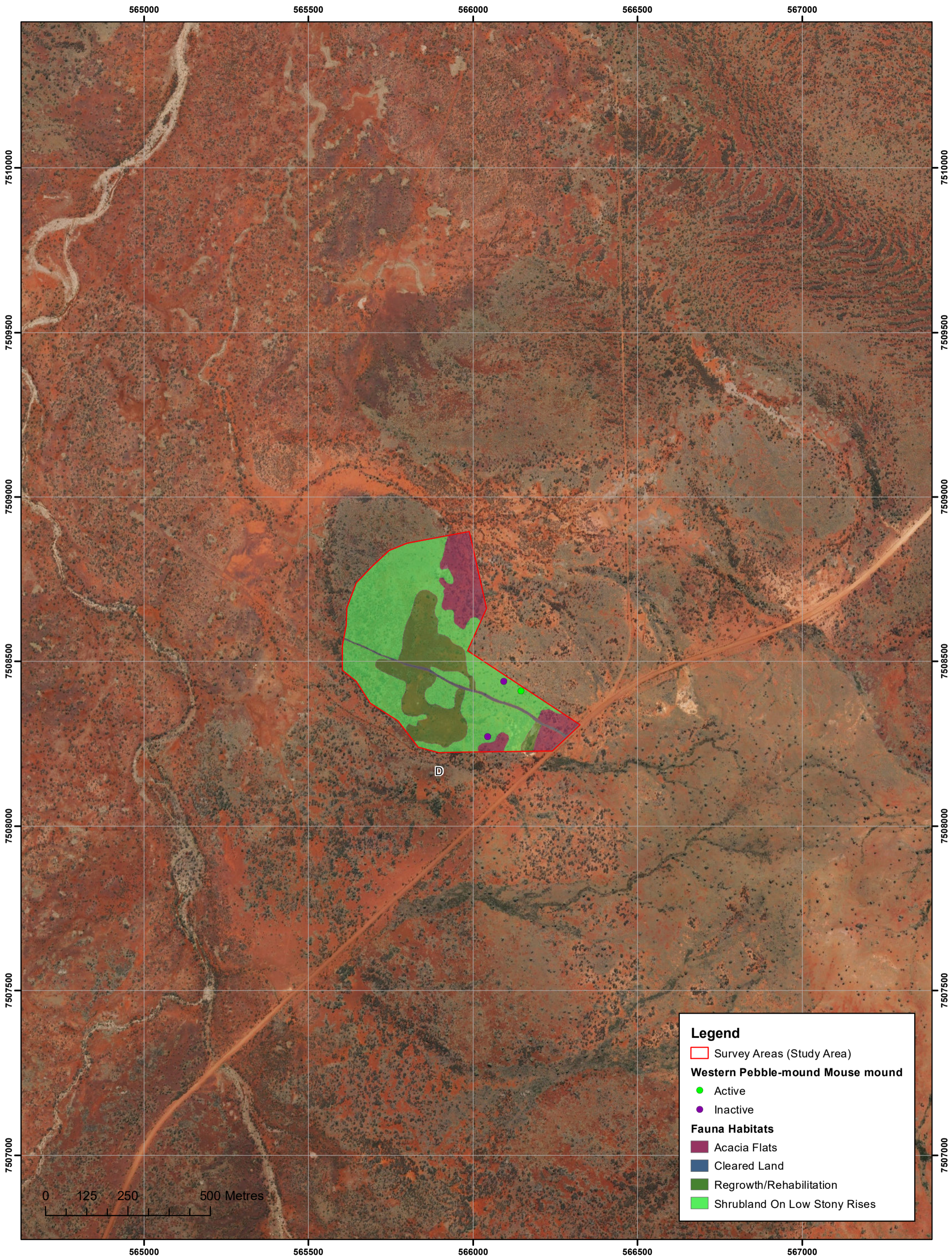
This map should only be used in conjunction with WEC report MR18-34-01.

**Fauna Habitats and  
Western Pebble-mound Mouse  
(*Pseudomys chapmani*) Mound Locations**

Revision: 0 - 21 Nov 2018      Scale: 1:10,000 (A3)

Author: David Coultas  
 WEC Ref: MR18-34-01  
 Filename: MR18-34-01-App-M.mxd  
 Projection: GDA 1994 MGA Zone 50

**Appendix  
M2**



**Legend**

- Survey Areas (Study Area)
- Western Pebble-mound Mouse mound**
- Active
- Inactive
- Fauna Habitats**
- Acacia Flats
- Cleared Land
- Regrowth/Rehabilitation
- Shrubland On Low Stony Rises



This map should only be used in conjunction with WEC report MR18-34-01.

**Fauna Habitats and  
Western Pebble-mound Mouse  
(*Pseudomys chapmani*) Mound Locations**

Revision: 0 - 21 Nov 2018      Scale: 1:10,000 (A3)

Author: David Coultas  
 WEC Ref: MR18-34-01  
 Filename: MR18-34-01-App-M.mxd  
 Projection: GDA 1994 MGA Zone 50

**Appendix  
M3**



**Legend**

- Survey Areas (Study Area)

**Fauna Habitats**

- Acacia Flats
- Cleared Land
- Regrowth/Rehabilitation
- Shrubland On Low Stony Rises



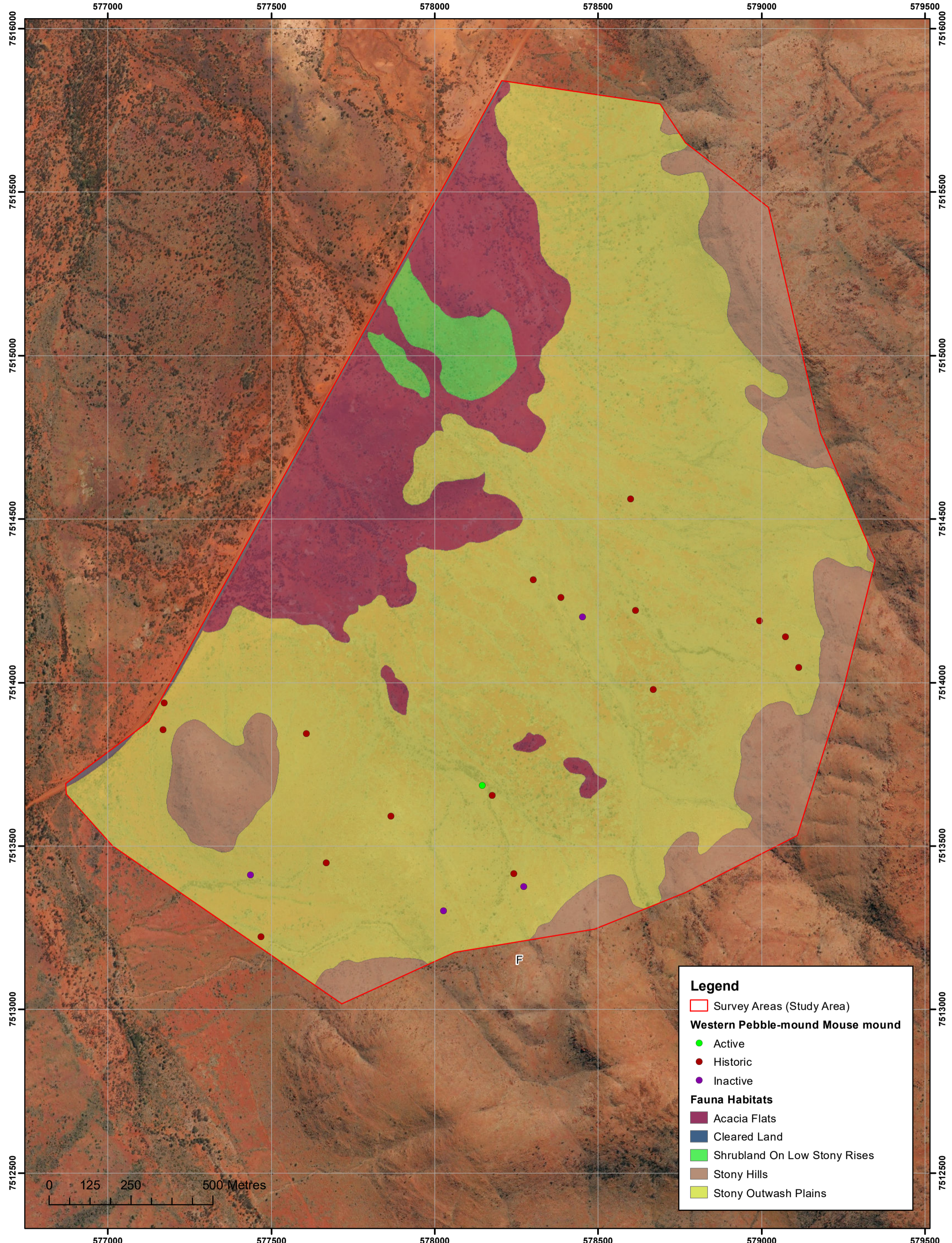
This map should only be used in conjunction with WEC report MR18-34-01.

**Fauna Habitats and  
Western Pebble-mound Mouse  
(*Pseudomys chapmani*) Mound Locations**

Revision: 0 - 21 Nov 2018      Scale: 1:10,000 (A3)

Author: David Coultas  
 WEC Ref: MR18-34-01  
 Filename: MR18-34-01-App-M.mxd  
 Projection: GDA 1994 MGA Zone 50

**Appendix**  
  
**M4**



**Legend**

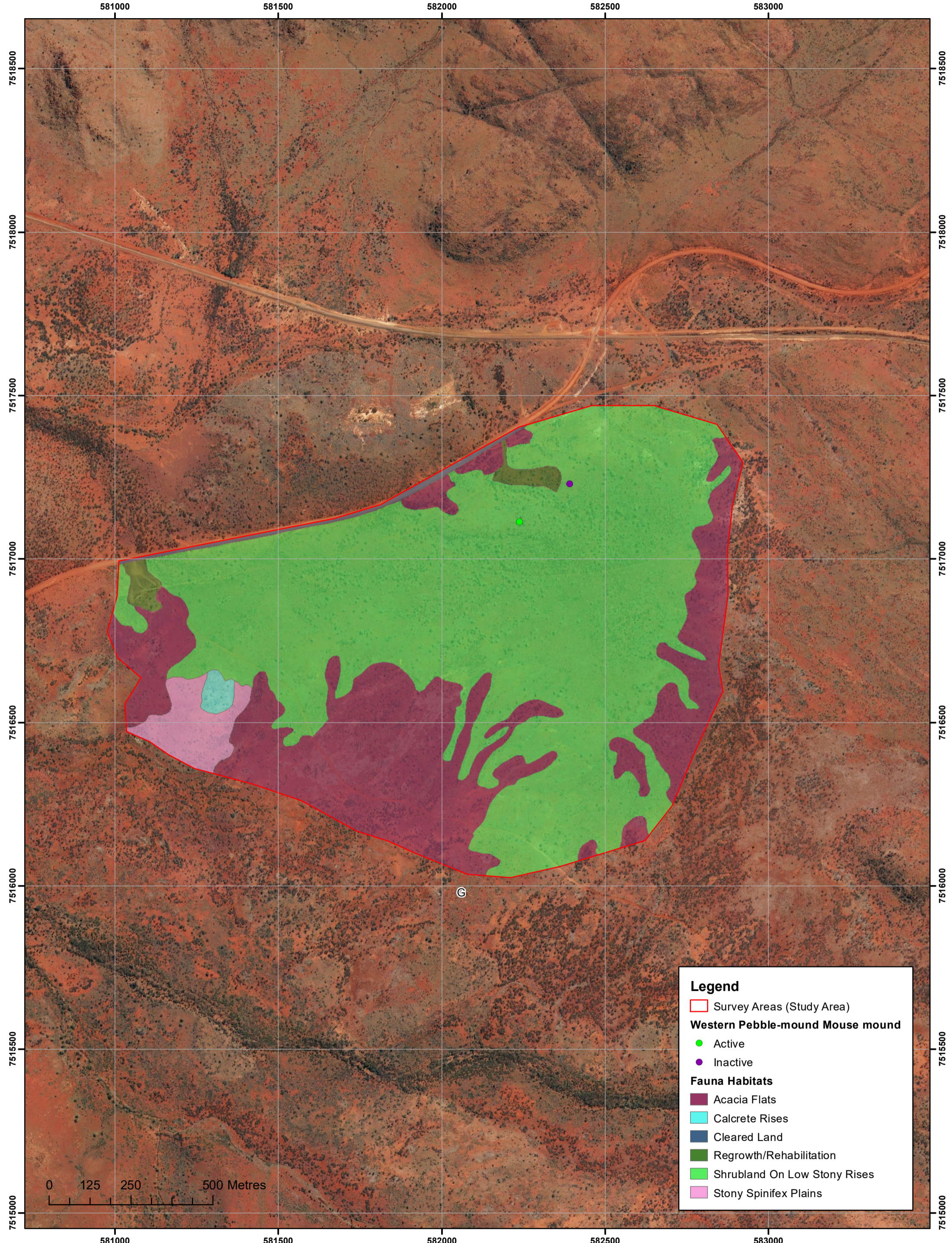
- Survey Areas (Study Area)

**Western Pebble-mound Mouse mound**

- Active
- Historic
- Inactive

**Fauna Habitats**

- Acacia Flats
- Cleared Land
- Shrubland On Low Stony Rises
- Stony Hills
- Stony Outwash Plains



**Legend**

- Survey Areas (Study Area)
- Western Pebble-mound Mouse mound**
- Active
- Inactive
- Fauna Habitats**
- Acacia Flats
- Calcrete Rises
- Cleared Land
- Regrowth/Rehabilitation
- Shrubland On Low Stony Rises
- Stony Spinifex Plains



This map should only be used in conjunction with WEC report MR18-34-01.

**Fauna Habitats and  
Western Pebble-mound Mouse  
(*Pseudomys chapmani*) Mound Locations**

Revision: 0 - 21 Nov 2018      Scale: 1:10,000 (A3)

Author: David Coultas  
 WEC Ref: MR18-34-01  
 Filename: MR18-34-01-App-M.mxd  
 Projection: GDA 1994 MGA Zone 50

**Appendix  
M6**





**Legend**

- Survey Areas (Study Area)

**Fauna Habitats**

- Cleared Land
- Shrubland On Low Stony Rises
- Stony Hills



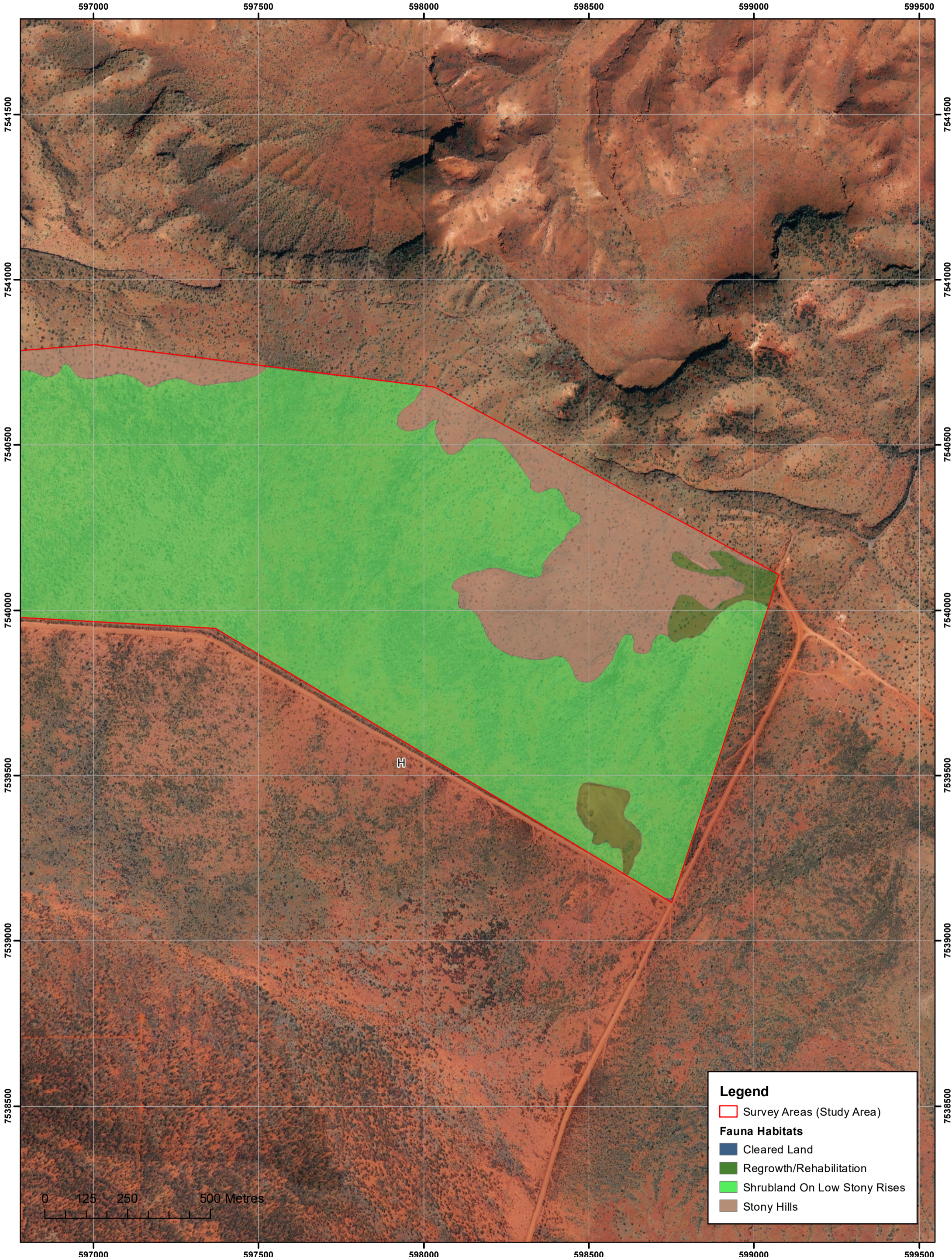
This map should only be used in conjunction with WEC report MR18-34-01.

**Fauna Habitats and  
Western Pebble-mound Mouse  
(*Pseudomys chapmani*) Mound Locations**

Revision: 0 - 21 Nov 2018      Scale: 1:10,000 (A3)

Author: David Coultas  
 WEC Ref: MR18-34-01  
 Filename: MR18-34-01-App-M.mxd  
 Projection: GDA 1994 MGA Zone 50

**Appendix  
M7**



**Legend**

- Survey Areas (Study Area)

**Fauna Habitats**

- Cleared Land
- Regrowth/Rehabilitation
- Shrubland On Low Stony Rises
- Stony Hills



This map should only be used in conjunction with WEC report MR18-34-01.

**Fauna Habitats and  
Western Pebble-mound Mouse  
(*Pseudomys chapmani*) Mound Locations**

Revision: 0 - 21 Nov 2018      Scale: 1:10,000 (A3)

Author: David Coultas  
 WEC Ref: MR18-34-01  
 Filename: MR18-34-01-App-M.mxd  
 Projection: GDA 1994 MGA Zone 50

**Appendix  
M8**

## **Appendix N: Vertebrate Fauna That Potentially Occur in the Study Area**

**Key to Status:** Int. = Introduced. P1 - 4 = Priority 1 - 4, S1 - 7 = Schedule 1 - 7, En = Endangered, Vu = Vulnerable, Mi = Migratory, LS = locally significant.

SPECIES GROUP, Family and Species	Common Name	Status	Recorded May 2018	NatureMap (A, B & C)	NatureMap (D & E)	NatureMap (F & G)	NatureMap (H)	DBCA Threat. & Priority DB	EPBC Act PMST
<b>FROGS</b>									
<b>Pelodyadidae</b>									
<i>Cyclorana maini</i>	Sheep Frog			+	+	+	+		
<i>Cyclorana platycephala</i>	Water-holding Frog			+	+	+			
<i>Litoria rubella</i>	Little Red Tree Frog			+	+	+			
<b>Limnodynastidae</b>									
<i>Platyplectrum spenceri</i>	Centralian Burrowing Frog			+	+	+			
<i>Notaden nicholli</i>	Desert Spadefoot			+	+	+			
<b>Myobatrachidae</b>									
<i>Pseudophryne douglasi</i>	Gorge Toadlet			+	+		+		
<i>Uperoleia russelli</i>	Russell's Toadlet				+	+	+		
<i>Uperoleia saxatilis</i>	Pilbara Toadlet			+	+	+	+		
<b>REPTILES</b>									
<b>Cheluidae</b>									
<i>Chelodina steindachneri</i>	Flat-shelled Turtle			+	+	+	+		
<b>Carphodactylidae</b>									
<i>Nephurus wheeleri</i>	Banded Knob-tailed Gecko			+	+	+	+		
<i>Underwoodisaurus seorus</i>	Pilbara Barking Gecko	<b>P2</b>			+	+	+	+	
<b>Diplodactylidae</b>									
<i>Crenadactylus pilbarensis</i>	Pilbara Clawless Gecko			+	+	+	+		
<i>Diplodactylus conspicillatus</i>	Fat-tailed Gecko			+	+	+	+		
<i>Diplodactylus galaxias</i>	Northern Pilbara Beak-faced Gecko						+		
<i>Diplodactylus mitchelli</i>							+		
<i>Diplodactylus pulcher</i>					+	+	+		
<i>Diplodactylus savagei</i>	Southern Pilbara Beak-faced Gecko			+	+	+	+		
<i>Lucasium stenodactylum</i>				+	+	+	+		
<i>Lucasium wombeyi</i>				+	+	+	+		
<i>Oedura fimbria</i>	Western Marbled Velvet Gecko			+	+	+	+		
<i>Rhynchoedura ornata</i>	Western Beaked Gecko			+	+	+	+		
<i>Strophurus elderi</i>	Jewelled Gecko			+	+	+	+		
<i>Strophurus jeanae</i>							+		
<i>Strophurus strophurus</i>					+	+	+		
<i>Strophurus wellingtonae</i>				+	+	+	+		
<b>Gekkonidae</b>									
<i>Gehyra pilbara</i>				+	+	+	+		
<i>Gehyra punctata</i>			+	+	+	+	+		
<i>Gehyra variegata</i>				+	+	+	+		
<i>Heteronotia binoei</i>	Bynoe's Gecko			+	+	+	+		
<i>Heteronotia spelea</i>	Pilbara Cave Gecko			+	+	+	+		
<b>Pygopodidae</b>									
<i>Delma butleri</i>					+	+	+		

SPECIES GROUP, Family and Species	Common Name	Status	Recorded May 2018	NatureMap (A, B & C)	NatureMap (D & E)	NatureMap (F & G)	NatureMap (H)	DBCA Threat. & Priority DB	EPBC Act PMIST
<i>Delma elegans</i>				+	+	+	+		
<i>Delma nasuta</i>				+	+	+	+		
<i>Delma pax</i>				+	+	+	+		
<i>Delma tincta</i>				+	+	+	+		
<i>Lialis burtonis</i>	Burton's Legless Lizard			+	+	+	+		
<i>Pygopus nigriceps</i>				+	+	+	+		
<b>Agamidae</b>									
<i>Gowidon longirostris</i>	Long-nosed Dragon			+	+	+	+		
<i>Ctenophorus caudicinctus</i>	Western Ring-tailed Dragon		+	+	+	+	+		
<i>Ctenophorus isolepis</i>	Military Dragon			+	+	+	+		
<i>Ctenophorus nuchalis</i>	Central Netted Dragon			+	+	+	+		
<i>Ctenophorus reticulatus</i>	Western Netted Dragon			+	+	+	+		
<i>Diporiphora</i>	Mulga Dragon			+	+	+	+		
<i>amphiboluroides</i>				+	+	+	+		
<i>Diporiphora valens</i>	Southern Pilbara Tree Dragon			+	+	+	+		
<i>Pogona minor</i>	Dwarf Bearded Dragon			+	+	+	+		
<i>Tympanocryptis cephalus</i>	Pebble Dragon				+	+			
<b>Scincidae</b>									
<i>Carlia munda</i>	Shaded-litter Rainbow Skink			+	+	+	+		
<i>Carlia triacantha</i>	Desert Rainbow Skink			+	+	+	+		
<i>Cryptoblepharus buchananii</i>				+	+	+	+		
<i>Cryptoblepharus ustulatus</i>				+	+	+	+		
<i>Ctenotus duricola</i>				+	+	+	+		
<i>Ctenotus grandis</i>				+	+	+	+		
<i>Ctenotus hanloni</i>					+	+	+		
<i>Ctenotus helenae</i>				+	+	+	+		
<i>Ctenotus leonhardii</i>				+	+	+	+		
<i>Ctenotus nigrilineatus</i>	Black-lined Ctenotus	P1		+	+	+		+	
<i>Ctenotus pantherinus</i>	Leopard Ctenotus			+	+	+	+		
<i>Ctenotus robustus</i>				+	+	+	+		
<i>Ctenotus rubicundus</i>				+	+	+	+		
<i>Ctenotus rutilans</i>				+	+	+	+		
<i>Ctenotus saxatilis</i>	Rock Ctenotus			+	+	+	+		
<i>Ctenotus schomburgkii</i>				+	+	+	+		
<i>Ctenotus serventyi</i>					+	+	+		
<i>Ctenotus severus</i>					+	+	+		
<i>Ctenotus uber uber</i>	Spotted Ctenotus	P2		+		+	+		
<i>Ctenotus uber johnstonei</i>	Spotted Ctenotus						+	+	
<i>Cyclodomorphus melanops</i>	Slender Blue-tongue			+	+	+	+		
<i>Egernia cygnitis</i>	West Pilbara Spiny-tailed Skink			+	+	+	+		
<i>Egernia formosa</i>				+	+	+	+		
<i>Eremiascincus pallidus</i>	Western Narrow-banded Sand Swimmer					+	+		
<i>Eremiascincus richardsonii</i>	Broad-banded Sand Swimmer			+	+	+	+		

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<i>Lerista flammicauda</i>	Dwarf Skink	P4		+	+	+	+				
<i>Lerista jacksoni</i>			+	+	+	+					
<i>Lerista muelleri</i>			+	+	+	+					
<i>Lerista timida</i>							+				
<i>Lerista verhmens</i>			+	+	+	+					
<i>Lerista zietzi</i>			+	+	+	+					
<i>Menetia greyii</i>			+	+	+	+					
<i>Menetia surda</i>			+	+	+	+					
<i>Morethia ruficauda</i>			Lined Soil-crevice Skink	P4		+	+	+	+	+	
<i>Notoscincus butleri</i>					+	+	+	+	+		
<i>Notoscincus ornatus</i>				+	+	+	+				
<i>Proablepharus reginae</i>	Central Blue-tongue			+	+	+	+				
<i>Tiliqua multifasciata</i>			+	+	+	+					
<b>Varanidae</b>											
<i>Varanus acanthurus</i>	Spiny-tailed Monitor			+	+	+	+				
<i>Varanus brevicauda</i>	Short-tailed Pygmy Monitor			+	+	+	+				
<i>Varanus bushi</i>	Pilbara Mulga Monitor			+	+	+	+				
<i>Varanus caudolineatus</i>	Stripe-tailed Monitor			+	+	+	+				
<i>Varanus eremius</i>	Pygmy Desert Monitor			+	+	+	+				
<i>Varanus giganteus</i>	Perentie			+	+						
<i>Varanus gilleni</i>						+	+				
<i>Varanus gouldii</i>	Bungarra or Sand Monitor			+	+	+	+				
<i>Varanus panoptes</i>	Yellow-spotted Monitor			+	+	+	+				
<i>Varanus pilbarensis</i>	Pilbara Rock Monitor			+	+	+	+				
<i>Varanus tristis</i>	Racehorse Monitor			+	+	+	+				
<b>Typhlopidae</b>											
<i>Anilius ammodytes</i>	Sand-diving Blind Snake	P1		+	+	+	+				
<i>Anilius ganei</i>	Gane's blind snake (Pilbara)				+	+	+				
<i>Anilius grypus</i>	Beaked Blind Snake				+	+	+				
<i>Anilius hamatus</i>					+	+	+				
<i>Anilius pilbarensis</i>	Pilbara Blind Snake				+	+	+				
<b>Pythonidae</b>											
<i>Antaresia perthensis</i>	Pygmy Python	Vu, S3		+	+	+	+				
<i>Antaresia stimsoni</i>	Stimson's Python				+	+	+				
<i>Aspidites melanocephalus</i>	Black-headed Python				+	+	+				
<i>Liasis olivaceus barroni</i>	Pilbara Olive Python				+	+	+	+	+	+	
<b>Elapidae</b>											
<i>Acanthophis wellsi</i>	Pilbara Death Adder			+	+	+	+				
<i>Brachyuropis approximans</i>	North-west Shovel-nosed Snake			+	+	+	+				
<i>Demansia psammophis</i>	Yellow-faced Whipsnake			+	+	+	+				
<i>Demansia rufescens</i>	Rufous Whipsnake			+	+	+	+				
<i>Furina ornata</i>	Moon Snake			+	+	+	+				
<i>Parasuta monachus</i>	Monk Snake			+	+	+	+				
<i>Pseudechis australis</i>	Mulga Snake			+	+	+	+				

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<i>Pseudonaja mengdeni</i>	Western Brown Snake			+	+	+	+		
<i>Pseudonaja modesta</i>	Ringed Brown Snake			+	+	+	+		
<i>Suta fasciata</i>	Rosen's Snake			+	+	+	+		
<i>Suta punctata</i>	Spotted Snake			+	+	+	+		
<i>Vermicella snelli</i>	Pilbara Bandy-bandy			+	+	+	+		
<b>BIRDS</b>									
<b>Dromaiidae</b>									
<i>Dromaius novaehollandiae</i>	Emu			+	+	+	+		
<b>Phasianidae</b>									
<i>Coturnix pectoralis</i>	Stubble Quail				+	+	+		
<i>Coturnix ypsilophora</i>	Brown Quail			+	+	+	+		
<b>Accipitridae</b>									
<i>Elanus caeruleus</i>	Black-shouldered Kite				+	+	+		
<i>Hamirostra isura</i>	Square-tailed Kite				+	+	+		
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard				+				
<i>Hieraaetus morphnoides</i>	Little Eagle				+	+	+		
<i>Aquila audax</i>	Wedge-tailed Eagle		+		+	+	+		
<i>Accipiter fasciatus</i>	Brown Goshawk				+	+	+		
<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk		+		+	+	+		
<i>Circus assimilis</i>	Spotted Harrier		+		+	+	+		
<i>Milvus migrans</i>	Black Kite				+	+	+		
<i>Haliastur sphenurus</i>	Whistling Kite		+		+	+	+		
<b>Otididae</b>									
<i>Ardeotis australis</i>	Australian Bustard				+	+	+		
<b>Turnicidae</b>									
<i>Turnix velox</i>	Little Button-quail		+		+	+	+		
<b>Burhinidae</b>									
<i>Burhinus grallarius</i>	Bush Stone-curlew				+	+	+		
<b>Charadriidae</b>									
<i>Charadrius veredus</i>	Oriental Plover	Mi, S5							+
<b>Columbidae</b>									
<i>Phaps chalcoptera</i>	Common Bronzewing		+		+	+	+		
<i>Ocyphaps lophotes</i>	Crested Pigeon		+		+	+	+		
<i>Geophaps plumifera</i>	Spinifex Pigeon				+	+	+		
<i>Geopelia cuneata</i>	Diamond Dove		+		+	+	+		
<i>Geopelia striata</i>	Peaceful Dove				+	+	+		
<b>Cuculidae</b>									
<i>Centropus phasianinus</i>	Pheasant Coucal				+	+	+		
<i>Chrysococcyx basalis</i>	Horsfield's Bronze Cuckoo					+	+		
<i>Chrysococcyx osculans</i>	Black-eared Cuckoo					+	+		
<i>Cacomantis pallidus</i>	Pallid Cuckoo				+	+	+		
<b>Tytonidae</b>									
<i>Tyto alba</i>	Barn Owl						+	+	

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<b>Strigidae</b>									
<i>Ninox connivens</i>	Barking Owl			+			+	+	
<i>Ninox boobook</i>	Boobook Owl			+	+		+	+	
<b>Podargidae</b>									
<i>Podargus strigoides</i>	Tawny Frogmouth			+	+		+	+	
<b>Caprimulgidae</b>									
<i>Eurostopodus argus</i>	Spotted Nightjar			+	+		+	+	
<b>Aegothelidae</b>									
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar		+	+	+		+	+	
<b>Apodidae</b>									
<i>Apus pacificus</i>	Fork-tailed Swift	Mi, S5				+	+	+	+
<b>Alcedinidae</b>									
<i>Dacelo leachii</i>	Blue-winged Kookaburra					+	+	+	+
<i>Todiramphus sanctus</i>	Sacred Kingfisher					+	+	+	+
<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher		+	+		+	+	+	
<b>Meropidae</b>									
<i>Merops ornatus</i>	Rainbow Bee-eater		+	+		+	+	+	
<b>Falconidae</b>									
<i>Falco cenchroides</i>	Australian Kestrel		+	+		+	+	+	
<i>Falco longipennis</i>	Australian Hobby		+	+		+	+	+	
<i>Falco berigora</i>	Brown Falcon		+	+		+	+	+	
<i>Falco hypoleucos</i>	Grey Falcon	S3					+	+	
<i>Falco subniger</i>	Black Falcon								
<i>Falco peregrinus</i>	Peregrine Falcon	S7		+	+		+	+	
<b>Cacatuidae</b>									
<i>Cacatua roseicapilla</i>	Galah		+	+		+	+	+	
<i>Cacatua sanguinea</i>	Little Corella			+		+	+	+	
<i>Nymphicus hollandicus</i>	Cockatiel		+	+		+	+	+	
<b>Psittacidae</b>									
<i>Platycercus zonarius</i>	Australian Ringneck		+	+		+	+	+	
<i>Platycercus varius</i>	Mulga Parrot			+		+			
<i>Neophema bourkii</i>	Bourke's Parrot			+		+	+	+	
<i>Melopsittacus undulatus</i>	Budgerigar			+		+	+	+	
<i>Pezoporus occidentalis</i>	Night Parrot	En, S1							+
<b>Ptilonorhynchidae</b>									
<i>Ptilonorhynchus maculatus</i>	Western Bowerbird			+		+	+	+	
<b>Climacteridae</b>									
<i>Climacteris melanurus</i>	Black-tailed Treecreeper			+		+	+	+	
<b>Maluridae</b>									
<i>Malurus lamberti</i>	Variiegated Fairy-wren		+	+		+	+	+	
<i>Malurus leucopterus</i>	White-winged Fairy-wren		+	+		+	+	+	
<i>Stipiturus ruficeps</i>	Rufous-crowned Emu-wren	LS	+	+		+	+	+	
<i>Amytornis striatus</i>	Striated Grasswren	LS	+	+		+	+	+	

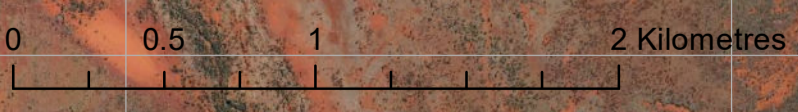
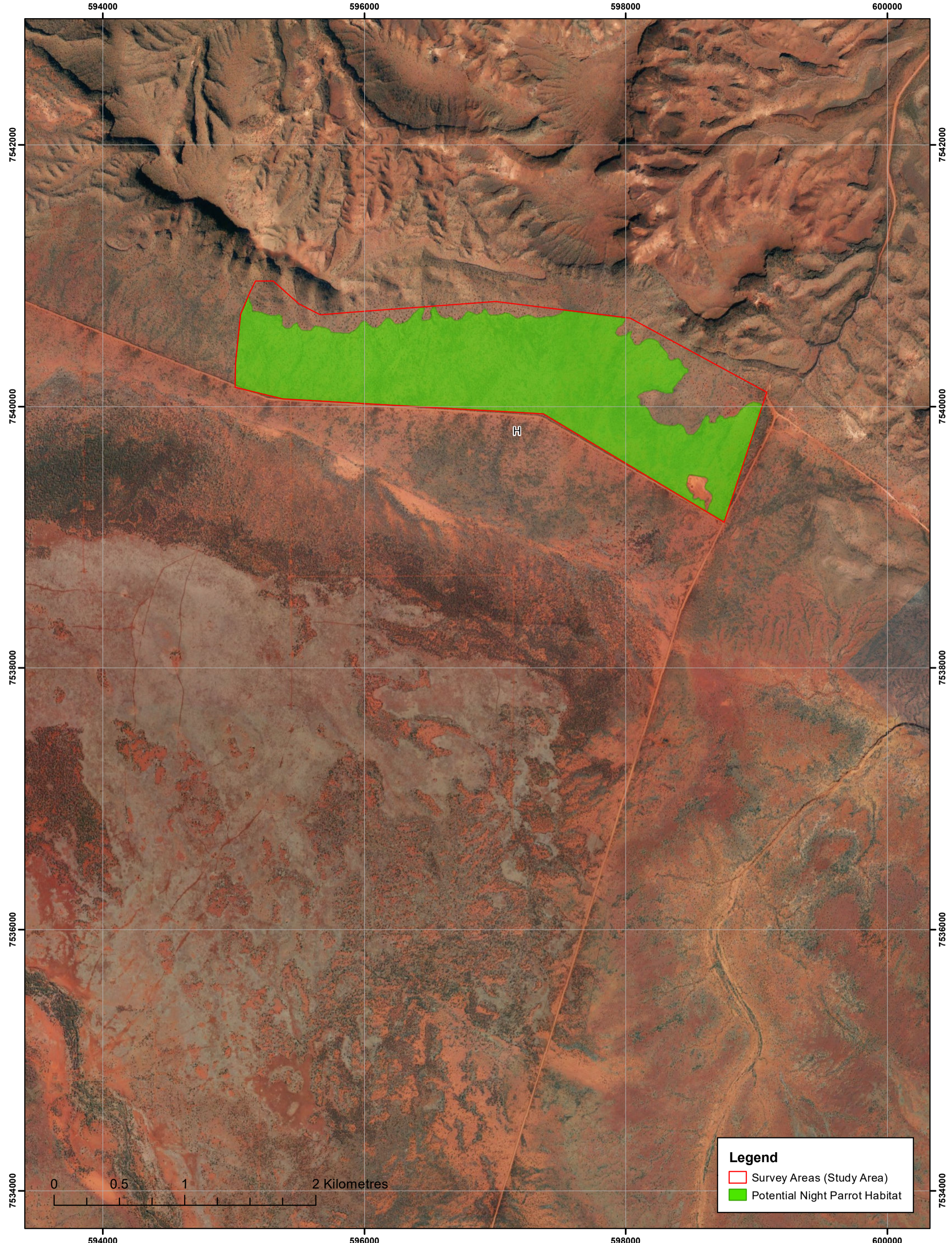


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<b>Meliphagidae</b>										
<i>Sugomel niger</i>	Black Honeyeater	LS		+	+	+	+			
<i>Certhionyx variegatus</i>	Pied Honeyeater				+	+	+	+		
<i>Lichmera indistincta</i>	Brown Honeyeater				+	+	+	+		
<i>Melithreptus gularis</i>	Black-chinned Honeyeater				+	+	+	+		
<i>Epthianura tricolor</i>	Crimson Chat			+	+	+	+	+		
<i>Lacustroica whitei</i>	Grey Honeyeater				+	+	+	+		
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater			+	+	+	+	+		
<i>Manorina flavigula</i>	Yellow-throated Miner			+	+	+	+	+		
<i>Purnella albifrons</i>	White-fronted Honeyeater				+	+	+	+		
<i>Gavicalis virescens</i>	Singing Honeyeater			+	+	+	+	+		
<i>Ptilotula keartlandi</i>	Grey-headed Honeyeater			+	+	+	+	+		
<i>Ptilotula penicillata</i>	White-plumed Honeyeater			+	+	+	+	+		
<b>Pardalotidae</b>										
<i>Pardalotus rubricatus</i>	Red-browed Pardalote		+	+	+	+	+			
<i>Pardalotus striatus</i>	Striated Pardalote		+	+	+	+	+			
<b>Acanthizidae</b>										
<i>Pyrholaemus brunneus</i>	Redthroat			+	+	+	+			
<i>Smicrornis brevirostris</i>	Weebill		+	+	+	+	+			
<i>Gerygone fusca</i>	Western Gerygone			+	+	+	+			
<i>Acanthiza apicalis</i>	Inland Thornbill		+	+	+	+	+			
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill			+	+	+	+			
<i>Acanthiza robustirostris</i>	Slaty-backed Thornbill		+	+	+	+	+			
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill		+	+	+	+	+			
<b>Pomatostomidae</b>										
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler		+	+	+	+	+			
<i>Pomatostomus superciliosus</i>	White-browed Babbler			+	+	+	+			
<b>Artamidae</b>										
<i>Artamus personatus</i>	Masked Woodswallow		+	+	+	+	+			
<i>Artamus cinereus</i>	Black-faced Woodswallow		+	+	+	+	+			
<i>Artamus minor</i>	Little Woodswallow			+	+	+	+			
<b>Cracticidae</b>										
<i>Cracticus torquatus</i>	Grey Butcherbird		+	+	+	+	+			
<i>Cracticus nigrogularis</i>	Pied Butcherbird		+	+	+	+	+			
<i>Cracticus tibicen</i>	Australian Magpie		+	+	+	+	+			
<b>Campephagidae</b>										
<i>Coracina maxima</i>	Ground Cuckoo-shrike			+	+	+	+			
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike		+	+	+	+	+			
<i>Lalage tricolor</i>	White-winged Triller		+	+	+	+	+			
<b>Neosittidae</b>										
<i>Daphoenositta chrysoptera</i>	Varied Sittella			+	+	+	+			
<b>Oreoicidae</b>										
<i>Oreoica gutturalis</i>	Crested Bellbird		+	+	+	+	+			

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<b>Pachycephalidae</b>									
<i>Pachycephala rufiventris</i>	Rufous Whistler		+	+	+	+	+		
<i>Colluricincla harmonica</i>	Grey Shrike-thrush		+	+	+	+	+		
<b>Rhipiduridae</b>									
<i>Rhipidura leucophrys</i>	Willie Wagtail		+	+	+	+	+		
<i>Rhipidura albiscapa</i>	Grey Fantail			+	+	+			
<b>Monarchidae</b>									
<i>Grallina cyanoleuca</i>	Magpie-lark		+	+	+	+	+		
<b>Corvidae</b>									
<i>Corvus orru</i>	Torresian Crow		+	+	+	+	+		
<i>Corvus bennetti</i>	Little Crow			+	+	+	+		
<b>Petroicidae</b>									
<i>Microeca fascinans</i>	Jacky Winter			+	+	+			
<i>Melanodryas cucullata</i>	Hooded Robin		+	+	+	+	+		
<i>Petroica goodenovii</i>	Red-capped Robin			+	+	+	+		
<b>Alaudidae</b>									
<i>Mirafra javanica</i>	Horsfield's Bushlark		+	+	+	+	+		
<b>Hirundinidae</b>									
<i>Cheramoeca leucosterna</i>	White-backed Swallow			+	+	+	+		
<i>Hirundo neoxena</i>	Welcome Swallow			+	+	+	+		
<i>Petrochelidon ariel</i>	Fairy Martin			+	+	+	+		
<i>Petrochelidon nigricans</i>	Tree Martin		+	+	+	+	+		
<b>Locustellidae</b>									
<i>Megalurus mathewsi</i>	Rufous Songlark			+	+	+	+		
<i>Megalurus cruralis</i>	Brown Songlark		+	+	+	+	+		
<i>Eremiornis carteri</i>	Spinifexbird		+	+	+	+	+		
<b>Cisticolidae</b>									
<i>Cisticola exilis</i>	Golden-headed Cisticola		+						
<b>Dicaeidae</b>									
<i>Dicaeum hirundinaceum</i>	Mistletoebird		+	+	+	+	+		
<b>Estrildidae</b>									
<i>Emblema pictum</i>	Painted Finch		+	+	+	+	+		
<i>Neochmia ruficauda</i>	Star Finch			+	+	+	+		
<i>Taeniopygia guttata</i>	Zebra Finch			+	+	+	+		
<b>Motacillidae</b>									
<i>Anthus australis</i>	Australian Pipit			+	+	+	+		
<b>MAMMALS</b>									
<b>Tachyglossidae</b>									
<i>Tachyglossus aculeatus</i>	Echidna			+	+	+	+		
<b>Dasyuridae</b>									
<i>Dasyurus hallucatus</i>	Northern Quoll	<b>Vu, S3</b>			+	+	+	+	+
<i>Dasykaluta rosamondae</i>	Kaluta			+	+	+	+		
<i>Ningau timealeyi</i>	Pilbara Ningau			+	+	+	+		

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<i>Planigale ingrami</i>	Long-tailed Planigale			+	+	+	+		
<i>Planigale sp.1 (undescribed)</i>	Pilbara Planigale			+	+	+	+		
<i>Planigale 'mt tom price'</i>	Mt Tom Price Planigale			+	+	+			
<i>Pseudantechinus woolleyae</i>	Woolley's Pseudantechinus			+	+	+	+		
<i>Sminthopsis longicaudata</i>	Long-tailed Dunnart	P4		+	+	+	+	+	
<i>Sminthopsis macroura</i>	Stripe-faced Dunnart			+	+	+	+		
<b>Thylacomyidae</b>									
<i>Macrotis lagotis</i>	Bilby	Vu, S3					+	+	+
<b>Macropodidae</b>									
<i>Osphranter robustus</i>	Euro		+	+	+	+	+		
<i>Osphranter rufus</i>	Red Kangaroo			+	+	+	+		
<i>Lagorchestes conspicillatus</i>	Spectacled Hare-wallaby (mainland)	P4			+	+	+	+	
<i>Petrogale rothschildi</i>	Rothschild's Rock-wallaby				+	+	+		
<b>Muridae</b>									
<i>Leggadina lakedownensis</i>	Northern Short-tailed Mouse	P4		+	+	+	+	+	
<i>Mus musculus</i>	House Mouse	Int.		+	+	+	+		
<i>Notomys alexis</i>	Spinifex Hopping-mouse			+	+	+			
<i>Pseudomys chapmani</i>	Western Pebble-mound Mouse	P4	+	+	+	+	+	+	
<i>Pseudomys delicatulus</i>	Delicate Mouse						+		
<i>Pseudomys desertor</i>	Desert Mouse			+	+	+	+		
<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse			+	+	+	+		
<i>Zyomys argurus</i>	Common Rock-rat			+	+	+	+		
<b>Rhinonycteridae</b>									
<i>Rhinonycteris aurantia</i>	Pilbara Leaf-nosed bat	Vu, S3		+	+	+	+	+	+
<b>Megadermatidae</b>									
<i>Macroderma gigas</i>	Ghost Bat	Vu, S3		+	+	+	+	+	+
<b>Emballonuridae</b>									
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tailed Bat			+	+	+	+		
<i>Taphozous georgianus</i>	Common Sheath-tailed Bat			+	+	+	+		
<i>Taphozous hilli</i>	Hill's Sheath-tail-bat			+	+	+	+		
<b>Molossidae</b>									
<i>Austronomus australis</i>	White-striped Mastiff Bat			+	+	+	+		
<i>Chaerephon jobensis</i>	Greater Northern Freetail Bat			+	+	+	+		
<i>Ozimops lumsdenae</i>	Northern Freetail Bat			+	+				
<b>Vespertilionidae</b>									
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat			+	+	+	+		
<i>Nyctophilus daedalus</i>	Northwestern Long-eared Bat								
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat				+	+	+		
<i>Vespadelus finlaysoni</i>	Finlayson's Cave Bat			+	+	+	+		
<i>Scotorepens balstoni</i>	Inland Broad-nosed Bat			+	+				
<i>Scotorepens greyii</i>	Little Broad-nosed Bat			+	+	+	+		
<b>Canidae</b>									
<i>Canis familiaris</i>	Dog/Dingo	Int.	+	+	+	+	+		

SPECIES GROUP, Family and <i>Species</i>	Common Name	Status	Recorded May 2018	NatureMap (A, B & C)	NatureMap (D & E)	NatureMap (F & G)	NatureMap (H)	DBCA Threat. & Priority DB	EPBC Act PMIST
<b>Felidae</b> <i>Felis catus</i>	Cat	Int.	+	+	+	+	+		
<b>Equidae</b> <i>Equus asinus</i> <i>Equus caballus</i>	Donkey Horse	Int. Int.		+	+	+	+		
<b>Camelidae</b> <i>Camelus dromedarius</i>	Dromedary, Camel	Int.				+	+		
<b>Bovidae</b> <i>Bos taurus</i>	European Cattle	Int.	+	+	+	+	+		



**Legend**

- Survey Areas (Study Area)
- Potential Night Parrot Habitat

WOODMAN  
ENVIRONMENTAL

This map should only be used in conjunction with WEC report MR18-34-01.

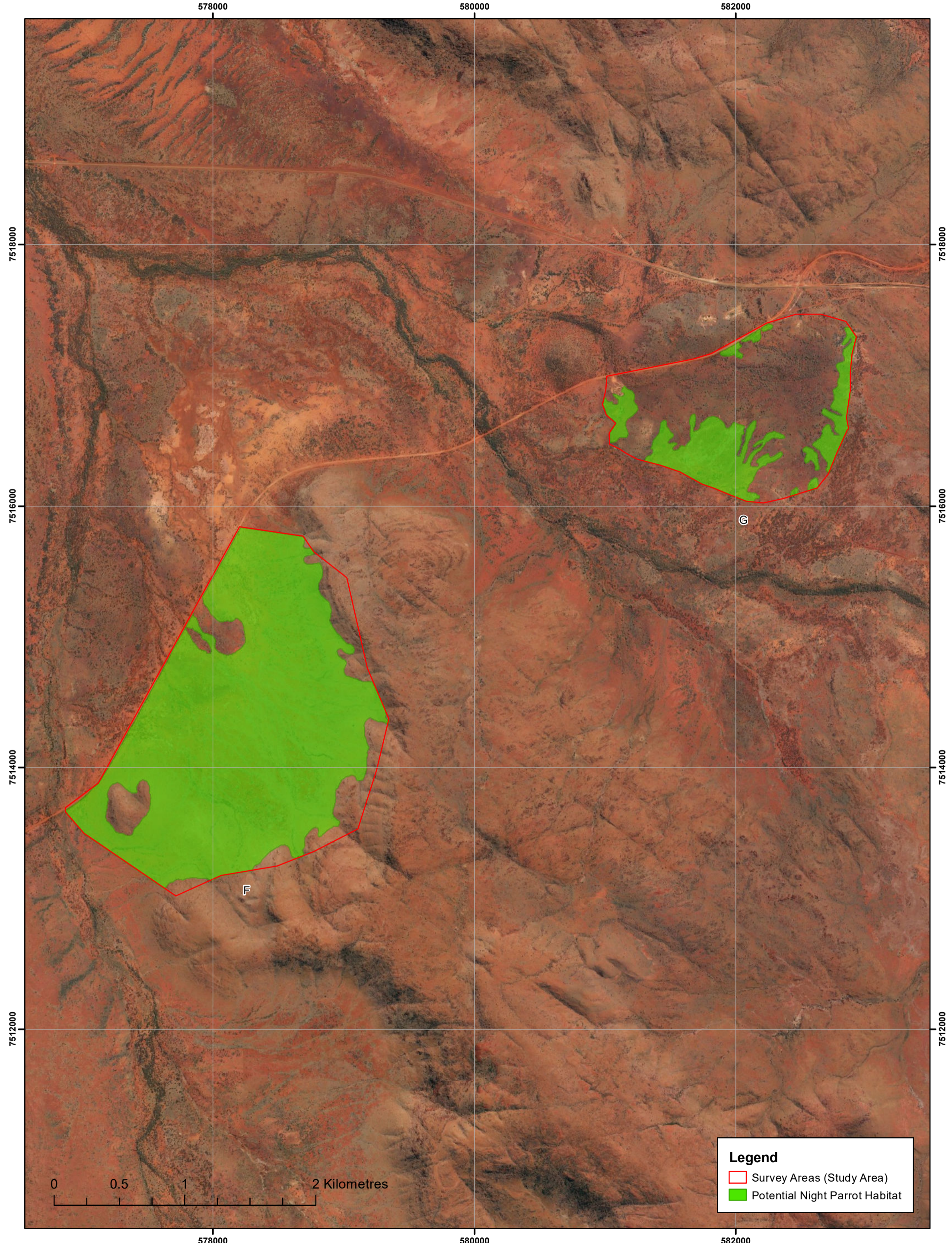
**Potential Night Parrot Habitat**

Revision: 0 - 21 Nov 2018      Scale: 1:25,000 (A3)

Author: David Coultas  
 WEC Ref: MR18-34-01  
 Filename: MR18-34-01-App-O.mxd  
 Projection: GDA 1994 MGA Zone 50

**Appendix**

**01**



0 0.5 1 2 Kilometres

**Legend**

- Survey Areas (Study Area)
- Potential Night Parrot Habitat



**Potential Night Parrot Habitat**

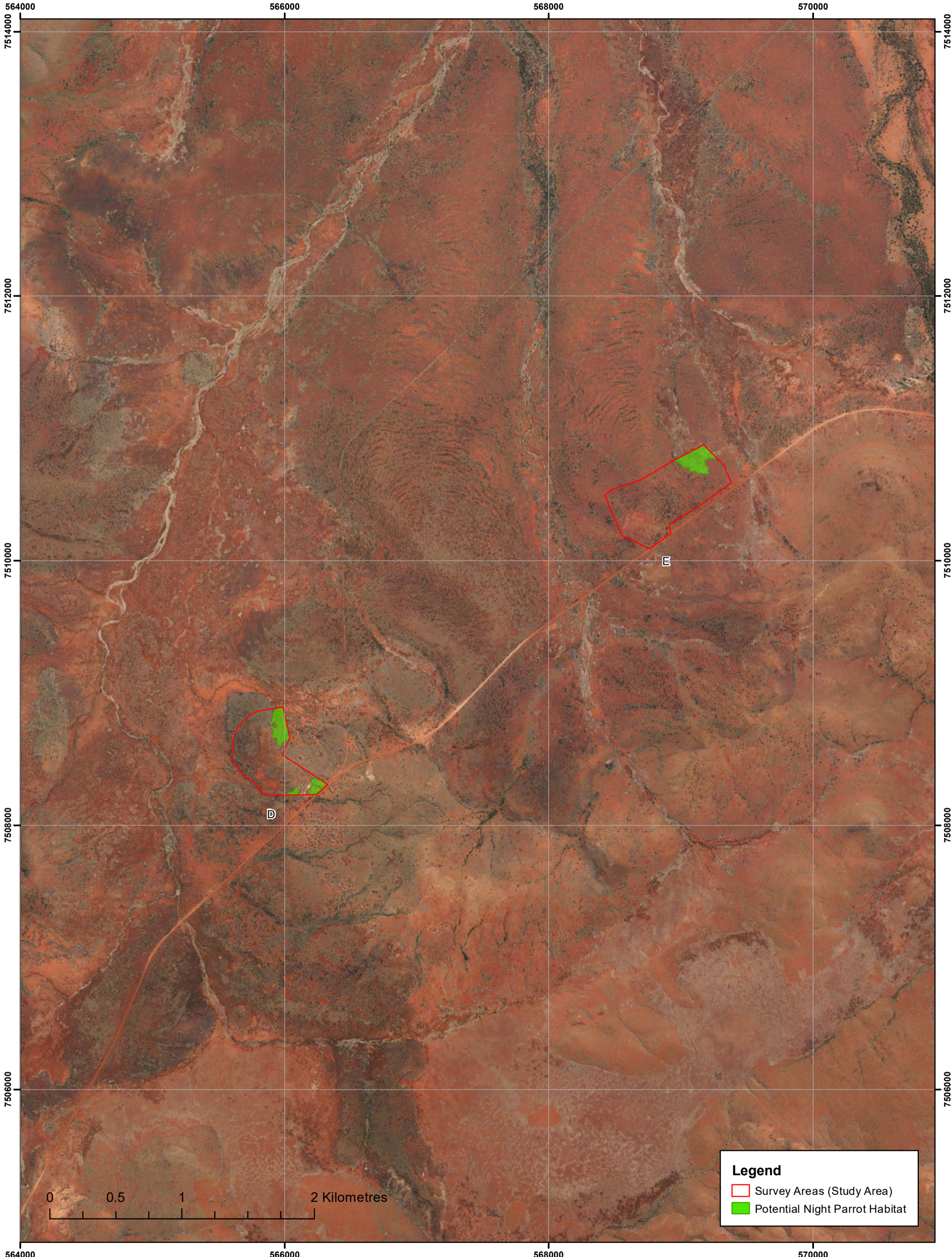
Author: David Coultas  
 WEC Ref: MR18-34-01  
 Filename: MR18-34-01-App-O.mxd  
 Projection: GDA 1994 MGA Zone 50

**Appendix**  
  
**02**

This map should only be used in conjunction with WEC report MR18-34-01.

Revision: 0 - 21 Nov 2018

Scale: 1:25,000 (A3)



This map should only be used in conjunction with WEC report MR18-34-01.



**Potential Night Parrot Habitat**

Revision: 0 - 21 Nov 2018

Scale: 1:25,000 (A3)

Author: David Coultas

WEC Ref: MR18-34-01

Filename: MR18-34-01-App-O.mxd

Projection: GDA 1994 MGA Zone 50

**Appendix**

**O3**

552000

554000

556000

7492000

7492000

7490000

7490000

7488000

7488000

7486000

7486000

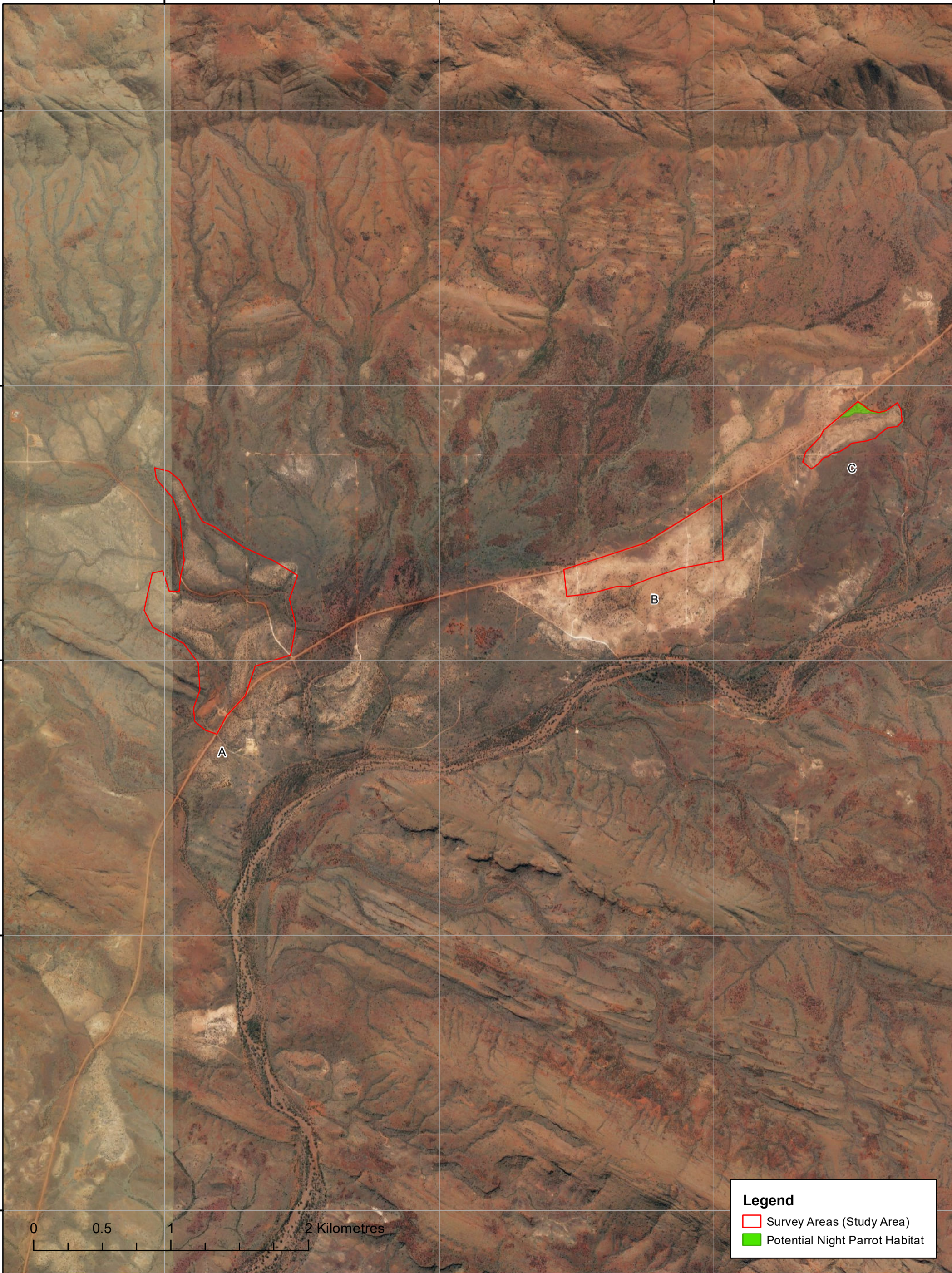
7484000

7484000

552000

554000

556000



**Legend**

- Survey Areas (Study Area)
- Potential Night Parrot Habitat



This map should only be used in conjunction with WEC report MR18-34-01.



**Potential Night Parrot Habitat**

Revision: 0 - 21 Nov 2018

Scale: 1:25,000 (A3)

Author: David Coultas

WEC Ref: MR18-34-01

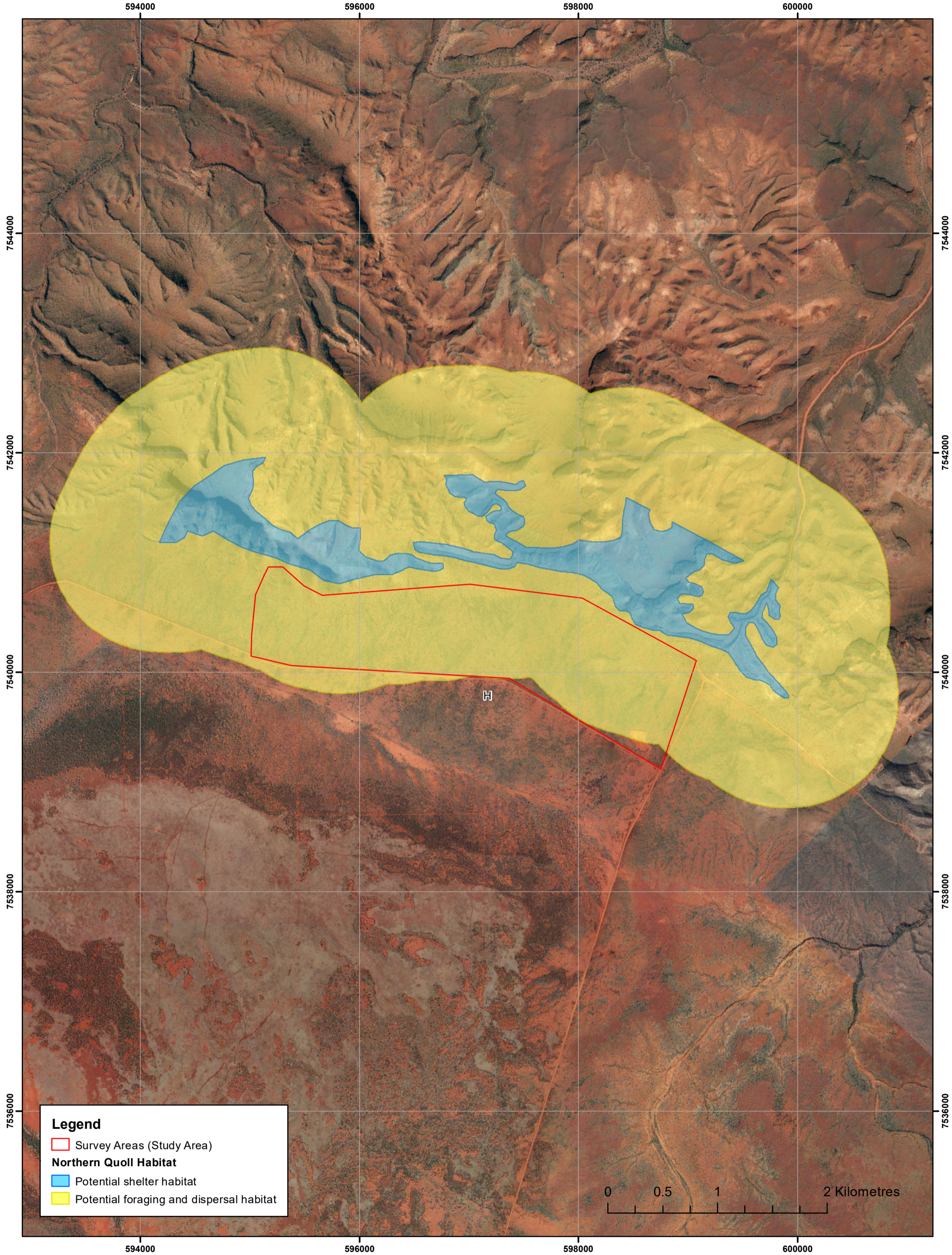
Filename: MR18-34-01-App-O.mxd

Projection: GDA 1994 MGA Zone 50

**Appendix**

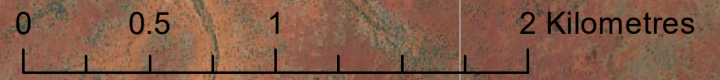
**O4**





**Legend**

- Survey Areas (Study Area)
- Northern Quoll Habitat**
- Potential shelter habitat
- Potential foraging and dispersal habitat



This map should only be used in conjunction with WEC report MR18-34-01.

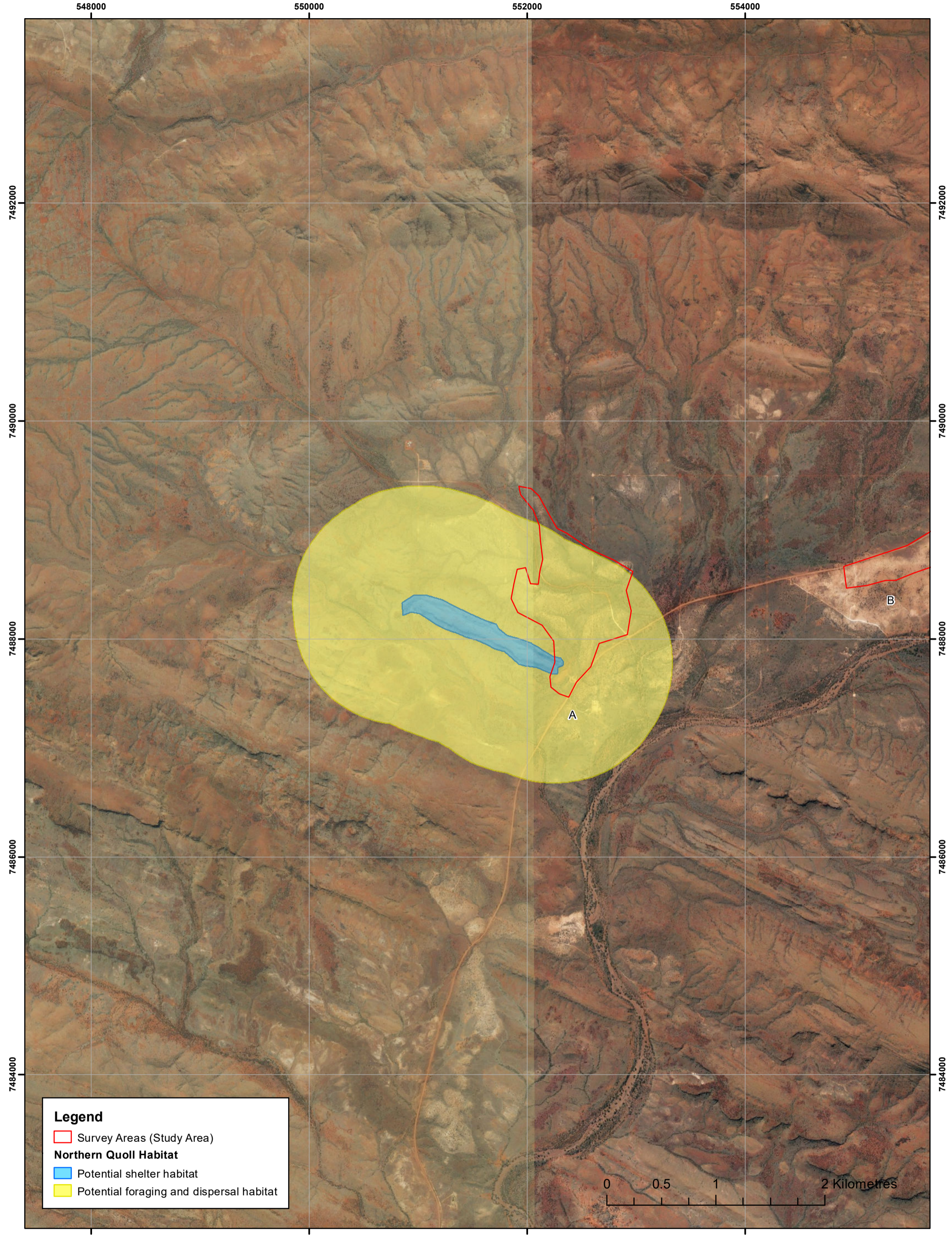
**Northern Quoll Shelter and Dispersal Habitat within 1 km of the Study Area**

Revision: 0 - 21 Nov 2018      Scale: 1:30,000 (A3)

Author: David Coultas  
 WEC Ref: MR18-34-01  
 Filename: MR18-34-01-App-P.mxd  
 Projection: GDA 1994 MGA Zone 50

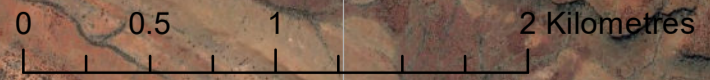
**Appendix**

**P1**



**Legend**

- Survey Areas (Study Area)
- Northern Quoll Habitat**
- Potential shelter habitat
- Potential foraging and dispersal habitat



## Appendix Q: Western Pebble-mound Mouse Mound Locations

Date	Location	Latitude	Longitude	Habitat	Certainty of ID	Description of Animal	Observation Method	Secondary Signs
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.710	117.509	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.710	117.511	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.712	117.513	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.714	117.514	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.713	117.508	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.712	117.507	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.711	117.505	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.711	117.506	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.714	117.510	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.711	117.507	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.712	117.510	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
22/05/18	Nanutarra-Munjina Rd, 26 km W of Tom Price.	-22.709	117.539	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
22/05/18	Nanutarra-Munjina Rd, 26 km W of Tom Price.	-22.707	117.545	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
22/05/18	Nanutarra-Munjina Rd, 26 km W of Tom Price.	-22.706	117.544	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
22/05/18	Nanutarra-Munjina Rd, 25 km W of Tom Price.	-22.699	117.554	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
24/05/18	Nanutarra-Munjina Rd, 25 km N of Tom Price.	-22.481	117.760	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.709	117.515	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.708	117.508	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound

Date	Location	Latitude	Longitude	Habitat	Certainty of ID	Description of Animal	Observation Method	Secondary Signs
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.710	117.511	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.717	117.512	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.714	117.509	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.712	117.506	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.712	117.505	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.711	117.505	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.713	117.514	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 26 km W of Tom Price.	-22.709	117.539	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
22/05/18	Nanutarra-Munjina Rd, 26 km W of Tom Price.	-22.708	117.541	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
22/05/18	Nanutarra-Munjina Rd, 26 km W of Tom Price.	-22.705	117.545	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
22/05/18	Nanutarra-Munjina Rd, 26 km W of Tom Price.	-22.705	117.545	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
22/05/18	Nanutarra-Munjina Rd, 24 km NW of Tom Price.	-22.530	117.643	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
25/05/18	Nanutarra-Munjina Rd, 27 km N of Tom Price.	-22.450	117.799	Spinifex on stony slope	Certain	Active pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.712	117.507	Spinifex on stony slope	Certain	Historic pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.710	117.507	Spinifex on stony slope	Certain	Historic pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.712	117.508	Spinifex on stony slope	Certain	Historic pebble-mound observed	Day sighting	Nest/Mound
22/05/18	Nanutarra-Munjina Rd, 26 km W of Tom Price.	-22.706	117.545	Spinifex on stony slope	Certain	Historic pebble-mound observed	Day sighting	Nest/Mound
24/05/18	Nanutarra-Munjina Rd, 25 km W of Tom Price.	-22.477	117.764	Spinifex on stony slope	Certain	Historic pebble-mound observed	Day sighting	Nest/Mound

Date	Location	Latitude	Longitude	Habitat	Certainty of ID	Description of Animal	Observation Method	Secondary Signs
24/05/18	Nanutarra-Munjina Rd, 25 km N of Tom Price.	-22.482	117.760	Spinifex on stony slope	Certain	Historic pebble-mound observed	Day sighting	Nest/Mound
24/05/18	Nanutarra-Munjina Rd, 25 km N of Tom Price.	-22.479	117.750	Spinifex on stony slope	Certain	Historic pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.710	117.510	Spinifex on stony slope	Certain	Historic pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.713	117.508	Spinifex on stony slope	Certain	Historic pebble-mound observed	Day sighting	Nest/Mound
22/05/18	Nanutarra-Munjina Rd, 26 km W of Tom Price.	-22.709	117.540	Spinifex on stony slope	Certain	Historic pebble-mound observed	Day sighting	Nest/Mound
22/05/18	Nanutarra-Munjina Rd, 25 km N of Tom Price.	-22.486	117.753	Spinifex on stony slope	Certain	Historic pebble-mound observed	Day sighting	Nest/Mound
24/05/18	Nanutarra-Munjina Rd, 25 km N of Tom Price.	-22.473	117.764	Spinifex on stony slope	Certain	Historic pebble-mound observed	Day sighting	Nest/Mound
24/05/18	Nanutarra-Munjina Rd, 25 km N of Tom Price.	-22.477	117.768	Spinifex on stony slope	Certain	Historic pebble-mound observed	Day sighting	Nest/Mound
24/05/18	Nanutarra-Munjina Rd, 25 km N of Tom Price.	-22.477	117.769	Spinifex on stony slope	Certain	Historic pebble-mound observed	Day sighting	Nest/Mound
24/05/18	Nanutarra-Munjina Rd, 25 km N of Tom Price.	-22.478	117.769	Spinifex on stony slope	Certain	Historic pebble-mound observed	Day sighting	Nest/Mound
24/05/18	Nanutarra-Munjina Rd, 25 km N of Tom Price.	-22.479	117.765	Spinifex on stony slope	Certain	Historic pebble-mound observed	Day sighting	Nest/Mound
24/05/18	Nanutarra-Munjina Rd, 25 km N of Tom Price.	-22.476	117.762	Spinifex on stony slope	Certain	Historic pebble-mound observed	Day sighting	Nest/Mound
24/05/18	Nanutarra-Munjina Rd, 25 km N of Tom Price.	-22.476	117.761	Spinifex on stony slope	Certain	Historic pebble-mound observed	Day sighting	Nest/Mound
24/05/18	Nanutarra-Munjina Rd, 25 km N of Tom Price.	-22.484	117.761	Spinifex on stony slope	Certain	Historic pebble-mound observed	Day sighting	Nest/Mound
24/05/18	Nanutarra-Munjina Rd, 25 km N of Tom Price.	-22.480	117.754	Spinifex on stony slope	Certain	Historic pebble-mound observed	Day sighting	Nest/Mound
24/05/18	Nanutarra-Munjina Rd, 25 km N of Tom Price.	-22.482	117.757	Spinifex on stony slope	Certain	Historic pebble-mound observed	Day sighting	Nest/Mound
24/05/18	Nanutarra-Munjina Rd, 25 km N of Tom Price.	-22.484	117.755	Spinifex on stony slope	Certain	Historic pebble-mound observed	Day sighting	Nest/Mound
24/05/18	Nanutarra-Munjina Rd, 25 km N of Tom Price.	-22.480	117.750	Spinifex on stony slope	Certain	Historic pebble-mound observed	Day sighting	Nest/Mound

Date	Location	Latitude	Longitude	Habitat	Certainty of ID	Description of Animal	Observation Method	Secondary Signs
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.711	117.512	Spinifex on stony slope	Certain	Inactive pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.714	117.514	Spinifex on stony slope	Certain	Inactive pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.714	117.509	Spinifex on stony slope	Certain	Inactive pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.713	117.509	Spinifex on stony slope	Certain	Inactive pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.712	117.507	Spinifex on stony slope	Certain	Inactive pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.712	117.508	Spinifex on stony slope	Certain	Inactive pebble-mound observed	Day sighting	Nest/Mound
22/05/18	Nanutarra-Munjina Rd, 26 km W of Tom Price.	-22.709	117.539	Spinifex on stony slope	Certain	Inactive pebble-mound observed	Day sighting	Nest/Mound
24/05/18	Nanutarra-Munjina Rd, 25 km N of Tom Price.	-22.485	117.759	Spinifex on stony slope	Certain	Inactive pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.703	117.507	Spinifex on stony slope	Certain	Inactive pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.710	117.509	Spinifex on stony slope	Certain	Inactive pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.713	117.508	Spinifex on stony slope	Certain	Inactive pebble-mound observed	Day sighting	Nest/Mound
21/05/18	Nanutarra-Munjina Rd, 29 km W of Tom Price.	-22.712	117.506	Spinifex on stony slope	Certain	Inactive pebble-mound observed	Day sighting	Nest/Mound
22/05/18	Nanutarra-Munjina Rd, 25 km W of Tom Price.	-22.699	117.558	Spinifex on stony slope	Certain	Inactive pebble-mound observed	Day sighting	Nest/Mound
22/05/18	Nanutarra-Munjina Rd, 24 km NW of Tom Price.	-22.531	117.642	Spinifex on stony slope	Certain	Inactive pebble-mound observed	Day sighting	Nest/Mound
22/05/18	Nanutarra-Munjina Rd, 24 km NW of Tom Price.	-22.529	117.643	Spinifex on stony slope	Certain	Inactive pebble-mound observed	Day sighting	Nest/Mound
22/05/18	Nanutarra-Munjina Rd, 25 km N of Tom Price.	-22.484	117.753	Spinifex on stony slope	Certain	Inactive pebble-mound observed	Day sighting	Nest/Mound
24/05/18	Nanutarra-Munjina Rd, 25 km N of Tom Price.	-22.477	117.763	Spinifex on stony slope	Certain	Inactive pebble-mound observed	Day sighting	Nest/Mound
24/05/18	Nanutarra-Munjina Rd, 25 km N of Tom Price.	-22.484	117.761	Spinifex on stony slope	Certain	Inactive pebble-mound observed	Day sighting	Nest/Mound

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Date	Location	Latitude	Longitude	Habitat	Certainty of ID	Description of Animal	Observation Method	Secondary Signs
25/05/18	Nanutarra-Munjina Rd, 27 km N of Tom Price.	-22.449	117.801	Spinifex on stony slope	Certain	Inactive pebble-mound observed	Day sighting	Nest/Mound